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Message from the Chief Editor

India is still fighting the COVID- 19 pandemic and let me at the outset place on record our rich appreciation and acknowledgment to the efforts put in by our Government at the Centre as well as the States in dealing with the pandemic, we do salute all our health workers, researchers and the dedicated medical team for their relentless support in fighting the virus and supporting human life. Our education institutions and teachers too have played their role in keeping education rights intact and doing everything possible to meet the aspirations of our learners.

The COVID 19 Pandemic has made us think deep on how a virus can restrict mobility and disrupt industry, but the challenges put forward would make us ponder over opportunities as is being done in terms of e -learning and online transactions. We are now compelled to think beyond the limitations of time and space, caring for all our resources and making careful use of the same. Responsibility Accounting and Environment Accounting, among other themes, would turn out to be relevant.

In the year 2020, IAA could not have its Annual Accounting Conference and International seminar, however, our branches were active all throughout with several workshops, seminars and academic activities all of which attracted huge participation and wide interest, I congratulate all our branch secretaries, members and Office Bearers for their initiative and support.

Transforming challenges in to opportunities and working under the emerging New Normal is what we need to learn and adopt. Moving in to the virtual space with E learning, MOOCs and advanced ICT tools like Artificial intelligence and Machine Leering systems is what will empower us. We need to Transform and re-engineer ourselves in to this demanding environment and this is what all of us are now attempting to do. The Accounting and finance disciplines are also demanding re- adjustment and re- focus on this line.

Much is emerging in terms of Environment Accounting, Environment Audit, Climate Change financing and so on. Gone are the days when we could just look at finance as raising funds and using them and Accounting as just preparing the statements on annual results. Wise and judicious use of scare resources and tracking fund usage in terms of impact on human life is turning to be important.

Indian Journal of Accounting would like to show- case pertinent research outcomes in the domain of Accounting and Finance as well as trans-disciplinary research which would be an eye opener for the industry, professional bodies as well as policy makers. Such research is a movement from data to information and from information to Knowledge and again from Knowledge to wisdom. For Academicians in Finance and Accounting this would be financial wisdom and Accounting Wisdom

I take this opportunity to thank all the contributors of research Papers to this issue and sincerely request all my friends to come up with more research work and research publications which we would welcome. I also thank all our Subscribers and the Office bearers of IAA, especially the President and General Secretary and all in my editorial team. I acknowledge with sincere gratitude the timely intellectual support from our reviewers. As we were caught up in the COVID lock down for over four months, this issue of IJA is coming out a little late. I request all our readers and well wishers to kindly give us suggestions and valuable inputs on improving the journal further.

Wishing you all the very best and hoping to see quality research Papers in future, let me conclude hoping and praying to see our economy and academics back in tis normal mode soon. Thank you.

Prof (Dr.) Gabriel Simon Thattil
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Message from the President

This is a matter of great satisfaction that despite difficulties posed by the pendamic, IAA has been successful in maintaining pace of its activities in recent past.

Marathon task of development of Model Curriculum went on with great consistence and sincereity under chairmanship of Prof K R Sharma. Much headway has been made by the Professional Bodies Liaison Committee under chairmanship of Prof K Eresi. Likewise, under chairmanship of Prof Ranjan K Bal, efforts continued to establish IAA eContent Bank and seek cooperation from the academic and professional community in this regard.

The flagship activity of the association namely National Accounting Talent Search was held well on the scheduled date (Feb 7, 2021) despite all difficulties and challenges in the present situation. This was the first time that the nation-wide competition was organised online. Participation from different parts of the country could be ensured despite pendamic situation. Results of the competition were also declared in time and certificates distributed online ahead of the schedule. My accolades to Prof Shurveer S Bhanawat, Coordinator, members of the organising committee, IAA Observers, and faculty members from all over the country who selflessly contributed as ever to ensure this great achievement.

Besides regular activities of the branches, the foundation day of the association (March 15) was celebrated by many branches of IAA and quality events were organised to mark the occasion.

Preparations for organising 43rd All India Accounting Conference and International Seminar (Dec 18-19, 2021) are going on with the efforts of the team led by Prof V Appa Rao, Conference Secretary. Website for the event has already been launched. Let us all join hands to motivate quality participation in this coveted event of the association.

The Institute of Chartered Accountants of India took a welcoming initiative to launch International Research Awards in accounting and related areas. This is a matter of pleasure that out of fifteen awards declared, as many as three were bagged by members of IAA. Further, two of these were published in our prestigious official journal, the Indian Journal of Accounting.

Due to the pendamic, academic activities have shifted to online platforms in a big way. Academic interaction at national and international levels have significantly increased. This phenomenon appears to have come to stay. This has important implications, inter alia, of the knowledge being viewed at global level. In this upcoming scenario, we as a nation are required, more than before, to be among fore-runners in the world in development of accounting knowledge by extensive research. This being an applied subject, good quality research in accounting ought to have combined efforts from academic as well as professional fraternity. If world class research in accounting is our cherished goal, then joint research projects are required to be undertaken by teams of accounting teachers and professionals such as CAs, CMAs, CSs, CFAs etc. A welcoming sign in this regard is indications of rising inclination towards research in accounting among professionals. However, more concerted efforts in this direction are required.

My hearty wishes for good health and happiness of you along with your family and friends.

Best regards.

G Soral
President, IAA
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CONTENTS

ANALYTICAL STUDY OF ENVIRONMENTAL AUDIT PRACTICES IN JK LAKSHMI CEMENT LTD.

Dr. Davendra Kumar Sharma *
Dr. Ravi Sharma **

ABSTRACT

The study has been done with the rationale to know the effectiveness of environmental audit practices. The present study is based on primary as well as secondary data on environmental audit of JK Lakshmi Cement Limited. Due to the exploratory nature of this research, the primary methods have been descriptive techniques. Hypotheses have been tested by applying appropriate test of significance.

The objective of this study is to define the environment audit in general term, offer explanation and point of discussion on the subject, and the present position under the Indian context. To reduce fuel and power consumption, the Company adopted the latest dry process, four stage preheater precalcination technology of clinkerisation and air swept roller mill grinding system for raw material and coal grinding. The study has been done by the parameters of environmental pollution and practices applied by the company. Further the conclusions were drawn from the results and suggestions are given.

Keywords: Environmental audit, Polluters, Eco-friendly, Eco-efficient.

Introduction

It is the common understanding of natural environment that underlies environmentalism— a broad political, social, and philosophical movement that advocates various actions and policies in the interest of protecting what nature remains in the natural environment, or restoring or expanding the role of nature in this environment. Complete ecological units that function as natural systems without massive civilized human intervention, including all vegetation, microorganisms, soil, rocks, atmosphere, and natural phenomena that occur within their boundaries and their nature.

Environmental Accounting

Accounting profession in its efforts for the protection of natural and environmental resources is working on the development of new topic called `environmental accounting'. From an environment accounting context, accountability —requires an account of the extent to which the objectives for which the resources were entrusted have been achieved.

Meaning of Environmental Audit

Organizations have responded in a proactive manner to environmental issues in western countries.

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With the awareness among its stakeholders like shareholder, government, lender, general public compelled organizations to respond to environmental issues and it's reporting in financial and non-financial terms. While stakeholders needed an attestation about the quality of the reporting and organizations also required expert professional guidance which will help them in setting systematizing them, environmental goals, periodical analysis against the benchmarked levels, to check the compliance by regulatory framework etc, has resulted in the birth of environment audit as a distinct professional function.

Environmental audit is at a relatively formative stage even in western countries in the recent past with internal audit departments checking them as part of their legal compliance program. Increasing public concern about the environmental translated into legislative activism in this field. Proactive companies started demonstrating their environmental concern and the steps initiated by them in terms of sustainable development in their accountability report.

Role of Environmental Audit

Following are some of the roles of Environmental Audit:

1. The main objective of environmental audit is to see that the natural resources are properly utilized.

2. To control the costs incurred on procuring the natural resources and to ensure that they have been properly classified.

3. To see that natural resources have been properly shown in balance sheet as they are the nation's valuable assets.

4. To ensure that the natural resources are utilized for industrial development and for national progress.

5. During production processes when natural resources are utilized, some adverse environmental effects are produced and pollution is created. So the objective of such type

of audit is to see that proper steps have been taken to prevent or to control such adverse effects like pollution.

6. To see that proper steps have been taken for maintaining health and welfare of the community and also for disposal of harmful wastes and social risk.

Objectives of the Study

The study object to review the initial attempts being made in India to establish the practice of environmental auditing, which is a fast-emerging new concept, especially in industries that cause pollution. The concept of the environmental audit is to highlight the notifications issued by the Government of India. A case history is included to demonstrate how the status of environmental management systems and equipment are investigated vis-à-vis the Indian regulatory requirements, and how material, energy, health, and safety audits have been conducted to identify avenues for savings in the cost of production.

Review of Literature

Sharma (2020) in their research —An Effective Implementation of Environmental Audit stated that

the effectiveness of environmental audit practices. Environmental audit assists in gaining a competitive advantage over competitors by better decision making and reducing the adverse environmental effects through enhanced designs, products and processes. But, contradictory to it, companies don't implement it, as they are comprehended of losing their secrecy and confidentiality. Therefore, environmental audits should be made more absolute, objective, credible and transparent in order to be successful.

The study by Carla Edgley, Michael J. Jones and Jill Atkins (2015) shows in their article the logics or values that shape the social and environmental reporting (SER) and SER assurance (SERA) process. The authors gathered qualitative data from interviews with both accounting and non-accounting assures. They analyzed the interplay between old and new logics that are shaping materiality as a reporting concept in SER. SER is a rich field in which to study the dynamics of change because it is a voluntary, unregulated, qualitative reporting arena. It has a broad, stakeholder audience, where accounting and non-accounting organizations are in competition. There are three key findings. First, the introduction of new arrivals, stakeholder logic has significantly changed the meaning and role of materiality. Second, a more versatile, performative, social understanding of materiality was portrayed by assurors, with a forward-looking rather than a historic focus. Third, competing logics have encouraged different beliefs about materiality, and practices, to develop. This influenced the way assurors theorized the concept and interpreted outcomes. A patchwork of localized understandings of materiality is developing. Policy implications both in SERA and also in the financial audit are explored.

Sharma DK (2014), in their research —Social Audit on Kapurdi and Jalipa Lignite Mines, Barmer, explains that Social audit is an independent evaluation of the performance of an organization as it relates to the attainment of its social goals. In this Project, all possible efforts were taken to identify the number and type of tree by stratified sampling, information from the affected households, forest department and the vegetation pattern of the affected village and on-site random sampling of affected khasras. This process of Social Audit is one step ahead of an accounting audit as it covers financial and nonfinancial details.

According to Linda S. Spedding (2009), both legislative and economic incentives have placed the environmental height on the agenda for businesses and government bodies. Some organizations have been aware of this trend and have reflected it in their growth from the starting; others have taken it at a later stage on board. There have been some that have taken their environmental responsibilities very seriously throughout the years, aware of the fact that the combination of green concerns and business objectives is a must for business. This has been demonstrated in the ways that they do business as well as their approach to transactions. The environment is a trans boundary global concern as has been vividly demonstrated in the debate over climate change. Yet much of the push towards the greening of business has also come about through national initiatives of different jurisdictions, where the competitive edge has been noted as well as through regional initiatives of the EU's environmental action programs, both as regards legislative and market-based tools. Environmental audits are the best tool for bringing about environmental reform of industrial practices.

According to Jutta Geldermannetal (2009), in this study environmental emergency situations can differ in many types, for instance, according to their causes and the dimension of their impacts. Yet, they show the characteristics of sudden onset and the necessity for coherent and effective disaster management. In this paper, they consider decision support in the event of a nuclear or radiological accident in Europe. Decision support is enhanced by a module that generates general language explanations to facilitate the understanding the evaluation process, therefore contributing to the direct involvement

of the managers, with the aim of increasing their confidence in the results of the analyses carried out, forming an audit trail for the managing process and improving the acceptability of the system as a whole system.

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The study by Carla Edgley, Michael J. Jones and Jill Atkins (2015) investigates the logics or values that shape the social and environmental reporting (SER) and SER assurance (SERA) process. Authors gathered qualitative data from interviews with both accounting and non-accounting assurors. They analyzed the interplay between old and new views that are shaping materiality as a reporting concept in SER. SER is a rich field in which to study the dynamics of change because it is a voluntary, unregulated, qualitative reporting arena. It has a broad, stakeholder audience, where accounting and non-accounting organisations are in competition. There are three key findings. First, the introduction of a new, stakeholder logic has significantly changed the meaning and role of materiality. Second, a more versatile, social understanding of materiality was portrayed by assurors, with a forward-looking rather than a historic focus. Third, competing logics have encouraged different beliefs about materiality, and practices, to develop. This influenced the way assurors theorized the concept and interpreted outcomes. A patchwork of localized understandings of materiality is developing. Policy implications both in SERA and also in financial audit are explored.

Research Methodology

The present study is based on primary as well as secondary data on environmental audit of JK Lakshmi Cement Limited.

Primary data is collected through head offices or interviewing of executive officers of JK Lakshmi Cement Limited concern departments. Data relating to environmental audits have been collected from journals, books, documents in the libraries and secondary information from books, journals and previous research reports. Sources of data have been indicated in the text and the tables. A detailed bibliography is also given at the end of this research paper.

Study Design: After the collection of data, they have been redrafted in proper formats and analysis has been made accordingly. Due to the exploratory nature of this research, the primary methods have been descriptive techniques. Hypotheses have been tested by applying appropriate test of significance.

Period of Study: The study mainly covers the current and relevant period i.e., from 2013-14 to 2017-18 for which the data became available from different sources within reach.

Building of Hypothesis

The present study is based on the following hypotheses:

1. The Company not followed the environmental audit practices properly.

2. There is no sufficient scope of applying environmental audit practices in the company under study.

3. The company under study are not showing the results of environmental audit with their financial situation.

Limitation of the Study

The research has been mainly limited to publicly-held company operating in manufacturing categories, which reported their environmental attributes. All other entities and company has been excluded from the research. Another limitation to be faced is the non-availability of desired information regarding the working style of key persons and their efficiency. They posed to be extremely busy. They preferred to brush the interviewer aside. They were miser and niggardly in discussing relevant matters. Lastly, the study is a subject to general human limitations.

An external analyst has to function under various constraints and limitations. Since the researcher has to depend heavily upon published reports and secondary data, one of the limitations lies in the quality of the accounting data. Further, the techniques and tools of investigations have also inherent limitations, e.g. official data are the mixture of convenience and convention.

Further Scope of the Study

The companies would be expected to have an environmental management system which, at a minimum, addressed regulatory compliance. Private companies shall be excluded from this research because of the lack of availability of information. The big polluters shall be chosen. It would be also expected that companies reporting the large quantities of releases and transfers of toxics were more likely to have implemented some form of environmental management to address environmental issues than were companies reporting low releases and transfers. One reason for this theory would be the belief that the big polluters would be more concerned with assuaging the environmental concerns of their stakeholder groups.

The Company

The study based on JK Lakshmi Cement Limited. JK Organisation is a prestigious organisation in India. The group known worldwide for its business legacy of more than a century, JK Lakshmi Cement has set new benchmarks in the cement industry in India. In the journey towards excellence, the company took a decisive action to become a high performance organisation. Company focus on product quality, customer satisfaction and innovation has helped us push our boundaries and tap the immense potential for development in the infrastructure and construction sectors in our country. Right from gaining foothold in the new and emerging markets in the country to investing in the latest research and development, we have continued to be a resilient performer despite the constantly evolving challenges of the cement sector.

A strong network of more than 7000 cement dealers spread in the states of Madhya Pradesh, Chhattisgarh, Punjab, Delhi, Haryana, Jammu & Kashmir, Maharashtra, Odisha, Rajasthan, Gujarat, Uttar Pradesh, Uttarakhand and West Bengal has helped us to serve our customers far and wide, in different regions of India. To continue our growth story, we have established a cement factory in Durg, Chhattisgarh, in accordance with the government‘s `Make in India‘ campaign, which aims to boost the economy and growth of the region. Apart from Durg, we have another cement plant in Sirohi, Rajasthan and four split location grinding units - at Kalol, Gujarat; at Surat, Gujarat; at Cuttack, Odisha and at Jhamri, district Jhajjhar, Haryana. The combined capacity of these units and factories makes us one of the leading

cement producing company in India. From government organisations like Airport Authority of India to infrastructure and real estate giants like Larsen & Toubro, it is our customer's trust in us that makes a preferred premium cement brand in India.

Analyzing of Facts

JK Lakshmi Cement Limited faced with limited access to low-cost energy, Company developed the world's most energy-efficient process for making its products. The company has become the global benchmark: leading cement companies from around the world visit JK to learn from its innovations.

In environmental terms, cement production is a high-impact business, using large amounts of energy and contributing 5% of global carbon dioxide emissions. Pollutants are often discharged in the cooling process and disposed of as run-off water, which affects ecosystems and human health. It will be crucial for Indian cement companies to find ways to improve energy efficiency and reduce water consumption. Only then can they achieve growth and support India's development without harming the community.

Practices

The company has challenged itself to use innovation and efficiency measures to substantially lessen the environmental impact of its cement production at every stage, adhering to clean and green is profitable.

Innovate Proactively

When it comes to energy use, the company has introduced an intelligent system that not only protects its operations against the power interruptions that are common in areas of operation, but also ensures a higher level of energy efficiency. It was the first cement company in the world to be certified EN 16001, which is designed to continuously monitor and document energy use, identify action targets, and provides the necessary resources and employee training. The company uses biomass in captive power plants. It also reuses bed ash waste, which contains unburned particles of carbon, as a fuel in the production of the clinker material for Portland cement.

All cement makers are challenged to lessen the impact of clinker, which must be heated to an extraordinarily high temperature. JK Lakshmi Cement Limited therefore minimizes the use of clinker, having developed processes allowing for an increase of the fly ash content in its cement as an alternative. It became the first company in the cement industry worldwide to register Optimal Utilization of Clinker by the United Nations Framework Convention on Climate Change (UNFCCC), resulting in 0.45 million certified emission reduction units.

Company has developed several innovative processes to use what is normally considered waste. The company was the first to develop in-house processes for converting low-quality limestone into gypsum, which can be used in the production of cement. In addition to this, Company makes use of lead zinc slag waste, and has thus far consumed 0.8 million tons. The company has also been able to fuel its heat power plants with petcock.

Operating in a water-scarce region of India, JK Lakshmi Cement has also made a point of reducing its water consumption. It has constructed a small artificial lake for the harvesting of water to minimize

emissions as well as reduce waste. The company is currently installing a 300 megawatt power plant that will be air-cooled instead of water-cooled, so it will use only one-tenth of the water needed in conventional power plants.

Shape the Environment

JK Lakshmi Cement Limited engages in sustainability reporting, complying with standards such as the Global Reporting Initiative, with the highest rating of A+ for external verification of transparency and disclosure, and for management of corporate social and environmental impact. The company also participates in the World Business Council for Sustainable Development's cement initiative. Top management invites competitors- including the major multinational cement companies- to visit their plant to share and exchange ideas on energy efficiency and environmental processes.

In addition to impressive energy efficiency achievements, the company has introduced the most extensive waste heat recovery efforts outside China. Its largest plants have a 46-megawatt heat-waste recovery system that supplements the main 260-megawatt generator. Altogether, the company's efforts have yielded carbon dioxide savings of 76,000 tons a year.

Beyond the walls of its sites, JK Lakshmi Cement Limited provides free health benefits to people living within a 20 km radius of its factories. Company practices waste-to-wealth conversion. Beyond using biomass and waste heat to supplement conventional electric generation, it has developed ways to make use of bed ash and lead zinc slag in cement production. It was the first company to convert low-quality limestone into gypsum for use in cement production.

Environment Audit in the Company

JK Lakshmi Cement Ltd. having several plants situated in different locations in India. Company conducts environmental audit and presents compliance reports of these in respective authority offices of their locations. For all these sites, environment statement have been provided by the cement company, these are approx. 200 pages and it is worthwhile to consider one unit extensively among these as all having similar pattern of compliance statements although observations are different obviously. Half yearly compliance report is as follows:

• First of all, this report has a covering letter addressed to The Member Secretary, SEIAA Rajasthan for submission of half yearly compliance report of the Environment Clearance granted to Clinker Grinding Unit of JK Lakshmi Cement Ltd from Unit In-charge (Addl. G.M.).

• With this covering letter, copy of which addressed to several Government authorities as mentioned in it, the compliance report has been attached. This report contains point-wise compliance status of 27 set-standards (Report given in Appendix).

• According to specific condition (xxiv), compliance stats of Environmental Clearance and monitoring data have been placed at the company's website and project site.

• This report also includes two annexure out of which one is `ambient air quality monitoring report' of plant location and data of three boundary sides have been given in this report. Another is `stack emission level monitoring report' containing particulate matter emission level from Stack attached with Bag House of cement mill.

Then test reports of sample taken from three boundary sides of cement plant, ambient air quality test

report of a certified company `Eco Pro Engineers Pvt. Ltd.' has been attached. Results of this report shows that quantity of pollutant matter was well below the `limit as per EPA' for all three sides of the plant as shown in following Tables:

(i) Sample results of Plant Boundary towards CCR

Table 1: Results (a)

S. No.	Parameter	Test Method	Results	Units	Limits as per EPA*
1	Particulate matter (PM10)	IS:5182 (P-23)	56.9	µg/m3	100.0
2	Particulate matter (PM2.5)	SOP-AAQ/89/01	30.5	µg/m3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	7.32	µg/m3	80.0
4	Nitrogen dioxide (as NO2)	IS:5182 (P-6)	14.8	µg/m3	80.0
5	Carbon monoxide (as CO)	IS:5182 (P-10) Grab method	<1.15	mg/m3	4.0

**Details as per EPA-1986, National Ambient Air Quality Standards, date 18.11.2017.*

(ii) Sample results of Plant Boundary towards Electrical Switch Yard

Table 2: Results (b)

S.No.	Parameter	Test Method	Results	Units	Limits as per EPA*
1	Particulate matter (PM10)	IS:5182 (P-23)	62.5	µg/m3	100.0
2	Particulate matter (PM2.5)	SOP-AAQ/89/01	33.6	µg/m3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	10.2	µg/m3	80.0
4	Nitrogen dioxide (as NO2)	IS:5182 (P-6)	17.9	µg/m3	80.0
5	Carbon monoxide (as CO)	IS:5182 (P-10) Grab method	<1.15	mg/m3	4.0

**Details as per EPA-1986, National Ambient Air Quality Standards, date 18.11.2017.*

(iii) Sample results of Plant Boundary towards Rain Water Collection Pond

Table 3: Results (c)

S.No.	Parameter	Test Method	Results	Units	Limits as per EPA*
1	Particulate matter (PM10)	IS:5182 (P-23)	60.9	µg/m3	100.0
2	Particulate matter (PM2.5)	SOP-AAQ/89/01	32.5	µg/m3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	7.46	µg/m3	80.0
4	Nitrogen dioxide (as NO2)	IS:5182 (P-6)	16.2	µg/m3	80.0
5	Carbon monoxide (as CO)	IS:5182 (P-10) Grab method	<1.15	mg/m3	4.0

**Details as per EPA-1986, National Ambient Air Quality Standards, date 18.11.2017.*

One more test report of Stack Emission Analysis for stack attached to cement grinding mill has been submitted by the company as follows:

Table 4: Results (d)

S.No.	Parameter	Test Method	Results	Units	Limits as per EPA*
1	Particulate matter (PM)	IS:11255 (P-1)	19.5	µg/m3	30.0

**Details as per EPA-1986, National Quality Standards, date 18.11.2017.*

Conclusion

JK Lakshmi Cement Ltd is a rapidly growing and one of the most efficient and environment friendly company in India. Currently, its manufacturing operations are spread over North and East India across six States. Company's high corporate governance and social performance together with consistent financial performance makes it a truly sustainable company.

Its Cement Production Capacity is 33.6 Million Tons Per Annum in 2017-18. Company is among the top 3 cement groups in India (in terms of production during FY 2017-18) and among the top 100 listed companies in India in terms of market capitalization.

JK Lakshmi Cement Ltd is the market leader in the states of Madhya Pradesh, Chhattisgarh, Rajasthan, Gujarat, Uttar Pradesh, Uttarakhand, Punjab, Delhi, Haryana, Jammu & Kashmir, Maharashtra, Odisha

and West Bengal. The company got highest 5-Star rating - first time to any cement company in the World by Whitehopleman, UK and also 5-Star rating for Chhattisgarh for sustainable development formulated by Indian Bureau of Mines, Ministry of Mines, Govt. of India.

To reduce fuel and power consumption, the Company adopted the latest dry process, four stage preheater precalcination technology of clinkerisation and air swept roller mill grinding system for raw material and coal grinding.

Now environment status of JK Lakshmi Cement Ltd is OHSAS-18001 Occupational health and safety complied with, Use of 100% Petcoke, a waste from Oil Refineries, thereby conserving Fossil Fuels.

Hypotheses Testing

The present study is based on the following null hypotheses:

H01 The Company not followed the environmental audit practices properly.

During this study, environmental audit practices of the company has been analyzed for last five years and it was found that this company is properly conducting the environmental audit at their different plant and working sites on regular basis and reports and statements for same are available on the company's websites or links. Hence, this study rejects the hypothesis.

H02 There is no sufficient scope of applying environmental audit practices in the company under study.

As the company under study having many plants and production units with large workforce, which are directly connected to environment and it is necessary to check pollution level at their plant and nearby locations. For all these, environmental audit practices are necessary to timely know about pollution status of their locations and hence, it can be said that there is sufficient scope of applying environmental audit practices in the company under the study i.e., the hypothesis is rejected.

H03 The Company under study are not showing the results of environmental audit with their financial situation.

During the present study, all the reports and statements related to environmental audit of the company was collected from company websites or links other than that where annual reports and financial statement are uploaded. The company under study is not showing the results of environmental audit with their financial statements so, the study supports this hypothesis.

Suggestions

• From this study, it is concluded that JK Lakshmi Cement Ltd has best results with regular environmental audit practices and innovative technological experiments and improvement towards eco-friendly production process.

• It is suggested that environmental audit results should be used by the company managements for identification of areas for improvement to maintain pollution of each kind within permissible limits.

• It is suggested that company should not only conduct regular environmental audit practices but im-

prove their production technology and other activities to minimise every kind of pollution for a better tomorrow.

• It is suggested that Environmental Audit Report should be published along with annual financial statements or separate environmental statements to reduce the communication gap between the public and the industry.

• It is suggested that regulatory governmental authorities should encourage companies to spend more on environment by giving tax benefits, exemptions and preferential treatment to eco-efficient concerns in relation to matters like registration, listing or clearances.

• Professional bodies like ICWAI, ICSI and ICAI should encourage companies to become environment friendly.

• Companies and professional accountants should be made aware of the benefits of being eco-conscious, e.g., significant social and financial benefits in using eco-efficient processes and technologies.

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RELATIONSHIP BETWEEN CSR INITIATIVES AND FINANCIAL PERFORMANCE OF CEMENT INDUSTRY IN INDIA - AN EMPIRICAL ANALYSIS

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ABSTRACT

The present paper is to find the influence level of Altman Z Score and other financial variables including Internal Growth Rate(IGR) and Sustainable Growth Rate (SGR) on the CSR initiatives (Business Responsibility Report) of the BSE 100 Cement companies in India. The study is based on content analysis, collected from Annual reports.(moneycontrol.com) Edward Altman's —Z score, IGR and SGR be treated as modern financial performance and calculated for the same period from 2009-10 to 2017-18.CSR Cost variance, CSR Budget variance and CSR Volume variance were calculated through standard costing technique. The standard cost process is mostly used to control the operating task. All the parameters have been analyzed with one sample t test, Karl Pearson's correlation analysis for its validity. The coefficient of determination has also been tested through linear regression analysis and the author found that the relationship between actual CSR initiative and the ancient financial variables were NEGATIVELY correlated and author concluded that the Asset Turnover and Quick ratio only influencing CSR Actual expenses of the selected companies for the study period.

Keywords: CSR Initiative, CSR Budget, CSR recovery, Standard Costing Technique, Altman's Z score, IGR and SGR, Cement Industry

Introduction

Corporate Social Responsibility

The essence of Corporate Social Responsibility is not about the talk or the plans, but the continuous improvements generated through corporate actions, where Corporate Social Responsibility is defined as actions and activities that improve and/or protect social welfare on a local or global level; and where Corporate Social Performance is the 'measurement' of the organizations overall performance in improving and protecting social welfare compared to their leading competitors in the industry, measured over a period of time (Luo and Bhattacharya, 2009). There has been intense increase in the stakeholders' awareness due to globalization, privatization and liberalization. Using philanthropy to enhance competitive context aligns social and economic goals and improves a company's long term business prospects and also leverage its capabilities and relationships in support of charitable causes. Society and Environment have mutual relationship. Nature and Society are Inter- dependent and duty of man to protect them is inherent. Rapid economic development, Techno-

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logical and Scientific advancement have increased their impact of Natural environment and caused Environmental Degradation and Ecological Imbalances (Nityanand Tiwari). The Former Prime Minister of India Dr. Manmohan Singh stated that Climate changes are threatening our fragile Eco-System we are staring at the prospect of an impending drought, Water Scarcity is becoming a way of life. Pollution is a growing threat to our health and to our habitats. (Ref: Ensuring Environment Sustainability – Special Address).Customers are now highly conscious of standards, stakeholders are aware of their interests, and more than anything else, the co-workers of a company are viewed quite differently from the way they were perceived till a few decades. Legal framework has been improving in various countries. The aim of Social responsibility is to create higher and higher standard of living, while preserving the Profitability of the organizations, for peoples within and outside the organizations. (Ref :Hopkins, Social responsibility Journal, Volume – 3, No -4(2007) Corporate Social Responsibility is the basic idea that businesses have to meet society's expectations in the practices. Business has traditionally focused on —Growth and Profits. The United Nations focuses its energies on Peace, Poverty Reduction and Human Rights, titled as Environmental, Social and Governance(ESG) As per the Section 135 of the Companies Act, 2013, every company having net worth of Rs. 500 crore or more, or turnover of Rs. 1000 crore or more or a net profit of Rs.5 crore or more during any financial year shall constitute a Corporate Social Responsibility Committee of the Board consisting of three or more directors, out of which at least one director shall be an independent director. Accordingly, the Corporate Social Responsibility (CSR) Committee was constituted. The Committee‟s responsibility is to assist the Board in undertaking CSR activities by way of formulating and monitoring CSR Policy.

Altman Z score

Edward Altman published formulae to assess the probability that a firm will measure financial health. Z score includes five easily derived business ratios, weighted by coefficients. Edward Altman's Z score was calculated and used as financial performance parameter. (Z score = 1.20 X 1+ 1.40X2 + 3.30X3 + 0.60X4 + 0.99X5, where X 1 is working capital / Total Assets, X2 is Retained earnings/Total Assets, X3 is EBIT/Total Assets, X4 is Market Capitalization/ Total Value of Liability and X5 is Sales /Total Assets).). If the Z score is below 1.80 means failure is certain: if Z score between 1.81 to 2.99 means, Healthy or Uncertain to Predict: if Z score is more than 3.00, means too healthy.

Standard Costing/Variance

According to ICMA terminology Standard Costing as —the preparation and use of standard costs, their comparison with actual costs and the analysis of variance to their causes and points of incidence Standard costing is a control device. The standard cost process is mostly used to control the operating task. CSR budget, CSR Actual amount spent and CSR Recovery of the selected companies were calculated for variance analysis. CSR Budget is calculated at two percent on past three year's average profit. CSR actual is taken from BRR report. CSR recovery is calculated at two percent on current year's profit. CSR Cost Variance = Recovered Overhead – Actual Overhead, CSR Expenditure Variance = Budgeted Overhead – Actual Overhead and CSR Volume Variance = Recovered Overhead – Budgeted Overhead. If the results F(favourable) means favorable to Company, A (Adverse) means Favorable to the society.

Du-Pont Analysis

Return on Investment (ROA) is Profit margin *Assets turnover. ie PAT/Sales * Sales/Total Assets. When the investment turnover is multiplied by the Net profit ratio, the product is known as ROI. This pattern is also known as DU PONT Analysis.

Return on Equity is ROA* Equity multiplier. I e PAT/Sales * Sales/Total Asset* Total Asset/ Shareholder Fund. (PAT/SHF)

Measuring the Growth of the firm:

Internal Growth rate (IGR) is ROA * b/ 1 – ROA*b, where b is retention rate. Retention rate is 1- Dividend pay out ratio

Sustainable growth rate (SGR) is ROE * b / 1 – ROE *b

Under du pont analysis

a. Operating Efficiency (as measured by profit margin)

b. Assets use efficiency (as measured by Sales / Total Assets)

c. Financial Leverage (as measured by Equity Multiplier)

Review of Literature

Indian ancient proverb by AVVAIYAR stated that `Aaram Seya Virumbu' which means desire to spend for the welfare of the society out of excess revenue.

Frynas J.G (2005) explained four factors in a firm's decision to embark on community development projects. They are obtaining a Competitive Advantage, Maintaining a stable working environment, Managing external perceptions and Providing Employees Growth and quality Standard of Life. He concluded that as CSR exists today in the Oil Industry, it has limited potential for fostering genuine local community development in practice.

Gunjan (2008) stated that Social concern by Indian corporate, thereby, is not merely a good-to-have option. In fact, good corporate citizenship and social responsibility initiatives are inextricably linked with the improved corporate reputation, shareholder value, employeerelations and retention, and improved relationship with local community. Most of the Indian corporate houses identify the absence of a clear linkage between the CSR and financial success as the principal barrier to CSR. They observed lack of mechanisms to measure, monitor, evaluate and report the impact of CSR initiatives as a major barrier. This is one of the significant findings reported by a survey jointly conducted by the United Nations Development Program, British Council, Confederation of Indian Industry and the Price water house coopers.

Ruchi Tewari (2010) examined the contribution of CSR of the Information and Technology sector in India. The author has chosen 25 companies as sample- the top 5 companies according to their market standing in five sectors into consideration – Cement, Steel, Oil, Banking and IT and applied the comparative analysis to find the sector that is involved most in the CSR initiative and the dimensions classified as Community development, Environmental management and workplace management and analyzed by applying CSR ratings by Karmayog to the respective company which belongs to that industry, their disclosures in websites or annual reports, the budget allocation and activities coverage as variables and applied cumulative ranking of the five sectors on the selected four parameters concluded that IT sector distinctly as a champion in not only adopting CSR but also in managing it.

Jain Neeta et al (2010) stated about stakeholder theory, Social contract theory and legitimacy theory, and 440 companies were randomly taken from rating list of 2009 by Karmayog CSR ratings of Indian companies. The authors studied the relationship between CSR ratings with firm characteristics, such as Sales, Number of Employees, Profit before Tax and the Age of the organizations and analyzed through Correlation and Regression analysis and concluded that Sales volume and Number of employees as significant variables of CSR ratings and these variables has positive impact on CSR rating

Sumanta Dutta et al. (2011), explored CSR activities of Indian companies by comparing with TBL reporting with GRI and Karmayog ratings and concluded that 128 companies scored 0 level, 147 companies at level1, 146 companies at level 2, 66 companies at level 3, 13 companies at level 4 and No even a company under the level 5 and resulted that there is considerable improvement in the status level 0 from 2007 to 2009.

Shruti Gupta (2011) examined the perception of CSR held by consumers in India and USA in order to draw out similarities and difference in conceptualization and response. This paper used web-based questionnaire administered based on Social and Economic oriented CSR dimensions to customers in India (216) and in USA (300) and aims to measure the nature of consumer response to CSR initiatives and the items measured as7 likert scale of 1-7 (`never' to `all time') and analyzed through `t' test, ANCOVA and concluded that in India and USA, Social Orientation more significant than Economic orientations and there is no significant difference in social orientation between India and USA but economic orientation significantly stronger in India than USA.

Jorge A.Arevalo and Deepa Aravind (2011), examined how corporations in India interpret CSR and focused on Ethical, Statist, Liberal and Stakeholder approaches and investigate the determinants and barriers to implementing CSR practices in India by applying seven likert scaling technique from `To a minimum' to' To a great extent' and concluded that stakeholder oriented model has been suggested and regarding motivators ethical value serve as important motivator followed by right things to do and with respect to the barrier faced by Indian companies in implementing CSR strategy, more significant obstacle is lack of resources.

Akinmulegun Sunday Ojo (2012) empirically examined the effect of financial leverage (measured by Debt-Equity ratio) on Earnings per Share (EPS) and Net Assets per Share (NAPS). Author used panel data on effect of leverage on performance indicators of some corporate firms in Nigeria

during 1993 and 2005 and employed econometric technique of Vector Auto Regression (VAR) on the variables and found that leverage shock on EPS indirectly affect the NAPS. Leverage therefore significantly affects Corporate Performance.

Dr. D P Singh (2012) examined working capital management and profitability in the IT and Telecom industry in India by using Working capital ratio, Sales to Total Asset ratio, Cash conversion cycle and selected 11 companies in India and applied Karl Pearson‟s coefficient correlation and Regression analysis based on pooled observations and concluded that working capital turnover ratio, Sales to Total Assets ratio and ROCE has positive significant relationship with profitability of both IT and Telecom Industry in India and also observed that Telecom industry is operating below average so far as working capital management concerned.

Dennis Krumwiede et.al (2012) stated actual CSR practices of manufacturers in different countries based on survey responses to the Global Manufacturing Research Group data for 2002-2003 and suggest that the workplace health and safety have been a priority of companies regardless of the country where the manufacturing process occurs. To a lesser extent, pollution prevention, recycling and waste reduction are valued as well.

Dr. Satish Kumar (2012) explored CSR initiatives by 30 BSE listed Companies. The study concluded that CSR initiatives of the companies under study are independent of the level of revenue, type of ownership and the type of public and private sector.

Dr Shuveer and S Bhanawat (2013) explained the prediction model for determination of Shareholders wealth has been developed with Market value added, Finished goods turnover ratio and Weighted average cost of capital for the period pertaining from 2003-04 to 2007-08 and applied rotated component matrix with a sample of 54 companies has been selected from BSE-A group, tested the regression model and concluded that there is no significant differences between the mean value of actual EVA and estimated EVA.

John Mahon et al (2012) studied the relationship between Corporate Social Performance and overall organizational performance and access how customer stakeholders and financial stakeholders measured and evaluate Corporate Reputation in an Industry context. Authors selected 5-8 companies in each of nine leading industries across 3-years time span. (56 companies for each year) and developed a measurement tool labeled — CSP Profiling consists of Business Motivations, Business Actions and Business Social Impacts and the authors attempt to move the discussion of CSP away from the dominance of Financial performance- Social performance research and focused on the existence and attempts to explain casualty and recognized that results are not statistically significant.

Dr Shiv Prasad et al (2013) studied Financial health of ITDC through Z score analysis and suggested that the company should take the step to reduce the operating expenses through modern cost accounting technique and the Capital structure has very low debt- equity mix, will increase the cost of financing which ultimately result in high cost burden and concluded that the financial health of corporation was in too healthy zone for the period from 2007-2009, which has came to Healthy zone due to recession in tourism sector.

Shailesh et al (2013) examined capital structure practices and its effects on profitability of top 5 pharmaceutical companies, listed on BSE for the period of 5 years and used operating profit margin ratio, ROCE, RONW and Debt to Equity ratio and tested through regression analysis and t test and concluded that firms profitability of pharmaceutical firms in India, is insignificant in bringing about any changes in their capital structure.

Statement of the Problem

This study is descriptive in nature and examines CSR contribution of selected cement companies in terms of how they have a significant impact on financial performance and the nature of such impact .. Many studies linked CSR initiatives with ROCE, RONW, and Operating profit. (Suwaidan 2004), Adam Lindgreen e al (2008), Jain Neeta et al, Zhi Tang et al (2010) Md Abdur Rouf (2011) and YaghoubAlaviMatin et al.2011). Edward Altman‘s Z score and AGR, SGR under Du-Pont analysis were used as modern financial variable in this study.

Objectives of the study

This study aims to identify whether selected key financial ratios including the Du Pont analysis (IGR & SGR) influences CSR of selected S&P BSE 100 listed cement companies in India.

1. To study the nature and extent of CSR disclosure through BRR in the annual report.

2. To examine variance analysis of CSR contributions through standard costing techniques

3. To calculate the modern financial measure of Altman Z score.

4. To measure IGR and SGR of the selected companies under Du Pont analysis

5. To verify the cause and effect relationship between CSR contribution and financial performance.

Methodology

The present study is mainly based on the secondary data and the data is collected from the annual report of selected company and websites of moneycontrol.com, BSE.com etc for the period of Nine years. The period of the study is 2009-10 to 2017-18. CSR budget, CSR Actual amount spent and CSR Recovery of the selected companies were calculated for variance analysis. CSR Budget is calculated at two percent on past three year‘s average profit. CSR actual is taken from BRR report. CSR recovery is calculated at two percent on current year‘s profit. Edward Altman‘s Z score was used as modern financial variable instead of other financial variables like operating profit ratio, ROCE etc. (Suwaidan 2004), Adam Lindgreen e al (2008), Jain Neeta et al, Zhi Tang et al (2010) Md Abdur Rouf (2011) and YaghoubAlaviMatinet al.2011). For the analysis Mean,

Standard Deviation, on sample t test, Correlation coefficients and regression analysis have been applied for its validity.

Analysis and Interpretation:

Table–1: CSR Contribution and Variance Analysis

Company Name	year	CSR Contribution(in crores)			Variance Analysis		
		Budget	Actual	Recovery	CSR Cost Variance	CSR Exp Variance	Volume Variance
ACC Limited	2010	28.39	13.40	22.40	9.00(F)	14.99(F)	05.99(A)
	2011	26.27	22.10	26.50	4.40(F)	04.17(F)	00.23(F)
	2012	27.01	25.66	21.22	4.44(A)	01.35(F)	05.79(A)
	2013	23.37	22.67	21.92	0.75(A)	00.70(F)	01.45(A)
	2014	23.21	23.21	23.36	0.15(F)	0.00	00.15(F)
	2015	22.17	13.78	11.84	1.94(A)	08.39(F)	10.33(A)
	2016	19.04	21.82	12.94	8.88(A)	02.78(A)	06.10(A)
	2017	16.04	18.69	18.03	0.66(A)	02.65(A)	01.99(F)
	2018	14.36	20.45	30.12	9.67(F)	06.49(A)	15.76(F)
Ambuja Cement Ltd	2010	29.26	24.10	25.26	1.16(F)	5.16(F)	04.00(A)
	2011	25.89	26.40	24.57	1.83(A)	0.51(A)	01.32(A)
	2012	24.72	39.08	25.94	13.14(A)	14.36(A)	01.22(F)
	2013	25.25	52.57	25.88	26.69(A)	27.32(A)	00.63(F)
	2014	25.46	38.40	29.92	8.48(A)	12.94(A)	04.46(F)
	2015	27.24	40.98	16.15	24.83(A)	13.74(A)	11.09(A)
	2016	23.98	59.37	18.65	40.72(A)	35.39(A)	05.33(A)
	2017	21.55	51.79	24.99	26.80(A)	30.24(A)	03.44(F)
	2018	19.93	53.46	29.74	23.72(A)	33.53(A)	09.81(F)
Ultra Tech	2010	18.45	20.22	21.86	01.64(F)	01.77(A)	03.41(F)
	2011	20.51	32.30	28.08	04.22(A)	11.79(A)	07.57(F)
	2012	23.16	56.28	48.92	07.36(A)	33.12(A)	25.76(F)
	2013	32.95	69.83	53.10	16.73(A)	36.88(A)	20.159F)
	2014	43.37	48.56	42.89	05.67(A)	05.19(A)	00.48(A)
	2015	48.30	29.22	40.30	11.08(F)	19.08(F)	08.00(A)
	2016	45.43	50.89	47.40	03.49(A)	05.46(A)	01.97(F)
	2017	43.53	54.15	52.54	01.61(A)	10.62(A)	09.01(F)
	2018	46.75	45.73	44.63	01.10(A)	01.02(F)	02.12(A)
Shree Cement	2010	06.76	10.80	13.52	02.72(F)	04.04(A)	06.76(F)
	2011	10.09	03.35	04.18	00.83(F)	06.74(F)	05.91(A)
	2012	09.75	08.90	12.38	03.48(F)	00.85(F)	02.63(F)
	2013	10.02	09.28	20.08	10.80(F)	00.74(F)	10.06(F)
	2014	12.21	11.57	15.74	04.17(F)	00.64(F)	03.53(F)
	2015	16.06	18.49	08.52	09.97(A)	02.43(A)	07.54(A)
	2016	14.78	14.75	22.86	08.11(F)	00.03(F)	08.08(F)
	2017	15.70	19.29	26.78	07.49(F)	03.59(A)	11.08(F)
	2018	19.38	27.81	27.68	00.13(A)	08.43(A)	08.30(F)

(CSR Cost Variance = Recovered Overhead – Actual Overhead, CSR Exp Variance = Budgeted Overhead – Actual Overhead and CSR Volume Variance = Recovered Overhead – Budgeted Overhead) F means favourable to Company, A means Favorable to the society.

Table – 2: Descriptive Statistics of Profitability, Per Share ratio, Liquidity ratio and Du Pont Growth rate variables with Altman Z score

Variables		Mean	Std Deviation	Skewness	
				Statistic	Std.error
ACC Limited	Altman Z score	03.25	0.209	0.629	0.717
	ROA	08.10	02.40	-0.707	0.717
	ROE	12.94	04.18	-0.374	0.717
	NP Margin	09.34	03.32	0.336	0.717
	Asset Turnover	87.17	08.68	-1.608	0.717
	ROCE	24.33	37.19	2.954	0.717
	EPS	55.55	16.12	-0.317	0.717
	DPS	25.11	07.20	-0.586	0.717
	Book Value	437.78	64.75	0.569	0.717
	Net Profit Per Share	55.49	16.11	-0.320	0.717
	Current ratio	1.056	0.25	0.382	0.717
	Quick ratio	0.73	0.25	0.359	0.717
	Inventory Turnover	08.59	01.50	-1.513	0.717
	IGR	04.68	01.97	0.565	0.717
	SGR	07.73	03.41	0.360	0.717
Ambuja Cement Limited	Altman Z score	03.31	0.32	-0.600	0.717
	ROA	8.219	3.00	-0.212	0.717
	ROE	11.21	4.66	-0.204	0.717
	NP Margin	12.96	2.51	-0.330	0.717
	Asset Turnover	61.78	15.03	-0.702	0.717
	ROCE	10.69	3.72	-0.234	0.717
	EPS	07.38	1.64	-0.578	0.717
	DPS	03.19	0.95	0.187	0.717
	Book Value	72.72	22.29	0.634	0.717
	Net Profit Per Share	10.85	4.85	-0.186	0.717
	Current ratio	01.62	0.29	0.070	0.717
	Quick ratio	01.30	0.29	0.196	0.717
	Inventory Turnover	09.71	0.87	-0.233	0.717
	IGR	05.11	2.27	0.241	0.717
	SGR	07.13	3.56	0.362	0.717
	Altman Z score	3.14	0.28	-0.654	0.717
	ROA	7.08	1.99	0.650	0.717
	ROE	14.14	4.89	1.040	0.717
	NP Margin	11.10	2.45	0.311	0.717
	Asset Turnover	65.43	7.81	0.584	0.717
	ROCE	12.63	1.97	0.626	0.717
	EPS	83.48	10.95	-0.693	0.717

Ultra Tech Limited	DPS	8.61	1.63	-0.915	0.717
	Book Value	633.29	206.90	0.178	0.717
	Net Profit Per Share	80.86	13.89	-1.104	0.717
	Current ratio	1.16	0.35	-0.192	0.717
	Quick ratio	0.84	0.30	-0.390	0.717
	Inventory Turnover	10.50	4.70	2.637	0.717
	IGR	7.64	3.17	0.988	0.717
	SGR	14.79	6.48	1.251	0.717
Shree Cement Limited	Altman Z score	4.07	0.58	0.579	0.717
	ROA	10.42	3.76	-0.360	0.717
	ROE	18.79	8.43	1.003	0.717
	NP Margin	13.63	5.12	-0.360	0.717
	Asset Turnover	76.98	12.47	0.351	0.717
	ROCE	13.32	5.052	-0.283	0.717
	EPS	241.67	116.21	-0.074	0.717
	DPS	36.33	40.34	2.637	0.717
	Book Value	1397.33	727.90	0.324	0.717
	Net Profit Per Share	241.67	116.21	-0.074	0.717
	Current ratio	1.51	0.21	0.530	0.717
	Quick ratio	1.02	0.19	0.862	0.717
	Inventory Turnover	8.33	2.01	0.691	0.717
	IGR	10.08	4.52	0.147	0.717
	SGR	21.12	13.97	1.543	0.717
Overall (S&P BSE 100 CEMENT)	Altman Z score	3.46	0.50	1.542	0.398
	ROA	8.58	2.95	0.324	0.398
	ROE	14.43	6.24	1.254	0.398
	NP Margin	11.88	3.75	0.143	0.398
	Asset Turnover	73.35	14.76	-0.381	0.398
	ROCE	15.37	19.11	5.565	0.398
	EPS	97.47	106.90	1.670	0.398
	DPS	18.53	24.03	4.022	0.398
	Book Value	626.46	617.07	1.736	0.398
	Net Profit Per Share	97.67	106.35	1.706	0.398
	Current ratio	1.35	0.35	-0.141	0.398
	Quick ratio	0.98	0.33	0.159	0.398
	Inventory Turnover	9.27	2.77	3.296	0.398
	IGR	6.96	3.74	1.024	0.398
	SGR	12.82	9.78	2.292	0.398

The above table-2 showed that the mean value of Altman Z score is 3.46, which proved that the selected companies were financially sound (Healthy) The Mean value of financial variables of IGR and SGR, Ultra Tech and Shree cement showed higher value then the average value. The mean value of Profitability ratios, Per share variables, Liquidity variables of Ambuja cement has showed higher than the average level.

			CSR ACTUAL EXPENSES	CSR Budget
CSR Budget	Posterior	Mode	0.592	
		Mean	0.558	
		Variance	0.013	
	95% Credible Interval	Lower Bound	0.329	
		Upper Bound	0.767	
	N		35	35
CSR Recovery	Posterior	Mode	0.673	0.722
		Mean	0.641	0.692
		Variance	0.010	0.008
	95% Credible Interval	Lower Bound	0.444	0.515
		Upper Bound	0.820	0.850
	N		35	35

Table -3: One-Sample Test

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
CSR Cost Variance	-2.192	34	0.035	-4.49600	-8.6645	-.3275
CSR Exp Variance	-2.910	34	0.006	-6.86943	-11.6674	-2.0715
CSR Volume Variance	1.684	34	0.101	2.37697	-.4921	5.2460

Table 3 shows that the variances of CSR cost, CSR budget has no any significant difference among the selected companies but CSR volume variances were significantly different with each other of selected companies at 5% levels.

Table – 4: The result of the Karl Pearson's Test for hypothesis testing with Profitability

Variable		1. CSR Actual	2. CSR Budget	3. CSR Recovery	Results		
					1	2	3
Return on Asset	Correlation	-0.310	0.292	0.067			
	Significance	0.070	0.089	0.703	No	No	No
Return on Equity	Correlation	0.414	0.350	0.013			
	Significance	**0.013**	**0.039**	0.939	Yes	Yes	No
Net Profit margin	Correlation	0.026	0.168	0.191			
	Significance	0.884	0.333	0.271	No	No	No
Asset Turnover	Correlation	0.566	0.281	0.252			
	Significance	**0.000**	0.103	0.145	Yes	No	No
Return on Capital Employed	Correlation	0.122	0.105	0.011			
	Significance	0.484	0.932	0.950	No	No	No

Null Hypothesis results : Yes – Rejected, No – Accepted

Table 4 shows that the CSR Actual expenses has significant correlation relationship with ROE and Asset Turnover. CSR Budget has significant relationship with ROE only at 5% levels. CSR Recovery has no any significant relationship with Profitability variables 5% level, hence not considered for further proceedings for the study period.

Table – 5: The result of the Karl Pearson's Test for hypothesis testing with Per Share

Variable		1. CSR Actual	2. CSR Budget	3. CSR Recovery	Results		
					1	2	3
Earnings Per Share	Correlation	-0.402	-0.369	-0.368			
	Significance	**0.017**	**0.029**	0.830	Yes	Yes	No
Dividend Per Share	Correlation	-0.349	-0.233	-0.108			
	Significance	**0.040**	0.178	0.538	Yes	No	No
Book Value Per Share	Correlation	-0.336	-0.230	-0.013			
	Significance	**0.048**	0.183	0.939	Yes	No	No
Net Profit Per Share	Correlation	-0.400	-036.5	-0.037			
	Significance	**0.017**	**0.031**	0.834	Yes	Yes	No

Null Hypothesis results: Yes – Rejected, No – Accepted

Table 5 shows that the CSR Actual expense has significant, adverse coefficient of correlation relationship with EPS, DPS, Book value and Net Profit per share at 5% levels. CSR Budget has significant adverse relationship only with EPS, but CSR Recovery has no any significant relationship with all per share variables for the study period

Table- 6: Karl Pearson's Test for hypothesis testing with Liquidity Variables

Variable		1. CSR Actual	2. CSR Budget	3. CSR Recovery	Results		
					1	2	3
Current ratio	Correlation	0.279	-0.109	0.037			
	Significance	0.105	0.534	0.834	No	No	No
Quick ratio	Correlation	0.395	0.038	0.101			
	Significance	**0.019**	0.828	0.563	Yes	No	No
Inventory Turnover	Correlation	0.074	-0.008	0.017			
	Significance	0.672	0.964	0.922	No	No	No

Null Hypothesis results: Yes – Rejected, No – Accepted

Table-6 showed that the CSR Actual expense has significant relationship with Quick ratio only for the study period.

Table – 7: Karl Pearson's Test for hypothesis testing with Financial Variables

Variable		1. CSR Actual	2. CSR Budget	3. CSR Recovery	Results		
					1	2	3
Altman Z score	Correlation	-0.367	-0.371	-0.115			
	Significance	**0.030**	**0.028**	0.512	Yes	Yes	No
IGR	Correlation	-0.296	-0.334	0.124			
	Significance	0.084	**0.050**	0.476	No	Yes	No
SGR	Correlation	-0.335	-0.372	0.003			
	Significance	**0.049**	**0.028**	0.985	Yes	Yes	No

Table-7 showed that CSR Actual expense has significant adverse relationship with Altman Z score and SGR. CSR Budget has significant relationship with all financial variables in terms of adverse at 55 levels for the study period.

Table- 8: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5209.295	9	578.811	3.774	0.004[b]
	Residual	3834.413	25	153.377		
	Total	9043.707	34			

a. Dependent Variable: CSR ACTUAL EXPENSES

b. Predictors: (Constant), Sustainable Growth rate, Dividend Per Share, Quick Ratio, Asset Turnover, Book Value Per Share, Altman Z score, Return on Equity, Earnings Per Share, Net Profit Per Share

c.R value – 0.759: R square value – 0.576

Table-9: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	81.146	31.989		2.537	0.018
	Return on Equity	-0.972	1.293	-0.372	-0.752	0.459
	Asset Turnover	-0.423	0.179	-0.383	-2.356	0.027
	Earnings Per Share	-0.366	0.749	-2.399	-0.489	0.629
	Dividend Per Share	0.173	0.181	0.255	0.956	0.348
	Book Value Per Share	0.009	0.016	0.338	0.547	0.589
	Net Profit Per Share	0.274	0.756	1.788	0.363	0.720
	Quick Ratio	22.706	9.020	0.465	2.517	0.019
	Altman Z score	-11.091	11.901	-0.344	-0.932	0.360
	Sustainable Growth rate	0.753	0.857	0.452	0.879	0.388

a. Dependent Variable: CSR ACTUAL EXPENSES

The degree of determination shows the extent to which the profitability, Per share and financial variables influence the CSR Actual expenses of the selected cement companies in India during the study period. Based on the result of Table-09, author concluded that the Asset Turnover and Quick ratio only influencing CSR Actual expenses of the selected companies for the study period.

Table-10: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	844.555	5	168.911	1.870	0.130[b]
	Residual	2619.425	29	90.325		
	Total	3463.980	34			

a. Dependent Variable: CSR Budget

b. Predictors: (Constant), Sustainable Growth rate, Altman Z score, Earnings Per Share, Return on Equity, Net Profit Per Share

c. R value – 0.494: R Square value – 0.244

Table 10 showed that the author not wish to find the degree of determination to the extent to which the profitability, Per share, Liquidity ratios and financial variables influence the CSR budget, because ANOVA has not significant to proceed further for the selected companies in India for the study period.

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STOCK MARKET ASYMMETRY & INVESTORS' SENSATION ON PRIME MINISTERIAL TENURE: INDIAN EVIDENCE

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ABSTRACT

This study empirically examines the growth of return, volatility shocks, market efficiency and investors' sentiment on Prime Ministers during their administration as a Prime Minister. Thus, various volatility forecasting measures are applied. It is observed that BSE return doesn't follow random walk and inefficient during their tenures as a Prime Minister. ARCH measure confirms about volatility clustering. According to the EGARCH measure leverage effect doesn't exists but presence of this effect based on TARCH during the tenure of few Prime Ministers. Finally, the investors are trustful to those Prime Ministers who are elected from Indian National Congress according to the growth of return.

Keywords: BSE, GARCH, Indira Gandhi, Rajiv Gandhi, Narendra Modi.

Introduction

The stock market movement around the globe partly depends on presidential or prime minister Election. The role of a particular political party is important during their election campaign and after their wining for stock market growth. Generally, the investors have a positive emotion or faith on a particular political party or a leader which he /she assumes that this leader is trustable for the growth of the stock market if he/she becomes the prime Minister. During the tenure of a Prime Minister, the stock market experiences several confrontations. Since independence, India has experienced fifteen Prime Ministers (Nerendra Modi presently holding PM office). But Indian stock market (BSE) releases its value publicly from 3rd April 1979 and thus, we have seen thirteen Prime Ministers from that date. During this period, the stock market faces diverse information asymmetry.

At this ground, the present study tries to examine the growth of stock market, market efficiency and various asymmetric effects during their tenures. Although, this study is restricted to those

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Prime Ministers who have completed their PM offices at least three years.

The study is designed as follows: section 2 describes the objective. Section 3 deals with data and study period. Section 4 provides methodology. Section 5 analyses the result and finally, section 6ends with a conclusion and recommendation.

Literature Review:

The financial time series like stock and exchange rate tends to occur in volatility clusters due to changes in the market. This type of phenomenon is first observed by Mandelbrot (1963) and Fama (1965), and further described by Baillie et al., (1996), Chou (1988) and Schwert (1989). Various models are employed to study this phenomenon. The empirical applications of the autoregressive conditional heteroskedasticity (ARCH) model introduced by Eagle (1982) or its extension generalised by Bollerslev (1986) in GARCH model and its various extensions (EGARCH, TARCH, PARCH etc) by Engle et al. (1987), Glosten et al. (1993), Nelson (1991) tries to forecast stock returns' volatility. Besides that, it is often observed in the stock returns that volatility is found to be higher after getting bad news (negative shocks) rather than good news (positive shocks) of the same magnitude. Hence, volatility is affected asymmetrically by the positive and negative shocks. This phenomenon is called leverage effect which is pointed out by Black (1976) that means changes in stock prices tend to be negatively correlated with the changes in volatility (see Christie 1982 and Nelson 1991). Engle & Ng (1993) explain news impact curve (IMC) with asymmetric response to both good and bad news. To test the leverage effect, many nonlinear extensions of the GARCH model are developed. Similarly, Threshold ARCH (TARCH), Threshold GARCH (TGARCH) and PARCH which are independently developed by Zakoian (1994) and Glosten, Jagannathan and Runkle (1993). Beside these, large numbers of recent studies have examined different aspects of volatility forecasting (see Longin 1997, Gazda & Vyrost 2003, Chen & Lian 2005, Brandt & Jones 2006, Engle, Focardi & Fabozzi 2007, Chang Su 2010, Goudarzi 2011, Ameur & Senanedsch 2014 etc.) and depicted many evidences by using a range of volatility measures. Risk-return relationship is another property widely examined in the past. In general, it is assumed that the risk-return trade off is based on the unconditional distribution of return. In 1980, Merton (cited in Karmaker, 2007) criticizes about the failure of the previous studies in respect of changes in the level of risk when return is forecasted. Thus, it is essential to consider heteroskedasticity by using realized returns. Here, GARCH-M model allows conditional variance to affect the mean (expected return). Generally, the GARCH model is based on the implicit assumption that the average risk premium is constant for the sample period. The GARCH-M model lightens up this assumption by allowing the velocity feedback effect to become operational (Karmakar 2007). The evidences of risk-return relation are mixed with posi-

tive, negative or zero relation (see French et. al. 1987, Campbell & Hentschel 1992, Nelson 1991, Glosten et. al. 1993, Baillie & DeGennaro 1990, Chan et. al. 1992, Poon & Taylor 1992, Balaban & Bayar 2005 etc.).

Lot of studies examines the various diverse asymmetric effects on stock markets around the globe. But, research on this topic in poor and developing countries are very less. So, further research is needed in this counter to know the dynamics on information asymmetry. With this notion, the present study seeks to examine the growth of return, asymmetric effects, market efficiency and investors sentiment on the Prime Ministers. It is quite uncommon to analyse those aspects during the tenure of the Prime Ministers. At this ground, the present study is little different and that adds value in the existing literature.

Objective of the study:

More specifically, the following objectives are achieved:

1. To examine the growth of BSE

2. To analyse the diverse asymmetric effect and market efficiency

3. To observe the investors' sentiment on Prime Minister

Data & Study Period:

The study considers the daily closing prices of Bombay Stock Exchange (BSE) that covers the tenure of six full-time Prime Ministers. The raw date is converted into a series of continuously compounded percentage returns. During (from 14th January 1980 to 30th May 2019) these periods there were six full-time PMs including Narendra Modi who completes his first tenure as Prime Minister in India on 30th May 2019 but the second term is not consider here. Although, there are twelve PMs during this study period but most of them don't complete their five years tenure so exclude them. Here, four Prime Ministers (Indira Gandhi, Rajiv Gandhi, P. V. Narasimha Rao & Dr. Manmohan Singh) are from Indian National Congress (INC) and the remaining two are (Atal Bihari Vajpayee & Narendra Modi) from Bharratiya Janata Party (BJP).The daily closing index price is obtained from the official website of Bombay Stock Exchange (BSE) and the information regarding Prime Minister is obtained from the Prime Minister's office.

Methodology:

The daily return of the BSE index is computed as under:

$$R_t = \log(I_t/I_{t-1})$$

Where, I_t is the index value at the current period t and I_{t-1} is the price at the previous period.

Here, Jarque-Bera test statistic is used to observe whether the time series data is normally distributed or not. The J-B test statistic as follows:

$$J-B = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (1)$$

Where, n is the number of observations, S is the skewness and K is the kurtosis. To test normality, the following hypothesis is formulated:

H_0: Return series is normally distributed

H_a: Return series is not normally distributed

It is assumed that the time series data is stationary that means its mean, variance and co-variance are time invariant. To test stationary, a non-parametric approach proposed by Phillips and Perron (1988) is applied and based on the following statistic:

$$\tilde{t}_\alpha = t_\alpha\left(\frac{\gamma_0}{f_0}\right)^2 - \frac{T(f_0-\gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s} \quad (2)$$

Where, $\hat{\alpha}$ is the estimate and t_α is the t ratio of α, $se(\hat{\alpha})$ is the coefficient of standard error and s is the standard error of the test regression. γ_0 is a consistent estimate of the error variance (computed as, (T-K)s^2/T where k is the number of regressors), f_0 is an estimator of the residual spectrum at frequency zero.

Here, the testable hypothesis for unit root may be written as under:

H_0: Return series is non stationary or unit root

H_a: Return series is stationary

KPSS test seems more reliable, as it nuances the type of nonstationary. The ADF and PP test only determine whether a time series is stationary or not, implicitly assuming in their null-hypothesis that the time series contains a unit-root. Thus, in case the ADF and PP test states that the time series is nonstationary, while the KPSS does not advocate this hypothesis, it is likely that the time series is level or trend stationary, rather than being non-stationary (Pfaff, 2008). The KPSS is therefore more delicate in distinguishing (non) stationary, and seems most appropriate and adequate for further analysis. Kwiatkowski et al. (1992) propose the following model:

$$y_t = \xi_t + r_t + e_t \quad (3)$$
$$r_t = r_{t-1} + \mu_t$$

Here, r_t corresponds with a random walk process and for the error term, e_t, is assumed that it is independent and identically distributed (i.i.d) with 0 mean constant standard deviation. The initial value of r_t, which is r_0, is the level of the time series and is fixed. The null hypothesis, H_0, posits that e_t is stationary meaning that y_t is level-stationary in case ξ is 0 and trend-stationary otherwise.

H_0: Return series is stationary

H_a: Return series is non-stationary or has a unit root

Now the growth model is developed to estimate the rate of growth of return of BSE as well as growth of BSE index in value during the tenure of the full-time Prime Ministers. Here, the basic model is as under:

$$\text{Log}(R_{it}) = \alpha_i + \beta(T) + e_i \quad (4)$$

Where, R_{it} is the return of the BSE at time t which is converted to log, T is the time period (duration of each PM) and e is the error term with its usual assumptions.

Equation 4 is a semi-log model because only dependent variable is in the log shape. After estimating equation 4, the residuals are considered for testing like serial or auto-correlation test, heteroskedasticity test, stationarity test and normality test to make the semi-log model suitable. For testing stationarity, correlogram analysis is used and the testable hypothesis is as under:

H_0: Residual is stationary

H_a: Residual is not stationary

Generally, the prices of stocks swing widely for an extended time period followed by a period of relative calm which looks like a stepping of a drunker person meaning that it follows random walk or non-stationary. To capture such varying variance Autoregressive Conditional Heteroskedasticity (ARCH) model is applied (Engle 1982). Although, heteroskedasticity has no autoregressive structure that means heteroskedasticity observed over different periods is auto-correlated meaning that presence of ARCH effect.

To test ARCH effect the following regression equation (OLS) is formulated and estimated after making the series stationary by taking the first difference:

$$R_{i,t} = \beta_1 + \beta_2 R_{i,t-1} + \beta_3 R_{i,t-2} + \ldots\ldots\ldots\ldots\ldots + \beta_p R_{i,t-p} + e_t \quad (5)$$

It is assumed that $e_t \sim N(0, \alpha_0 + \alpha_1 \mu^2_{t-1})$. Here, the variance of e at time t depends on squared distributions at time t-1 that causes serial correlation and thus, the variance of 'e' not only depends on one lagged squared disturbance term but also on several lagged squared disturbance terms which may be written as under:

$$Var(\mu_t) = \sigma^2_t = \alpha_0 + \alpha_1 e^2_{t-1} + \alpha_2 e^2_{t-2} + \ldots\ldots\ldots\ldots\ldots + \alpha_p e^2_{t-p} \quad (6)$$

Equation 6is the ARCH model of order p and the ARCH effect is tested by examining the validity of the null hypothesis H_0: $\alpha_1 = \alpha_2 = \ldots\ldots\ldots = \alpha_p = 0$. To test this Engle proposed to run the auxiliary regression (Regressed Squared Standardized Residuals on a constant) at p lags.

$$e^2_t = \alpha_0 + \alpha_1 e^2_{t-1} + \alpha_2 e^2_{t-2} + \ldots\ldots\ldots + \alpha_p e^2_{t-p} \quad (7)$$

If there is no ARCH effect in the residuals then ARCH model is mis-specified. After testing for unit root and ARCH effect then GARCH model may be applied.

The ARCH specification looks like a moving average specification as compared to the auto-regression and thus, considers lagged conditional variance as autoregressive term in the ARCH model (Bollerslev, 1986). The GARCH model is based on the assumption that changes of variances depend on the lagged variances of the capital assets. Unexpected swings of stock prices generate more volatility in the upcoming periods. The GARCH (p, q) model may be written as follows:

$$\sigma^2_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i e^2_{t-i} + \sum_{i=1}^{q} \beta_i \sigma^2_{t-i} + v_i \quad (8)$$

Where, α_0 is the mean. p is the degree of ARCH process (lagged terms of squared errors) and q is the degree of GARCH process (lagged terms of conditional variances) and v_i is the random error. Here, ARIMA technique is applied to determine the degree of p and q (see Box-Jenkins, 1970). The most widespread GARCH(1,1) model can be written as:

$$\sigma^2_t = \alpha_0 + \alpha_1 e^2_{t-1} + \beta_1 \sigma^2_{t-1} + v_t \quad (9)$$

As the variance is expected to be positive then it is assumed that the regression coefficient α_0, β_1 and $\alpha_1$will be always positive, while the stationarity of the variance is preserved, if the coefficients β_1 and α_1 are smaller than 1. Here, $(\alpha_1+\beta_1)$ expresses the influence of variability of index or return from the previous period on the current value of the variability which is usually close to 1.

The GARCH models are unable to observe frequently asymmetric effects when a different volatility is recorded systematically. According to the martingale model, decrease and increase of return / index price may be treated as bad and good news respectively. If decrease (negative shocks) in return is accompanied

by an increase in volatility which is greater than the volatility induced by an increase in return is called leverage effect measured by EGARCH and TGARCH models.

Let R_t is the return of BSE index at time t. (10)

$$R_t = \sigma' I_{t-1} + \xi_t$$

$$\xi_t = \sigma_t Z_t \quad (11)$$

$$Z_t / \Omega_{t-1} \sim \Psi(0,1,v) \quad (12)$$

The conditional variance may be written as follows:

$$\log \sigma^2 = \omega + \sum_{i=1}^{p} \alpha_i \left| \frac{e_{t-1}}{\sigma_{t-1}} \right| + \sum_{j=1}^{q} \beta_j \log(\sigma^2{}_{t-1}) + \sum_{k=1}^{r} \gamma_k \frac{e_{t-1}}{\sigma_{t-1}} + v_t \quad (13)$$

Equation 10 indicates that conditional variance is an exponential function of the BSE returns or values that automatically ensures its positive character. Where, $\sigma^2{}_t$ is the conditional variance. Z_t is the standardized residual and v denotes a vector of parameters that specifies the probability density function. ω, α, β and γ are the parameters to be estimated. Here, α represents the symmetric effect or ARCH effect. β measures the persistence in conditional volatility or GARCH effect. An asymmetric effect is indicated by the non-zero value of γ and the presence of leverage effect is given by its negative value. When γ < 0 then positive shocks (good news) generate less volatility than the negative shocks (bad news) and when γ > 0 then positive innovations are more destabilizing than the negative innovations.

The positive and negative shocks in stock market have diverse effects on volatility and to deal with this event, Glosten, Jagannathan and Runkle (1993) and Zakoian (1994) independently introduce the Threshold GARCH or TGARCH model[1] that captures the possible asymmetric shocks to volatility by adding an additional term. The TGARCH(1,1) model is expressed as under:

$$\sigma^2{}_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i e^2{}_{t-i} + \sum_{j=1}^{q} \beta_j \sigma^2{}_{t-j} + \sum_{k=1}^{r} \gamma_k e^2{}_{t-k} I_{t-k} \quad (14)$$

Where, (a) $I_{t-1} = 1$, if $e_{t-1} < 0$ or negative (bad news)

(b) $I_{t-1} = 0$, if $e_{t-1} > 0$ or positive (good news)

The leverage effect is captured by γ coefficient.

The study also uses dummy variable to capture investors' sentiment on Prime Minister regarding growth of BSE return that may be shown as under:

$$R_{BSE} = \alpha + \beta_1 IG_{1BSE} + e_t \quad (15)$$

$$R_{BSE} = \alpha + \beta_1 RG_{2BSE} + e_t \quad (16)$$

$$R_{BSE} = \alpha + \beta_1 NR_{3BSE} + e_t \quad (17)$$

$$R_{BSE} = \alpha + \beta_1 AV_{4BSE} + e_t \quad (18)$$

$$R_{BSE} = \alpha + \beta_1 MS_{5BSE} + e_t \quad (19)$$

$$R_{BSE} = \alpha + \beta_1 NM_{6BSE} + e_t \quad (20)$$

Where, R_{BSE} represents return of BSE index

IG_{1BSE} = 1 if the investors positive sentiment on Indira Gandhi for BSE growth

= 0 otherwise

RG_{2BSE} = 1 if the investors positive sentiment on Rajiv Gandhi for BSE growth

= 0 otherwise

NR_{3BSE} = 1 if the investors positive sentiment on P.V. N. Rao for BSE growth

= 0 otherwise

AV_{4BSE} = 1 if the investors positive sentiment on A. B. Vajpayee for BSE growth
= 0 otherwise

MS_{5BSE} = 1 if the investors positive sentiment on Dr. M. Singh for BSE growth
= 0 otherwise

NM_{6BSE} = 1 if the investors positive sentiment on Narendra Modi for BSE growth
= 0 otherwise

Result & Discussion:

The descriptive statistics of BSE is presented in table 1. It is observed that the daily mean return of BSE is quite stable during the tenure of the Prime Ministers. The highest mean return is provided during the tenure of P.V. Narasimha Rao from Indian National congress (INC) and the lowest return is provided during the occupancy of Narendra Modi from Bharotio Janata Party (BJP). The BSE's risk has reached to highest level during the tenure of Dr. Monmohan Singh and lowest during the time of Narendra ModiAtl Bihari Vajpayee. The JB statistics of the return distribution during the tenure of the Prime Ministers are very large and the probabilities of obtaining such statistics under the normality assumption are significantly zero meaning that rejection of null hypothesis (H_0: Normally distributed).

Table 1 Descriptive Statistics of BSE Return

Prime Minister	OB	Mean	Max	Min	Std. Dev	Skew.	Kurt.	J-B
Indira Gandhi	906	0.0922	11.0530	-7.2100	1.1257	0.8834	17.1613	7688.36 (0.000)
Rajiv Gandhi	1063	0.1057	9.1329	-5.8220	1.6586	0.3238	4.531	122.47 (0.000)
P.V. Narasimha Rao	1065	0.1172	13.1353	-12.7680	1.0140	0.3072	9.0564	1644.43 (0.000)
Atal Bihari Vajpayee	1540	0.0320	8.2541	-11.1385	1.7334	-0.2489	6.0108	597.59 (0.000)
Dr. Manmohan Singh	2494	0.0767	17.3393	-10.9564	1.5766	0.3152	12.1145	8674.08 (0.000)
Narendra Modi	1503	0.0292	8.9748	-13.1525	1.1134	-1.2828	25.8057	32983.55 (0.000)

Probabilities in parenthesis;
Source: Author's own calculation

Table 2 provides information regarding stationarity and market efficiency. It is observed that the computed ADF and PP test statistics in level forms (absolute value) during the tenure of all the Prime Ministers are higher than the critical value and statistically significant at five percent level that means rejection of null hypothesis (H_0: $\delta = 0$ or $\rho = 1$) and thus, the time series don't appear to have a unit root and don't follow random walk and thus, inefficient at their weak forms. Based on KPSS test statistics, the LM-statistics also reject the null hypothesis as the LM-statistics are lower than the asymptotic critical value at one percent level of significance and may be said that the returns during the tenure of the PMs of BSE don't follow random walks and inefficiency is seen at weak forms during their occupancy.

Table 2 Test of Stationarity & Market Efficiency

Prime Minister	Unit Root Test		
	ADF Test	PP Test	KPSS Test
Indira Gandhi	-16.77177**	-282.7538**	0.1810
Rajiv Gandhi	-19.91093**	-206.7896**	0.2403
P.V. Narasimha Rao	-16.13296**	-147.4540**	0.2620
Atal Bihari Vajpayee	-18.44720**	-385.3635**	0.1145
Dr. Manmohan Singh	-22.95915**	-562.8931**	0.1733
Narendra Modi	-13.9228**	-40.3029**	0.0419

**** Significance at 5% level**

Source: Author's own calculation

The growth rate of return of BSE (in percentage) during the tenure of the prime Ministers is depicted in table three. It is seen that the time coefficients are not significant as the probabilities values are higher than five percent (in parenthesis) of all the PMs and the percentage of growth rate is negative during the tenure of Indira Gandhi (From 14th January 1980 to until 24th March 1984), Rajiv Gandhi (31st October 1984 to until 2nd December 1989), P.V. Narasimha Rao (21st June 1991 to until 16th May 1996) and Dr. Manmohan Sing (23rd May 2004 to 25th May 2014) who elected from INC. Similarly, the growth rate of return during the tenure of Atal Bihari Vajpayee (19th March 1998 to until 22nd May 2004) and Narendra Modi (26th May 2014 to 30th May 2019) who are elected from BJP is positive. Although, the percentage rate of return during their tenure is not lucrative. The R^2 value during the tenure of all the PMs is not satisfactory and the F statistics are insignificant. The residuals are not serially correlated during the tenure of Indira Gandhi, Atal Bihari Vajpayee and Nerendra Modi but heteroskedasticity problem is found in the residuals during the tenure of all the Prime Ministers except Rajiv Gandhi. The residuals are also not normally distributed during the tenure of the PMs (JB statistics). But the residuals are found to be stationary during the tenure of Indira Gandhi and Atal Bihari Vajpayee.

Table 3 Growth rate of Return of BSE

Prime Minister	Coefficient	Growth %	R^2	F-stat	Breuch-Godfrey LM Test (Ser. Cor.)	Breuch-Pagan-Godfrey Test (Hetero.)	J-B	Q-Stat (Stationary)
Indira Gandhi	-0.000144 (0.3141)	-0.014	0.0011	1.01466 (0.3141)	0.3626 (0.8342)	5.1577** (0.0231)	7668.233** (0.0000)	Insignificant
Rajiv Gandhi	-0.000197 (0.2345)	-0.019	0.0013	1.4152 (0.2345)	32.0795** (0.0000)	2.9751 (0.0847)	121.9854** (0.0000)	Sig.
P.V. Narasimha Rao	-0.000324 (0.1065)	-0.032	0.0025	2.6105 (0.1065)	31.3032** (0.0000)	44.2694** (0.0000)	1635.526** (0.0000)	Sig.
Atal Bihari Vajpayee	0.000056 (0.5730)	0.006	0.0002	0.3178 (0.5729)	4.9964 (0.0822)	19.1055** (0.0000)	603.0378** (0.0000)	Insignificant
Dr. Manmohan Singh	-0.000045 (0.3020)	-0.005	0.0004	1.0647 (0.3022)	16.1025** (0.0003)	6.8703** (0.0088)	8708.093** (0.0000)	Sig.
Narendra Modi	-0.000020 (0.5964)	0.006	0.0006	0.0989 (0.7531)	2.6363 (0.2676)	23.5660** (0.0000)	32830.86** (0.0000)	Sig.

**** Significance at 5% level**

Source: Author's own calculation

Detection of ARCH Effect:

Volatility clustering of daily return is examined by applying ARCH test. Here, AR(1) model is used to generate squared residuals for testing ARCH effect. It is found (Table 4) that both the F-statistics and LM

statistics are statistically significant at five percent level during the tenure of the Prime Ministers that means presence of ARCH effect in return series. It is also observed that the return volatility is lower during the regime of Indira Gandhi (6.0951) who was elected from INC as compared to the other PMs and higher during the time of P.V. Narasimha Rao (7.7133) who was elected from INC and then Dr. Monmohan Sing (7.0310) who was elected from INC and so on based on AIC criterion. But in a nutshell, the return volatility is almost same according to AIC criteria.

Table 4 Test of ARCH Effect

Prime Minister	F-Stat.	Obs*R^2	AIC
Indira Gandhi	4.7561** (0.0232)	4.7538** (0.0109)	6.0951
Rajiv Gandhi	6.3019** (0.0122)	6.2764** (0.0122)	6.1746
P.V. Narasimha Rao	105.4367** (0.0000)	96.0869** (0.0000)	7.7133
Atal Bihari Vajpayee	204.5026** (0.0000)	180.7093** (0.0000)	6.5219
Dr. Manmohan Singh	35.1090** (0.0000)	34.6487** (0.0000)	7.0310
Narendra Modi	65.3867** (0.0000)	62.7374** (0.0000)	6.3944

**** Significance at 5% level**

Source: Author's own calculation

The estimated outcome of GARCH model is presented in table 5. It is observed that the lagged squared residuals 'coefficients of the return during the tenure of the Indian Prime Ministers are significant as the probability values are less than five percent that means existence of volatility clustering (ARCH Effect) that also confirms about volatility of risk which is affected significantly by the past squared residuals during the tenure of the Prime Ministers. Similarly, the coefficients of the lagged conditional variance in the conditional variance equation (GARCH Effect) are significant as the probability values are less than five percent meaning that the past volatilities of BSE returns during the tenure of the Prime Ministers' are significantly influence current returns. Moreover, the summation of ARCH and GARCH effects measure the shock persistence which is very close to unity during their tenure.

Table 5 Estimation of GARCH

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)					
Prime Minister	**C(3)**	**C(4)**	**C(5)**	**C(4) + C(5)**	**AIC**
Indira Gandhi	0.2006** (0.0000)	0.2194** (0.0000)	0.6539** (0.0000)	0.8733	2.9629
Rajiv Gandhi	0.0558** (0.0003)	0.0609** (0.0000)	0.9205** (0.0000)	0.9814	3.7494
P.V. Narasimha Rao	0.0579** (0.0016)	0.1088** (0.0000)	0.8777** (0.0000)	0.9865	3.8525
Atal Bihari Vajpayee	0.1629** (0.0000)	0.1651** (0.0000)	0.7881** (0.0000)	0.9532	3.7587
Dr. Manmohan Singh	0.0275** (0.0000)	0.0924** (0.0000)	0.8965** (0.0000)	0.9889	3.3657
Narendra Modi	0.0053** (0.0004)	0.1061** (0.0000)	0.8697** (0.0000)	0.9758	2.5864

**** Significance at 5% level**

Source: Author's own calculation

Table 6 presents the estimated result of EGARCH model. It is observed that the constant terms in variance equation are statistically significant and the persistence of conditional volatility (volatility clustering) exists in return during the tenure of the Prime Ministers as depicted by the probability values. The GARCH coefficients of the return series during their tenure are statistically significant meaning that past shocks persistence significantly influences current returns. The study also examines existence of leverage effect on return during their tenure. The gamma coefficients of BSE return during the occupancy of the Prime Ministers are non zero meaning that presence of asymmetric effect in the volatilities. Here, the γ coefficients of BSE return during their regime are positive and significant. It may be said that leverage effect doesn't exist in the return during the Prime Ministers' tenure that implies presence of positive correlation between the past return and future volatility of the return or in other words, positive shocks (good news) generates less volatility than negative shocks (bad news). Thus, return of the BSE is less volatile during the administration of the PMs.

Table 6 Estimation of EGARCH model

LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)*RESID(-1)/@SQRT(GARCH(-1) + C(6)*LOG(GARCH(-1))					
Prime Minister	**C(3)**	**C(4)**	**C(5)**	**C(6)**	**AIC**
Indira Gandhi	-0.1915** (0.0000)	0.3014** (0.0000)	0.0457** (0.0029)	0.8812** (0.0000)	2.9511
Rajiv Gandhi	-0.0787** (0.0000)	0.1464** (0.0000)	-0.0190 (0.1480)	0.9654** (0.0000)	3.7432
P.V. Narasimha Rao	-0.1445** (0.0000)	0.2112** (0.0000)	0.0312** (0.0316)	0.9808** (0.0000)	3.8562
Atal Bihari Vajpayee	-0.1517** (0.0000)	0.2949** (0.0000)	-0.1301** (0.0000)	0.9155** (0.0000)	3.7356
Dr. Manmohan Singh	-0.1376** (0.0000)	0.1947** (0.0000)	-0.0787** (0.0000)	0.9781** (0.0000)	3.3567
Narendra Modi	-0.0919** (0.0000)	0.1078** (0.0000)	-0.1446** (0.0000)	0.9742** (0.0000)	2.5275

**** Significance at 5% level**

Source: Author's own calculation

Table 7 presents the outcome of TGARCH estimation. Here, the constant term is significant during the tenure of the Prime Ministers. The GARCH coefficients are statistically significant that confirms about previous return volatility significantly influence current returns. The γ values during the tenure of the Prime Ministers are not zero that means presence of asymmetric shocks in the return. If a fall in return is accompanied by an increase in volatility greater than the volatility induces by an increase in return then leverage effect exist or in other words, leverage effect means negative correlation between past returns and future volatility of returns (bad news has more impact on volatility of return than good news). Here, the C(5) coefficients during the time of Atal Bihari Vajpayee, Dr. Monmohan Sing and Narendra Modi are positive and statistically significant as the probabilities values are less than five percent that means leverage effect exists during their administration. Thus, it may be said that negative news has more impact on conditional volatility of return than the positive news during their tenure as compared to other Prime Ministers.

Table 7 Estimation of TGARCH

GARCH = C(3) + C(4)*RESID(-1) ^2 + C(5)*RESID(-1) ^2*(RESSID(-1)< 0) + C(6)*GARCH(-1)							
Prime Minister	**C(3)**	**C(4)**	**C(5)**	**C(6)**	**C(4) + C(5)**	**C(4)+C(5)+C(6)/2**	**AIC**
Indira Gandhi	0.2075** (0.0000)	0.2715** (0.0000)	-0.0999** (0.0155)	0.6442** (0.0000)	0.1716	0.4079	2.9617
Rajiv Gandhi	0.0727** (0.0002)	0.0539** (0.0001)	0.0379 (0.0576)	0.9039** (0.0000)	0.0918	0.4979	3.7492
P.V. Narasimha Rao	0.0553** (0.0013)	0.1178** (0.0000)	-0.0297 (0.1881)	0.8816** (0.0000)	0.0881	0.4849	3.8531
Atal Bihari Vajpayee	0.2014** (0.0000)	0.0439** (0.0080)	0.2144** (0.0000)	0.7838** (0.0000)	0.2583	0.5211	3.7327
Dr. Manmohan Singh	0.0332** (0.0000)	0.0396** (0.0000)	0.1076** (0.0000)	0.8929** (0.0000)	0.1472	0.5201	3.3508
Narendra Modi	0.0275** (0.0000)	-0.0168** (0.0253)	0.1919** (0.0000)	0.8887** (0.0000)	0.1751	0.5319	2.5343

**** Significance at 5% level**

Source: Author's own calculation

The study uses various measures to forecast volatility of BSE return and it is also a hard task to select the best performing model among them. Here, AIC (Akaike Information Criterion) is used to select the best model. It is observed that EGARCH model is superior to forecast return volatility during the administration of Indira Gandhi (INC), Rajiv Gandhi (INC) and Narendra Modi (BJP). Similarly, TGARCH measure is appropriate to forecast BSE return volatility during the tenure of P.V. Narasimha Rao (INC), Atal Bihari Vajpayee (BJP) and Dr. Monmohan Singh (INC).

Table 8 Selection of appropriate volatility forecasting model

AIC				
Prime Minister	**GARCH**	**EGARCH**	**TGARCH**	**Selection**
Indira Gandhi	2.9629	2.9511	2.9617	EGARCH
Rajiv Gandhi	3.7494	3.7432	3.7492	EGARCH
P.V. Narasimha Rao	3.8525	3.8562	3.8531	TARCH
Atal Bihari Vajpayee	3.7587	3.7356	3.7327	TARCH
Dr. Manmohan Singh	3.3657	3.3567	3.3508	TARCH
Narendra Modi	2.5864	2.5275	2.5343	EGARCH

Source: Author's own calculation

The investors' sentiment on Prime Minister regarding growth of BSE return is presented in table nine. It is observed that the investors are more sensitive during the administration of Indira Gandhi, Rajiv Gandhi and Dr. Monmohan Singh who are elected from INC because the Prime Ministers' dummies are positive and statistically significant meaning that those Prime Ministers have significant impact on the growth of BSE return and gaining the faith of the investors point of view. Similarly, during the tenure of P.V. Narasimha Rao (INC), Atal Bihari Vajpayee (BJP) and Narendra Modi (BJP) have failed to gain the faith of the investors' as the coefficients are not statistically significant and therefore, can't influence the growth of return significantly.

Table 9 Investors' sentiment on Prime Minister

Prime Minister	Coefficient	t-statistic	Probability
Indira Gandhi	0.0922**	2.4656	0.0139
Rajiv Gandhi	0.1057**	2.0779	0.0380
P.V. Narasimha Rao	0.1172	1.8985	0.0579
Atal Bihari Vajpayee	0.0320	0.7251	0.4685
Dr. Manmohan Singh	0.0768**	2.4325	0.0151
Narendra Modi	0.0349	1.3269	0.1650

**** Significant at 5% level**
Source: Author's own calculation

Conclusion:

It is observed that the BSE return don't follow random walk and inefficient at its weak form during the tenure of the Prime Ministers. Therefore, the investors don't have the ability to forecast future return during their occupancy. Moreover, volatility shocks present in the return. GARCH coefficient indicates that past volatility affects the current returns during their tenure that is also followed by the EGARCH measure. Leverage effect doesn't exist in the return during their time span. But leverage effect exists based on TGARCH measure during the administration of Atal Bihari Vajpayee, Dr. Monmohan Sing and Narendra Modi meaning that negative shocks generate more volatility than positive shocks during their tenure. The appropriate volatility forecasting model during their tenure is determined based on AIC criterion. Finally, the investors are more biased on those Prime Ministers who are elected from Indian National Congress for the growth of BSE return. Finally, it may be concluded that election of Prime Minister can influence stock market's growth and also recommended that every elected prime minister should take appropriate measure and policy by which Indian stock market can flourish and investors can trust on them.

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RISK- RETURN PERCEPTION AND OPTIMAL PORTFOLIO BUILDING THROUGH DIVERSIFICATION IN INDIAN STOCK MARKET

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ABSTRACT

Investment in stock market is associated with high levels of risk and therefore people have a fear of losing their hard earned income. But the risk associated with stock market is something which cannot be eliminated completely. In this context continuous research works are being done by investors, stock analysts, to find out strategies using which the risk can be reduced to the least possible extent. One such strategy for reduction of risk is through proper diversification. In this context, the study intended to identify the risk-return perception of individual investors relating to various industrial sectors in the Indian Stock Market and to assess the performance of sector wise portfolios in the Indian Stock Market formulated based on different risk – return levels and size of market capitalisation. The data analysis revealed that the most return generating sectors during the last ten years were Automobile, Consumer durables and Chemicals and the least risky sectors were FMCG, Pharmaceuticals and Chemicals. Based on the analysis and computations, it was found out that all the sector wise diversified portfolios generated higher returns than the market.

(Keywords: Risk, return, diversification, portfolio selection, industrial sectors, stock market, investment)

Introduction

The growth of an economy is driven by several factors amongst which level of savings and investment plays a key role. People have the liberty to decide the utilization of their personal income and how much of their income is to be kept as savings. The success of an economy depends on the fact that how much of these savings can be channelized into productive investments. Prospective investors always seek for investment avenues providing maximum returns at minimum level of risk. Stock market of a country is one such investment avenue which provides returns to investors based on the level of risk they are willing to bear. Therefore the stock market plays a prominent role in channelizing savings of households into the capital allocation of the corporate sector and thereby contributing to the overall economic aggregates.

India is one of the fastest growing economies in the world. The success run that India has been recognized with over the past decade has been reflected upon several indicators including the Indian Stock Market. The stock market indices are generally considered to be the barometer of an economy. The two

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major stock market indices in India- BSE Sensex and NSE Nifty have shown considerable growth over the last ten years. NSE Nifty has increased from 3033.45 points as on January 1, 2009 to 12190 on January 1, 2020. Likewise S&P BSE Sensex had risen from 9903.46 points as on January 1, 2009 to 41,306,as on January 1, 2020. This growth in the stock market can be accounted to investors forming part of only three per cent of the total population of India as in 2020 (based on number of demat accounts registered with CDSL and NSDL). This shows that a vast majority is still remaining aloof from investing in the stock market and there is a lot of scope for improving the investment levels in this arena.

People generally shy away from investing the stock market due to its high volatile nature and unpredictability. Investment in stock market is associated with high levels of risk and therefore people have a fear of losing their hard earned income. But the risk associated with stock market is something which cannot be eliminated completely. In this context continuous research works are being done by investors, stock analysts, to find out strategies using which the risk can be reduced to the least possible extent. The ultimate aim of every investor is to create an optimal portfolio which yields him the maximum returns at the minimum level of risk.

One such strategy for reduction of risk is through proper diversification. Kumar and Goetzmann(2001) in their work 'Equity Portfolio Diversification' stated that investors were unable to (or unwilling to) choose stocks in a manner consistent with the goal of diversification. A vast majority of the portfolios were found to be under diversified. The typical investor did not seem to show any evidence of attempting to diversify their accounts beyond naive approaches like holding a few more different stocks. Proper diversification of risk can be done by investing across different sized firms, different industrial sectors or different instruments. An in depth analysis of the stock market indices and risk reduction strategy through sectoral investment can help investors to arrive at their most optimal portfolio and this in turn will attract more and more prospective investors to invest in the Indian stock market.

Review of Literature

The disenchantment of household sector with securities is confirmed by various SEBI –NCAER (NCAER, 2011) surveys, indicating a low priority of investors for securities. The studies also revealed that majority of the investors were unlikely to invest in the securities market in the future years. Therefore a need for a simplified model for constructing optimal portfolio which will work in the Indian Stock Market aroused.

(Jiranyakul, 2011) tried to provide new evidence on the risk- return trade off in the Stock Exchange of Thailand using monthly data. It is found that there exists a positive risk- return trade off in both capital gain and dividend excess returns. The size of the risk –return trade off is higher and more highly significant when the market divided yield is used to obtain the excess return.

(Pandey, 2012) reviewed the formation of optimal portfolio using real life data. The study revealed that Markowitz portfolio selections were obtained by solving the portfolio optimization problems in generating maximum total returns, with minimum allowable risk level as a constraint. It basically calculates the standard deviation and returns for each of the feasible portfolios and identifies the efficient frontier

which is the boundary of feasible portfolios of increasing returns in the risk- return region.

(Malik & Saini, 2013) analysed the rationale of portfolio management under traditional and modern approach, in helping the investor in creating a portfolio which yields him maximum return at minimal risk. It was concluded that the traditional approach takes into consideration, the entire financial plan of the individual investor whereas in the modern approach, Markowitz model is used which gives more importance to decision based on analysis of risk and return.

(Jensen, 2013) reviewed asset allocation strategies namely four risk-based portfolios - Global Minimum-Variance, Inverse Volatility, Most Diversification Portfolio and Risk Parity. It was found out that, all the risk based portfolios showed improved portfolio performance over the traditional 60-40 portfolio. Optimization was not required for the Inverse Volatility portfolio making it less complex than any of the other portfolio strategies. The Most Diversification Portfolio had the highest ex-ante diversification but delivered lower risk adjusted returns than the Global-Minimum Variance and at a higher turnover.

(Gajera, Vyas, & Patoliya, 2015) analysed the risk and return of various indices of S&P BSE namely large cap, mid cap and small cap to find out the best indices for investment. Historical data for a period of four years on a monthly basis were taken for the study and it was concluded that most of the investors who were risk averse preferred large cap funds. The large cap funds had low returns as well as low risk as compared to other stocks based on market cap.

(Sirucek, 2015)focused on building investment portfolios by using the Markowitz Portfolio Theory in the US Stock Market. The formulated portfolios by a random selection included a benchmark portfolio made using the CAPM model, portfolios with low and high beta coefficients and a random portfolio. The results of thee formulated portfolios compared to the tangency portfolio based on benchmark Dow Jones Industrial Average Index indicated a relatively high performance of US stock markets.

(Rodrigues & Suresha, 2018) carried out a study on risk and return using Markowitz model in constructing an optimal portfolio and its relative importance to investors. The sample selected for the study included 25 companies listed with NSE. It was found out that the Markowitz model helped the investors in selecting a portfolio which yielded higher returns at a given level of standard deviation and also in diversification of investments.

(Patil & Ravi, 2018) examined the correlation and the risk- return tradeoff of the BSE Sensex with selected banking stocks namely HDFC Bank, ICICI Bank, Axis Bank and SBI. The results indicated high correlation between returns of Sensex with Axis bank and negative correlation with ICICI. All the banking stocks except ICICI Bank move similar to Sensex as they have positive beta values.

(Ayre & Yadav, 2019) analysed the risk and return of selected stocks in Banking Sector which were listed in NSE, based on Markowitz model and Sharpe ratio. This analysis aimed to give solutions to investors for creating the most suitable portfolio. Five years data from 2013 to 2017 were taken for the study. The results indicated that all the selected banks have performed well. From the study, it was found out that investors can diversify their risk by adding more stocks to the portfolio.

With investing it could be said that one of the most important decisions is diversification. As the various stock markets in the world increasingly move in tandem, diversification and optimal returns are more likely to be achieved if evolving changes in sectors are taken seriously in portfolio management

Statement of the Problem

Diversification is considered as a strategy to reduce the risk involved in stock market investment. It emphasizes on the general investment rule of not putting all eggs in one basket. This concept is mis-interpreted as investors are merely holding a few numbers of stocks in their portfolio in the name of diversification. This is done without any proper judgments and therefore does not serve the purpose of risk reduction. David Rode(2000) demonstrated that investors do not make a clear connection between risk reduction and diversification. They pursue diversification for its own sake and not for achieving reduction in portfolio risk. Kumar and Goetzmann(2001) also stated that investors were unable to or unwilling to choose stocks in a manner consistent with the goal of diversification and therefore a vast majority of the portfolios were found to be under diversified. All this suggests that investors want to diversify their portfolios but are not so successful in doing it for attaining its objective of risk reduction. Since the investors are not able to do proper diversification of risk, they are finding it difficult to create and maintain an optimal portfolio of investment which provides them with maximum returns at minimal risk. If investors can diversify their portfolio properly and deal with the risk involved in stock market, then the Indian Stock Market will witness tremendous increase in the levels of investment, thereby contributing to the growth of the entire Indian economy.

Need and significance of the Study

Indian Stock Market is one such avenue which has grown considerably over the years. But this growth is attributable only to a minority of the population. Inorder to increase the attractiveness of stock market investment, many reforms were carried out like dematerialization of shares, electronic trading platforms that can be accessed from anywhere, faster trading settlements, development of mobile friendly applications, and online registration with e-brokers, more transparent and secure trading. All these efforts were carried out to make investments in stock market more investor friendly and convenient and thereby to increase the number of investors. But one the major factor keeping the investors at bay is the risk associated with the dynamic environment of the stock market. Therefore, various strategies are being worked out on diversification of risk to channelize more and more investments into the stock market.

Objectives of the Study

The study is based on the following objectives:

1. To identify the risk-return perception of individual investors relating to various industrial sectors in the Indian Stock Market.

2. To assess the performance of sector wise portfolios in the Indian Stock Market formulated based on different risk – return levels and size of market capitalisation.

Methodology

This study analyses the investment preferences of individual investors who have been investing in the Indian Stock Market for a period exceeding ten years. For the primary data required for the study, a structured questionnaire was used to collect the opinion of the individual investors. Likert's five-point scale was used for measuring the opinion of respondents. Judgement sampling technique was used to collect the primary data from 400 individual stock market investors residing in Kerala.

For the secondary data, the Indian stock market is represented by NSE as it is the leading stock exchange in India and the second largest in the World by the number of trades in equity shares as in 2018 according to the World Federation of Exchanges (WFE) Report. Sectoral investment preference and analysis of sectors were limited to selected 15 sectors which covers all the major industries in the Indian economy. The 15 sectors are automobile, banking, cement, chemicals, construction, consumer durables, FMCG, Information Technology, media, metals and mining, oil& gas, pharmaceuticals, power, real estate and telecommunications. From each of these sectors, ten companies having the highest market capitalization were selected for detailed analysis and formulation of sector based portfolios. Monthly adjusted closing prices of the stocks were taken for the study.

Return perception relating to industrial sectors

While selecting a portfolio, an investor would select those companies which offer the highest rate of return. Before selection of companies, the investors can analyse the returns of industrial sectors to which those companies belong and then make investments and thereby diversify investments across sectors. This section analyses the return associated with various industrial sectors by the individual investors.

Table . 1 : Return Associated with Sectors: One sample t-test

Sectors	Mean	SD	t-value	p-value
Automobile	3.760	0.975	15.597	<0.001**
Banking	3.508	1.153	8.807	<0.001**
Cement	3.333	0.990	6.720	<0.001**
Chemicals	3.495	0.939	10.540	<0.001**
Construction	3.640	0.996	12.846	<0.001**
Consumer durables	3.270	1.261	4.281	<0.001**
FMCG	3.250	1.260	3.970	<0.001**
Information Technology	3.458	1.234	7.417	<0.001**
Insurance	3.333	1.249	5.323	<0.001**
Media	3.380	1.257	6.047	<0.001**
Metals and Mining	3.468	1.085	8.619	<0.001**
Oil& Gas	3.238	1.255	3.785	<0.001**
Pharmaceuticals/healthcare	3.145	1.262	2.298	0.022*
Power	3.418	0.922	9.055	<0.001**
Real Estate	3.835	1.227	13.606	<0.001**
Telecommunication	3.518	1.201	8.615	<0.001**
Overall Return Associated with Sectors	**55.045**	**11.748**	**88.600**	**<0.001****

Source: Primary data *** denotes significant at 1% level * denotes significant at 5% level*

The opinion of individual stock market investors on returns generated by various industrial sectors are significantly different from the average opinion among individual investors (p<0.01) (Table no 1) Majority of the investors consider real estate sector ($\bar{x}$=3.835), automobile sector ($\bar{x}$=3.760) and construction sector ($\bar{x}$=3.640) as the sectors giving maximum returns for their investment. Pharmaceuticals sector ($\bar{x}$=3.145) is comparatively opined to be the sector providing least level of returns but is also preferred as sector providing returns and t test also reveals the same at 5 % level (p<0.05).

Risk perception relating to industrial sectors

People generally consider stock market to be a risky avenue for investment. The perception of the investors relating to the various industrial sectors in the stock market is different. This section analyses the perception of investors towards industrial sectors in the India stock market in terms of risk associated with it.

Table . 2: Risk Associated with Sectors : One sample t-Test

Sectors	Mean	SD	t-value	p-value
Automobile	3.753	0.966	15.576	<0.001**
Banking	3.928	0.902	20.557	<0.001**
Cement	3.778	0.985	15.785	<0.001**
Chemicals	3.365	1.134	6.440	<0.001**
Construction	3.548	1.022	10.710	<0.001**
Consumer durables	3.658	1.117	11.770	<0.001**
FMCG	3.570	1.011	11.273	<0.001**
Information Technology	4.183	0.947	24.979	<0.001**
Insurance	3.568	1.214	9.348	<0.001**
Media	3.443	1.194	7.413	<0.001**
Metals and Mining	3.550	0.954	11.533	<0.001**
Oil& Gas	3.885	0.930	19.043	<0.001**
Pharmaceuticals/healthcare	3.673	0.945	14.237	<0.001**
Power	3.513	0.947	10.822	<0.001**
Real Estate	3.600	1.204	9.970	<0.001**
Telecommunication	3.423	1.232	6.859	<0.001**
Overall Risk Associated with Sectors	**58.433**	**11.132**	**99.596**	**<0.001****

Source: Primary data ** *denotes significant at 1% level*

The opinion of individual stock market investors on risk associated with various industrial sectors are significantly different from the average opinion among individual investors (p<0.01) (Table no. 2). Majority of the investors consider IT sector ($\bar{x}$=4.183) as the sector having highest level of risk. Other risky sectors includes banking sector ($\bar{x}$=3.928), oil & gas ($\bar{x}$=3.885), cement sector ($\bar{x}$=3.778), automobile sector ($\bar{x}$=3.753) and healthcare sector ($\bar{x}$=3.673) and t test reveals the same at 1 % level. Chemical sector ($\bar{x}$=3.365) and telecommunication sector are comparatively opined to be the sectors having least level of risk and t test also reveals the same at 1 % level (p<0.01). The overall opinion on level of risk associated with sectors indicate that all the sectors are risky to individual investors and are highly significant at 1 % level (p<0.01)

Performance of the sector based portfolios

The overall performance of the 15 sectors based on the monthly data collected for a period of ten years from 1st January,2009 to 31st December,2018 has been shown in this section. The performance has been analyzed using the evaluative measures – Sharpe ratio, Treynor ratio and Jensen's differential return. The formulae for these measures are as shown below:

Risk adjusted returns	
(i) Sharpe Ratio $= \frac{Rp - Rf}{\sigma_p}$	*where*, R_p is the portfolio return, R_f is the risk free rate of return, σ_p is the portfolio standard deviation β_p is the portfolio beta α is the differential return, R_m is the market return $\bar{R}_p$ is the expected return of the portfolio, (Determined by CAPM equation $\bar{R}_p = R_f + \beta_p(R_m - R_f)$
(ii) Treynor ratio $= \frac{Rp - Rf}{\beta_p}$	
(iii) Jensen's α $= R_p - \bar{R}_p$	

Table.3 Performance of Sectors Based on Sharpe Ratio

Sector	Rp	SD	Coeff of variation**	Sharpe*	Rank
Automobile	13.607	6.672	0.490	0.876	**I**
Bank	7.085	8.826	1.246	-0.076	VIII
Cement	7.892	8.806	1.116	0.015	VI
Chemical	12.766	5.890	0.461	0.850	**II**
Construction	4.487	9.016	2.009	-0.363	IX
Consumer durables	13.530	8.010	0.592	0.720	**III**
FMCG	7.814	4.094	0.524	0.013	VII
IT	9.372	6.496	0.693	0.248	**V**
Media	3.937	7.793	1.979	-0.491	X
Metals	3.246	8.636	2.661	-0.523	XII
Oil & Gas	2.516	7.202	2.862	-0.728	XIV
Pharmaceuticals	10.097	5.499	0.545	0.425	**IV**
Power	0.655	6.748	10.305	-1.053	XV
Realty	3.643	8.310	2.281	-0.495	XI
Telecom	2.468	7.341	2.975	-0.721	XIII
NIFTY	**2.056**	**5.265**	**2.561**	**-1.083**	

Source: Computed Data *Rf= 7.760 (monthly average rate of India 10 year bond)

** Coefficient of variation= Standard deviation/ Mean

Table No.3 evaluates the portfolio based on Sharpe ratio. The preliminary analysis gave the portfolio returns and standard deviation of all the sectors. The highest return was generated by automobile sector(13.607) followed by Consumer durables sector (13.530) and chemicals sector(12.766).The lowest risk as measured by the standard deviation was associated with FMCG(4.094), Pharmaceuticals(5.499) and Chemicals(5.890).

The Sharpe ratio uses standard deviation as the measurement of risk. But by properly diversifying, the total risk as measured by standard deviation can be reduced to systematic risk as measured by beta. The Treynor ratio uses beta as the measure of risk. The risk adjusted returns based on Treynor ratio is shown in Table No.4

Table. 4 Performance of Sectors Based on Treynor Ratio

Sector	Rp	Bp	Treynor*	Rank
Automobile	13.607	1.065	5.492	**I**
Bank	7.085	1.422	-0.475	VIII
Cement	7.892	1.295	0.102	VII
Chemical	12.766	0.948	5.280	**II**
Construction	4.487	1.378	-2.376	IX
Consumer durables	13.530	1.195	4.829	**III**
FMCG	7.814	0.462	0.116	VI
IT	9.372	0.725	2.223	**V**
Media	3.937	1.225	-3.121	XI
Metals	3.246	1.307	-3.455	XII
Oil & Gas	2.516	1.059	-4.954	XIV
Pharmaceuticals	10.097	0.540	4.330	**IV**
Power	0.655	1.018	-6.983	XV
Realty	3.643	1.407	-2.925	X
Telecom	2.468	1.071	-4.943	XIII
NIFTY	**2.056**	**1.000**	**-5.704**	

Source: Computed data *Rf= 7.760 (monthly average rate of India 10 year bond)

Based on the Treynor ratio, the sector which generated the highest return was Automobile which was followed by chemicals and consumer durables sector. Only seven out of the 15 sectors generated positive returns from the market. Power, oil and gas and telecom sectors were the worst performing sectors based on Treynor ratio (Table No. 4). These results were similar to that provided by Sharpe ratio in Table No.3

For analyzing the performance of the sectors, the excess returns generated by each of the sectors as measured by Jensen's differential return taking into consideration the actual return of the portfolio and

the expected return as per the CAPM equation is given in Table No.5

Table. 5 Performance of Sectors Based on Jensen's Differential Return

Sector	Rp	Bp	Jensen*	Rank
Automobile	13.607	1.065	11.920	**II**
Bank	7.085	1.422	7.435	**V**
Cement	7.892	1.295	7.518	**IV**
Chemical	12.766	0.948	10.414	**III**
Construction	4.487	1.378	4.586	VIII
Consumer durables	13.530	1.195	12.586	**I**
FMCG	7.814	0.462	2.688	XII
IT	9.372	0.725	5.747	VI
Media	3.937	1.225	3.164	X
Metals	3.246	1.307	2.939	XI
Oil & Gas	2.516	1.059	0.794	XIV
Pharmaceuticals	10.097	0.540	5.416	VII
Power	0.655	1.018	-1.301	XV
Realty	3.643	1.407	3.911	IX
Telecom	2.468	1.071	0.815	XIII
NIFTY	**2.056**	**1.000**	**-0.0004**	

Source: Computed Data *Rf = 7.760(monthly average rate of India 10 year bond)

The Jensen's alpha or the differential return indicated that Consumer durables is the sector that provided the highest excess returns during the 2009-2018 period. It was followed by automobile sector and chemicals sector. The least performing sectors were Power, Oil &gas and telecom sectors (Table No.5). Inferior returns were generated only by the power sector.

SECTOR WISE PORTFOLIOS- AN ANALYSIS

The portfolios were formed on the basis of highest market return, highest standard deviation, lowest standard deviation, highest beta, lowest beta based on the data analysed for the ten year period from 2009-2018. Three additional portfolios were formulated based on market capitalization- large cap, mid-cap and small cap portfolios (SEBI, 2017). Two stocks were selected from each of the sectors to form these sector-wise diversified portfolios. The risk return analysis of the eight sectoral portfolios formu-

lated is given in Table No. 6

Table .6 Risk- Return Analysis of Sector Wise Formulated Portfolios

Portfolio	Mean return	Standard deviation	Coefficient of variation
Highest return portfolio	16.19	6.34	39.17
Highest standard deviation portfolio	7.81	8.24	105.56
Lowest standard deviation portfolio	5.22	4.27	81.72
Highest beta portfolio	5.72	9.45	165.18
Lowest beta portfolio	6.22	3.82	61.46
Large Cap portfolio	5.88	4.77	81.06
Mid Cap portfolio	5.34	6.13	114.87
Small Cap portfolio	4.70	7.68	163.30
Market – NIFTY	**2.06**	**5.27**	**256.09**

Source: Computed Data

Based on the analysis and computations, it was found out that all the sector wise diversified portfolios generated higher returns than the market. The highest return portfolio gave 16.19 per cent of monthly simple returns which was way more than the return generated by the market (2.06). The standard deviation associated with this portfolio computed using variance covariance matrix, was also higher than the market. But the relative measure of coefficient of variation of highest return portfolio (39.17) was very low as compared to the market(256.09) (Table No. 6).Therefore a sector wise diversified portfolio based on highest mean returns is an advisable portfolio. The highest and lowest standard deviation portfolios had returns based on the level of risk which indicates that higher the risk, higher the return. Based on risk tolerance, a portfolio can be selected. While considering the beta values, the lowest beta portfolio generated more returns than the market than the highest beta portfolio at lower standard deviation and coefficient of variation lesser than the market and is therefore advisable for investment. Among the market capitalization portfolios, the large cap portfolio has the highest return (5.88) which was higher than the market return and the lowest risk (4.77) which was lower than the market (Table No.6). Therefore large cap portfolio is the most advisable among the large, mid and small cap portfolios.

Conclusion

Majority of the investors consider real estate sector, automobile sector and construction sector as the sectors giving maximum returns for their investment. Chemical sector and telecommunication

sector are comparatively opined to be the sectors having least level of risk The secondary data analysis revealed that the most return generating sectors during the last ten years were Automobile, Consumer durables and Chemicals and the most risky sectors were Construction, Bank and Cement sector. The least risky sectors were FMCG, Pharmaceuticals and Chemicals. The stable sectors as compared to the market, based on beta were FMCG, Pharma, IT and Chemical sectors. All the sector-wise diversified portfolios formulated for the study generated mean returns higher than the market returns for the period 2009-2018.The optimal portfolios amongst the eight portfolios formulated were Lowest beta portfolio, Lowest standard deviation portfolio, and Large cap portfolio, as they had generated returns higher than the market and had a standard deviation less than the market. If the risk tolerance level of the investor is high, the Highest return portfolio is also a good investment option, as it provided maximum returns as compared to the market. The sectoral investment therefore helps in outperforming the market and selecting an optimal portfolio.

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COVID - 19 PANDEMIC & ITS IMPACT ON STOCK MARKET

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ABSTRACT

The present study seeks to examine the effect of COVID-19 on stock market. Due to sudden COVID-19 attack thousands of people have lost their valuable lives and infected people around the world are fighting against death and the situation is severe. All the nations are jointly working against COVID-19 to save the human civilization. The COVID-19 shock has not only pushed the human life in danger but also the entire economy in the world has headed down in front of COVID-19. The entire stock markets around the world are expected to decline sharply by COVID-19 shock. Keeping this view in mind, the study considers five indices (BSE & NSE – India, SCI – China, LSE – Great Britain & NYSE – USA) to examine the above issue and thus, closing daily values of the indices are considered and checked for normality and stationarity. Here, OLS, logit and probit models are applied and found that all the selected indices are sharply affected by COVID-19 shock except Shanghai Composite Index (SCI) in China.

Key Words: COVID, BSE, NSE, NYSE, LSE, SCI

Jel Code: C13, C5, G15

Introduction

Entire world is now experiencing the negative impact of COVID-19. We are all fighting against this deadly Corona virus by which we can save our human civilization in the Earth. Already, we have lost thousands of human lives by this deadly virus. Millions of people have been infected and in isolation. The entire economy in the world is going down speedily within a very short period of time and if this continues the entire world would experience a great recession. Corona virus is not a flu, because it is not due to an influenza virus but it is very similar to these pandemic flus. But, there are two epidemics

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of corona virus related severe respiratory illness in the recent past. The first one is Severe Acute Respiratory Syndrome (SARS) caused by the virus known as SARS-COV that spread among 30 countries in the world in 2003-04 and infected more than 8500 people and 813 were died among them. The second epidemic is Middle East Respiratory Disease Syndrome (MERS) in Arabia due to corona virus that affected 2500 people and 858 were declared as death (Sullivan, 2018).

COVID-19 outbreak expands significantly into a global pandemic. It is the epidemic of a respiratory illness caused by a virus identified and popularly known as COVID-19 (Corona virus). The virus is officially designated as "Severe Acute Respiratory Syndrome Corona virus 2 (SARS-COV-2)" that is assigned by the International Committee on Taxonomy of Viruses. It is related genetically but unlike from acute respiratory syndrome corona viruses (SARS-CoV) (WHO, 2020). The Pattern of symptoms is the same in the majority of patients with mild or levels of symptoms (JSA & AIPSN, 2020). A study claims that around 14% per 1000 were died (Guan et al., 2020). Another study by Li et al., 2019 depicts that 71000 influenza associated excess respiratory deaths occurred in individuals aged 60 years or older. Another study by Lancet (2018) concludes that influenza virus causes death to children but fortunately the corona virus has not led to death in children but infected (CIA et al., 2020). In India, currently, 7000 persons have been tested since the epidemic began (Scroll, 2020). A joint mission on COVID-19 conducted by WHO and China (2020) reports that (1) COVID-19 is transmitted via droplets and fomites during close unprotected contact between an infector and infectee (2) in China, human to human transmission of the COVID-19 is largely occurring in families and (3) China has a policy of meticulous case and contact identification for COVID-19. Another paper by Benjamin Hurlbut (2017) examines the relationship between political norms associated with governance of pandemic risk and he argues that scientific regimes are laying claim to a kind of sovereignty by positioning the norms of scientific practice including a commitment to unfettered access to scientific information and to the authority of science to declare what needs to be known as essential to global governance. He reports that scientific authority occupies a constitutional position insofar as it figures centrally in the repertoire of imaginaries that shape how a global community is imagined. In 2019, Yang et al., says that COVID-19 outbreaks in Wuhan, Hubei province and began spreading rapidly with more than 80000 cases confirmed and 3000 deaths in China. Many countries like Italy, Iran, Korea, Japan, USA and other countries have reported nearly 60000 cases and most of the COVID-19 patients initially suffered from fever, cough, fatigue and breathing problem along with muscle pain, headache, chest pain and diarrhea similar to the symptoms observed after chemotherapy, targeted and immune therapy. Kim et al., (2016) once again memorizes the Ebola scare in 2014 where many people evinced strong fear and xenophobla and their study informed by the pathogen-prevalence hypothesis, tested the influence of individualism and collectivism on xenophobic response to the threat of Ebola. Similarly, Ceukelaire et al., (2020) says that corona virus (COVID-19) outbreak has already spread from China to the entire world in less than two months. Now is the time to take stock and to assess the responses of different countries to the outbreak so far. Global corona pandemic teaches to the entire nation that strong public health systems have the flexibility to address massive health threats with the collective responses they require. Privatization of health services and individualization of risks might further weaken our ability to address this and future global pandemics. Another study by Tomes (2010) observes that Spanish influenza arrived in the United States at a time when new forms of mass transportation, mass media, mass consumption and mass warfare had vastly expanded the public places in which communicable diseases could spread. So, public health authorities tried to implement social distancing measure to control over the situation of deadly crowd disease. The study reports that social distancing is an im-

portant measure that significantly can reduce mortality rates affected by H1N1 influenza pandemic during 1918-1919. So, it may be opined that social distancing is an important tool opined by the entire world to protect human lives from spreading COVID-19 also.

A 55 year old individual from Hubei province in China may have been the first person to have infected COVID-19 in 17th November 2019 (South Morning China Post). Therefore, the authorities suspect that the virus came from something sold at a wet market in the city. However, it is now confirmed that early in what is now a pandemic, some infected people had no connection to that seafood market which is reported by the researchers in 20th January 2020 in a journal (The Lancet). Scientists now suspect that corona virus has been originated in a bat and somehow hopped to another animal, possibly the pangolin which then passed it into the human body. So, here there is a lot of anomaly about origin of COVID-19. Someone claims it is artificially invented by the scientist and the other groups claim it has been passed from the animal body. Now the disease is spreading between people without any animal intermediary and the scientists are trying to trace the virus back to where it has been originated to learn more about its spread.

Where the source of COVID-19 till now is unknown and we expect it would be disclosed in the coming days. But, besides human loss, the entire economy is at risk. Today's economy is not a centrally planned and fully independent. All economies are interlinked and interdependent with each other and thus, all the economy is termed as global economy. There are so many factors that affect the economy positively or adversely. Recently, the entire economy in the globe is suddenly affected by the corona virus (COVID-19) and as a result, the economies become slowdown and side by side all the nations become lockdown rapidly. So, COVID-19 shock originated from China has been spread all over the world and the economies are going to face global crisis. The increased uncertainty has led to financial market more volatile which transpiring all the economies in front of deepest financial crisis in recent time. It has been seen that most international stock markets are nearing bear market territory as investors process the lower corporate earnings that will result from the fear of COVID-19 pandemic outbreak. The longer the COVID-19 spreads, the more economic and corporate performance will be adversely impacted and raising concern about debt sustainability especially for highly indebted countries and companies. In 2012, Lewandowsky et al., says that widespread prevalence and persistence of misinformation in contemporary societies, such as the false belief that there is a link between childhood vaccinations and autism, is a matter of public concern. They speak about myths surrounding vaccinations which prompted some parents to refuse to give immunization from their children have led to a marked increase in vaccine preventable disease as well as unnecessary public expenditure on research and public information campaigns aimed at rectifying the situation. They examine how this misinformation is disseminated in society both unintentionally and purposely. Misinformation can originate from rumors but also from works of fiction, governments and politicians and vested interests. Moreover, changes in the media landscape including the arrival of internet have fundamentally influenced the ways in which information is communicated and spread and they also examine the misinformation at the level of the individual and review the cognitive factors that often render misinformation resistant to correction. Recently, we have seen misinformation spreading over the social media about COVID-19 pandemic and it is very difficult to assess which is wrong and which right. This misinformation is spreading by the individual, political leaders, religious saints and their followers for their vested interest. So, it is dangerous for a country to control over the situation of COVID-19 and thus, to control over the debunking of misinformation they provide

specific recommendations pertain to the ways in which corrections should be designed, structured and applied in order to maximize their impact.

In this volatile situation, the present study tries to examine the effect of COVID-19 on the selected stock markets around the world. The study is new one and there is scanty of literatures. There is lot of studies on financial crisis but financial slow down by virus attack is totally new one and this study surely adds value to the existing literature.

Objective of the study:

The study is trying to examine the following objectives:

1. To examine the impact of CIVID-19 on stock market

2. To examine the vulnerable situation caused by COVID-19 in the stock market based on logit and probit model

Data & Study period:

The study uses daily data and thus five popular stock market indices are considered around the world namely Bombay Sensitive Exchange (BSE), National Stock Exchange (NSE), New York Stock Exchange (NYSE), London Stock Exchange (LSE) and Shanghai Composite Index (SCI). The first two indices are from India and followed by USA, Great Britain and China respectively. The reason behind to select these indices are (a). from daily experience it is observed that Indian stock market is drastically fall by COVID-19 pandemic (b) the first person infected by COVID-19 is from China so SCI is selected (c) NYSE is the leading stock market in the world and also affected by COVID-19 drastically (d) LSE is also a leading stock market in Europe and this region is significantly affected by COVID-19. The daily closing index data is collected from 1st April 2019 to 20th March 2020 and converted into log form. The whole data is divided into two halves. The first half is from 1st April 2019 to 30th September when all the stock market is at normal position or in other words is not affected by COVID-19 and the second half is from 1st October 2019 to 20th March 2020. It is assumed that the first COVID-19 attack and also detected is between in the months of November or December 2019 but when COVID-19 entered into a human body was unknown. It is also assumed that some publicly available information about COVID-19 already prevailing in the economy through social media before November, 2019 and that time the information was not so important to the public as well as Government and for this reason the whole data is divided into two halves. The daily data is collected from the official websites of the respective indices.

Methodology:

Let start with a simple regression model where pandemic period (COVID-19) is considered as the independent variable and closing price of the indices (BSE & NSE) as the dependent variable. Before specify the model, it is assumed that the closing index value is normally distributed with zero (0) mean constant standard deviation. To test normality J-B statistic is used and the following hypothesis is formulated:

H0: time series data is normally distributed

Ha: not normally distributed

To test J-B statistic, skewness and kurtosis are computed. The distribution is symmetry if the value of skewness is zero (0). Similarly, kurtosis measures the peakedness of the distribution and finally, J-B statistic as under:

$$J - B = n\left[\frac{S^2}{6} + \frac{(k-3)^2}{24}\right] \quad \textbf{(1)}$$

Where, n is the number of observations

S is the skewness

K is the kurtosis

In the same way, a random variable (Yt) is said to be stationary if the following conditions are satisfied:

E(Yt) = e = constant for all t; var (Yt) = σ2 = constant for all t, and cov(Yt,Yt-j) = λi = constant for all t ≠ j.

It is assumed that the macro-economic time series is stationary if differentiating technique is followed. Now, start with an autoregressive framework AR(1):

$$Y_t = \rho Y_{t-1} + e_t \quad \textbf{(2)}$$

Where, Yt is a series of observations at time t, ρ is the real number and et-1 is the error term with 0 mean constant variance.

Here, if /ρ/<1 then Yt converges (as t→∞) toward stationary time series and if /ρ/=1, then it faces a problem of unit root, i.e., a situation of non-stationary and if this happens then the variance grows exponentially as t increases (Dickey & Fuller 1979). Here, ADF and P-P tests are used to check stationary as under:

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + e_t \quad \textbf{(3)}$$

et is white noise error term with the same properties as discussed above. Here, equation 3 incorporates difference term [ΔYt = (Yt-1-Yt-2)] and the null hypothesis is as under:

H0: δ = 0 (non-stationary) and Ha = δ < 0 (stationary)

Now, start with a simple regression function by considering closing daily closing value of the stock market index as the dependent variable and pandemic period (COVID-19) as the independent variable. It is assumed that the daily closing value of the index is normally distributed with 0 mean and constant standard deviation. Generally, the formal model can be written as:

$$\text{Index}_{it} = \alpha + \beta\text{COVID-19}_{it} + e_{it} \quad \textbf{(4)}$$

or in other words index is a function of COVID-19 as under:

Index = f(COVID-19)

Where, Indexit is the daily closing value of the ith index at time t

COVID-19it is the dummy variable that takes value 1 (if the index is affected by it) or 0 (otherwise).

eit is the disturbance term with all usual assumptions of CLRM.

Here, E(Indexit/COVID-19it = 0) = $\alpha = \mu 0$

E(Indexit/COVID-19it = 0) = $\alpha + \beta = \mu 1$

It may be said that the intercept of equation 4 is the mean value of index not affected by COVID-19 attack. The slope coefficient is the difference of mean index value affected by COVID-19 and also non-affected by it (i.e., $\beta = \mu - \mu 0$). From the above discussion, the following hypothesis may be formulated as under:

H0: $\mu = 0$

Ha: $\mu \neq 0$

and it may be examined whether there exists any statistically significant differences between the mean value of the index under two type of situations.

In model 4 it is found that COVID-19 (dummy) appeared as independent variable. But, in many situations where the dependent variable is considered as dummy variable and such type of model is known as binary choice model and this model also belongs to the class of limited dependent variable models (LDVM) because the dependent variable assumes only a limited or countable number of values or in other words, in this model, the dependent variable considers two situations namely presence or absence of an attribute.

Such type of situation may be handled by applying three approaches (i) linear probability model (LPM) (ii) logit model and (iii) probit model where dependent variable is considered as dummy which indicates quantity or attribute.

Now, start with the following linear probability model (LPM):

$$\text{COVID-19}_{it} = \alpha + \beta \text{Index}_{it} + e_{it} \qquad \textbf{(5)}$$

Where, the details about the notations are same as described in equation 4.

But, the present study uses logit and probit models to examine the above issue because LPM model suffers from some difficulties like (i) violation of normality assumption of the disturbance term (ii) disturbance term suffers from heteroskedasticity (iii) due to violation of normality and homoskedasticity assumptions, test of significance becomes invalid (iv) violation of condition $0 \leq E(Yi/Xi) \leq 1$ and (v)

unsuitability of conventional measure of goodness of fit (R2).

Therefore, the study doesn't consider LPM model here. But, it can be started with the sigmoid curve or S-shaped curve.

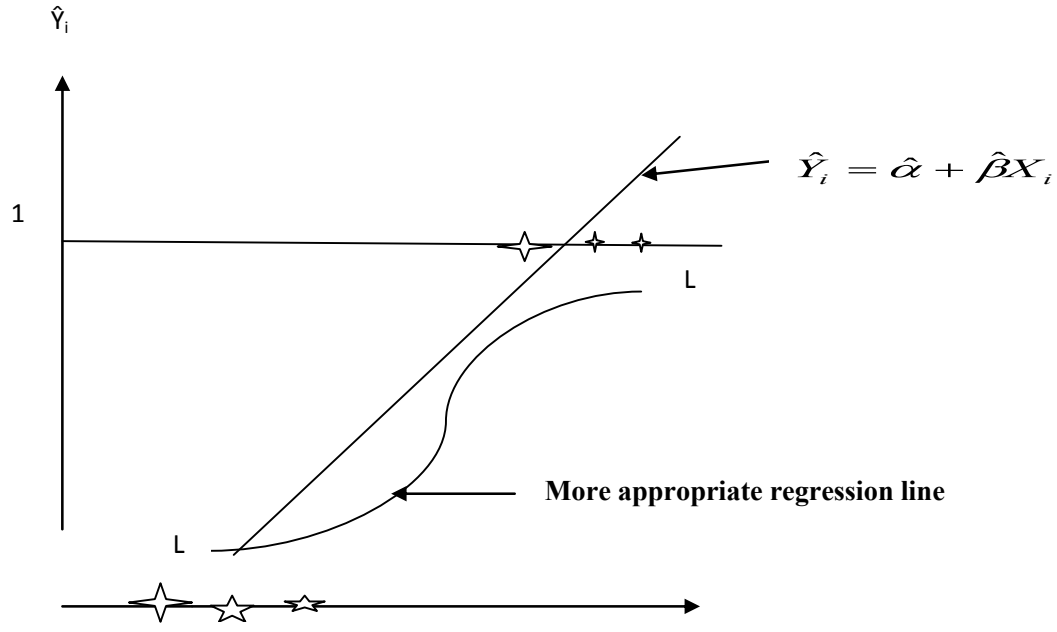

Fig. 1: Sigmoid Curve

It is observed from the above figure that the value of Ŷi is negative at the lower left end of the line and higher than unity at the upper right end. The LPM shows that when the dependent variable is binary then a non-linear specification of the model appears more appropriate. Particularly, it seems meaningful to some kind of an S-shaped or sigmoid curve to the observe data points. This curve has the following characteristics:

(i) It represents an elongated – S (ii) The tails of the sigmoid curve level off before reaching P = 0 or P = 1, so that the problem of impossible values of estimated probability is avoided and (iii) The sigmoid curve resembles the cumulative distribution function (CDF) of a random variable and therefore an appropriate CDF can choose to represent the sigmoid curve to capture 0 - 1 representation for the dependent variable.

The commonly chosen CDFs represent sigmoid curves are logistic and normal. The model that uses CDF of a logistic function to represent the binary dependent variable model is called logit model. Similarly, the model that uses CDF of the standard normal distribution to represent the same is known as probit model.

Firstly, the logit model can be represented as:

$$P_i = (\text{COVID-19}_i = 1) = F(Z_i) = \frac{1}{1 + e^{-zi}} \qquad \textbf{(6)}$$

Where,

Pi represents the probability of COVID-19i = 1

F(Zi) represents the CDF of the cumulative logistic function

Zi = α + βIndexi is a predictor variable and e is the base of natural logarithms which is 2.71828.

Now,

$$1 - P_i = \frac{1}{1 + e^{zi}} \qquad [\text{as, } P_i + (1 - P_i) = 1]$$

and $$\frac{P_i}{1 - P_i} = \frac{1 + e^{zi}}{1 + e^{-zi}} = e^{zi}$$

so, $$\ln(\frac{P_i}{1 - P_i}) = Z_i = \alpha + \beta Index_i \qquad \textbf{(7)}$$

Here, $\frac{P_i}{1 - P_i}$ represents odd-ratio in favour of the event occurring and $\ln(\frac{P_i}{1 - P_i})$ is the log odds-ratio (also called logit P).

Model 7 considers only one explanatory variable but according to the necessity more explanatory variables can be included by assuming that Zi is a linear function of a set of predictor variables and that can be written as follows:

$$Z_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots\ldots\ldots + \beta_k X_k \qquad \textbf{(8)}$$

Practically, it is not possible to estimate equation 7 by applying OLS technique because of two reasons:

(i) Equation 7 is a non-linear model (although it is linear in parameter)

(ii) $\ln(\frac{p_i}{1 - P_i})$ is not a familiar quantity

To solve such type of situation there are two approaches namely weighted least squares (WLS) and maximum likelihood (ML). Due to some difficulties contain in model 7, the study uses maximum likelihood approach.

If the study applies logit model 6then it is not possible to observe individual Pi values for the 1st choice (1) as well as second choice (0). The main objective of ML method of logit model is to estimate the coefficients (α and β) and thus likelihood function (it gives joint probability of observing a given set of sample values) is formed in this way:

Suppose,

n1 = number of times the first alternative is selected

n2 = number of times the second alternative is selected

and finally, n1 + n2 = n

It may be written as that the first n_1 observations are associated with the first choice and thus the likelihood function is under:

$L = \text{Prob}(\text{COVID-19}_1, \text{CIVID-19}_2, \ldots\ldots\ldots, \text{COVID-19}_n)$

$= \text{Prob}(\text{COVID-19}_1) * \text{Prob}(\text{COVID-19}_2) * \ldots\ldots\ldots\ldots\ldots * \text{Prob}(\text{COVID-19}_n)$ **(9)**

Similarly, the probability of the second option is equal to 1 minus the probability of the first option (1 – 1 = 0) and it can be represented as under:

$$L = P_1 * P_2 * \ldots\ldots\ldots\ldots P_{n1} * (1 - P_{n+1}) * (1 - P_{n+2}) * \ldots\ldots\ldots (1 - P_n)$$

$$= \prod_{i=1}^{n_1} Pi \times \prod_{i=n_1+1}^{n} (1 - P_i) = \prod_{i=1}^{n} P_i^{COVID-19_i} (1 - P_i)^{1-COVID-19_i} \quad \textbf{(10)}$$

Now, we take logarithm on both sides to form log-likelihood function as under:

$$\ln L = \sum_{i=1}^{n_1} COVID-19_i \ln P_i + \sum_{i=n_1+1}^{n} (1 - COVID-19_i) \ln(1 - P_i)$$

$$= \sum_{i=1}^{n_1} COVID-19_i \ln\left[\frac{1}{1 + e^{-\alpha-\beta Index_i}}\right] + \sum_{i=n+1}^{n} (1 - COVID-19_i) \ln\left[\frac{1}{1 + e^{\alpha+\beta Index_i}}\right] \quad \textbf{(11)}$$

Now, maximizing lnL with respect to α and β, we can obtain ML (maximum likelihood) estimates of α and β.

It is assumed that in ML estimates (a) all parameter estimates are consistent and efficient asymptotically and (b) all parameter estimates are asymptotically normal. Generally, in OLS regression, the ith estimated slope coefficient indicates the marginal effect of change in the ith explanatory variable (Indexi) on the dependent variable but in case of logit model, the marginal effect of change in explanatory variable on Pi needs to be calculated after estimation of the model and that can be done as under:

$$\frac{dP_i}{dZ_i} = \frac{d}{dZ_i}\left[\frac{1}{1+e^{-z_i}}\right] = \frac{e^{-z_i}}{(1+e^{-z_i})^2} \quad \textbf{(12)}$$

Now, the marginal effect (dP_i/dZ_i) of change in i^{th} explanatory variable ($Index_i$) on Pi is computed as under:

$$\frac{dP_i}{dIndex_i} = \frac{dP_i}{dZ_i} \times \frac{dZ_i}{dIndex_i} = \frac{e^{-\hat{\alpha}-\beta I\bar{n}dex_i}}{1+e-\alpha-\beta I\overline{ndex}_i)^2} \times \hat{\beta}_i \quad \textbf{(13)}$$

and this marginal effect exposes about ($dP_i/dIndex_i$) change in P_i as a result of one percentage change in index.

Like logit model, probit model also represents an S-shaped or sigmoid curve. This model also considers CDF of a standard normal distribution and P_i shows standard normal CDF which is considered as a linear function of the explanatory variable (s). The probit model can be written as under:

$$P_i = P(COVID = 1) = F(\alpha + \beta Index_i) \quad \textbf{(14)}$$

Where, $F(\alpha + \beta Index_i)$ indicates the CDF of the standard normal distribution so that

$$P_i = F(\alpha + \beta Index_i) = \int_{-\alpha}^{\alpha+\beta Index_i} f(Z)dz \quad \textbf{(15)}$$

Where, f(z) is the density function of $z \sim N(0,1)$, i.e.,

$$F(z) = \frac{1}{\sqrt{2\pi}} e^{(-\frac{z^2}{2})} \quad \textbf{(16)}$$

The estimation of probit model almost same like logit model except that Pi represents probabilities associated with the cumulative normal function rather than cumulative logistic function. Like logit model, the log-likelihood function can be written as:

$$\ln L = \sum_{i=1}^{n_1} COVID-19_i \ln P_i + \sum_{i=n_1+1}^{n} (1-COVID-19_i)\ln(1-P_i)$$

$$= \sum_{i=1}^{n_1} COVID-19_i \ln F(\alpha+\beta Index_i) + \sum_{i=n_1+1}^{n} (1-COVID-19_i)\ln\left[1-F(\alpha+\beta Index_i)\right] \qquad \textbf{(17)}$$

Now, the unknown parameters can be estimated by solving equation17.

Similarly, like logit model, the marginal effect of change in explanatory variable on Pi needs to be computed in probit model as under:

$$\frac{dP_i}{dIndex_i} = \frac{dP_i}{dZ_i} \times \frac{dZ_i}{dIndex_i} = f(Z) \times \hat{\beta}_i = \left(\frac{1}{\sqrt{2\pi}} e^{(-\frac{z^2}{z})} \right) \times \hat{\beta}_i \qquad \textbf{(18)}$$

Where, $\pi = 3.14159265$

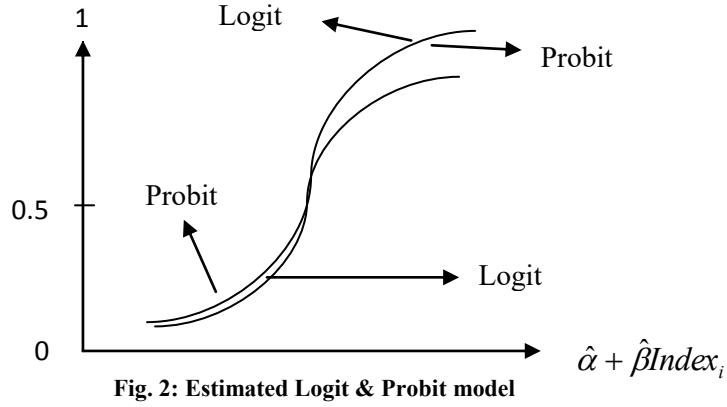

Fig. 2: Estimated Logit & Probit model

To understand the goodness of fit of any estimated model, we generally use R2 or adjusted – R2 for OLS regression model. Sometime, these measures are not enough to understand the goodness of fit when the dependent variable of the model is binary. In this case there are two approaches to assess goodness of fit of binary dependent variable models (i) revising the existing R2 formula considering the binary feature of the dependent variable and (ii) developing alternative measures using the likelihood ratios.

Here, the study uses Mcfadden's Pseudo-R2 that considers likelihood ratios to measure goodness of fit of the estimated model and that can be obtained by comparing the values of log-likelihood of initial

regression model (models) with the value of log-likelihood that can be obtained with only the intercept term in the regression model. It is a joint probability of observing given sample quantities and its value lies between 0 and 1 that implies that log-likelihood is negative and can be written as:

$$Pseudo - R^2 = 1 - \frac{\ln L}{\ln l_0} \quad \textbf{(19)}$$

So, the minimum value of Pseudo-R2 is 0 when lnL = lnL0 and its maximum value is less than 1.

Finally, to examine the overall significance of logit and probit models, log-likelihood ratio-statistic (LR statistic) is used and it can be computed as under:

$$LR = 2\ln(\frac{L}{L_0}) = 2(\ln L - \ln L_0) \quad \textbf{(20)}$$

Here, LR statistic follows χ2 distribution with k degrees of freedom.

Results & Analysis:

The descriptive statistics of four major stock indices are reported in Table 1. It is found that the fluctuation of daily returns of the indices is not so wide and the average returns of the indices are positive. Here, BSE provides the highest return (4.591041) and followed by NYSE, NSE, LSE and SCI. The standard deviation of the indices is not so high. The data of the three indices are skewed in the left (leptokurtic) as compared to the right one and positive excess kurtosis means that the indices' values are flatter tails than a normal distribution. Finally, the JB test statistic (Jarque-Bera) shows very large and the probability of obtaining such statistics under the normality assumption is significantly 0 (at 99% confidence interval) that confirms about rejection of null hypothesis (H0: Normal distribution).

Table 1 **Descriptive statistics**

Index	OB	Mean	Median	Max	Min	Std. Dev	Skew	Kurt	JB	P-Value
lnBSE	240	4.591041	4.592375	4.622759	4.451606	0.024804	-2.401511	12.57271	1147.058	0.0000
lnNSE	240	4.063090	4.068326	4.092099	3.917161	0.025060	-2.797611	14.36937	1605.691	0.0000
lnNYSE	245	4.116241	4.115519	4.151774	3.980800	0.022896	-2.226148	13.84089	14.02092	0.0000
lnLSE	246	3.815300	3.837652	3.931560	3.677059	0.070103	-0.442377	1.886946	20.72222	0.00003
lnSCI	217	3.471626	3.468833	3.514654	3.431706	0.015638	0.574998	3.731628	16.79733	0.00022

Source: Author's own calculation

The unit root problems of the indices are tested by using the ADF and PP test statistics. It is found (Table 2) that the computed ADF and PP test statistics of the indices in level form are statistically significant at 5% level with their corresponding probabilities that confirms about rejection of null hypothesis (H0: δ = 0 or ρ = 1) that means the time series don't appear to have a unit root. But in case of LSE the ADF and P-P test statistics are significant at 1st difference that confirms about rejection of null hypothesis.

Table 2: Unit root test

Variable	ADF Test		Philips-Perron Test	
	Level		Level	
	t-statistic	Probability	t-statistic	Probability
lnBSE	-3.523404*	0.0082	-3.378026*	0.0127
lnNSE	-3.725263*	0.0043	-3.414827*	0.0114
lnNYSE	-3.04587*	0.0322	-3.744915*	0.0040
LnLSE	-1.292139*	0.0423	-1.249406*	0.0000
lnCSI	-3.399717*	0.0220	-3.842530*	0.0029

Source: Author's own calculation

***significant at 5% level**

Value in parenthesis 1st difference form

Table 3 presents the regression (model 4) result when COVID-19 is used as a dummy variable. It is found that the constant terms of all the indices are positive and statistically significant. In the same way, the slope coefficients of the COVID-19 dummy are positively significant for BSE, NSE, NYSE and LSE that indicates COVID-19 significantly affects the stock market of India (BSE & NSE), USA (NYSE) and Great Britain (LSE). It is also found that the slope coefficient of the COVID-19 dummy is negative and statistically insignificant that means Shanghai Composite Index (CHINA) is not affected by COVID-19.

Table 3 Simple Regression Estimate

Dep. Var.	Constant	t-statistic	Slope Coefficient	t-statistic
lnBSE	4.584053	2126.572* (0.0000)	0.014213	4.623371* (0.0000)
lnNSE	4.058787	1813.158* (0.0000)	0.008753	2.741709* (0.0066)
lnNYSE	4.109285	2137.689* (0.0000)	0.014566	5.236397* (0.0000)
lnLSE	3.766770	845.3902* (0.0000)	0.098664	15.52997* (0.0000)
lnSCI	3.473014	2278.914* (0.0000)	-0.002688	-1.267148 (0.2065)

Source: Author's own calculation

***Significant at 5* level**

The estimated result of the LOGIT model is given in table 4. It is observed that relationship between the slope coefficients (COVID-19 dummy) with the stock markets (BSE, NSE, NYSE & LSE) are positive and statistically significant meaning that India, USA and Britain are mostly affected by COVID-19 attack but surprisingly Shanghai Composite Index (CHINA) is in safe position and this result is in same line with the above result. The goodness of fit of the estimated models of all the indices is shown by the values of McFadden R2. It is also found that overall significance indicated by the LR statistic of the estimated LOGIT model (BSE, NSE, NYSE & LSE) is statistically significant except in case of China market (SCI).

Table 4 Estimation of LOGIT Model

Index	Dep. Var.	Constant	z-statistic	Slope Coefficient	z-statistic	McFadden R^2	LR Statistic
BSE	COVID-19	-150.6869	-4.19318* (0.0000)	32.8041	4.193493* (0.0000)	0.071573	23.80826* (0.000001)
NSE	COVID-19	-66.92907	-2.555592* (0.0106)	16.46108	2.555041* (0.0106)	0.023993	7.981060* (0.004727)
NYSE	COVID-19	-174.4831	-4.832395* (0.0000)	42.35357	4.830642* (0.0000)	0.092912	31.51108* (0.00000)
LSE	COVID-19	-144.4108	-7.344327* (0.0000)	37.72448	7.367890* (0.0000)	0.459799	156.7745* (0.0000)
SCI	COVID-19	38.69591	1.264539 (0.2060)	-11.12766	-1.262442 (0.2068)	0.005370	1.614332 (0.203884)

Source: Author's own calculation

***Significant at 5* level**

Table 5 presents the estimated result of the PROBIT model. It is observed COVID-19 positively and significantly affects India, USA and Britain except China and the result is same as provided by the LOGIT model.

Table 5 Estimation of PROBIT Model

Index	Dep. Var.	Constant	z-statistic	Slope Coefficient	z-statistic	McFadden R^2	LR Statistic
BSE	COVID-19	-61.45915	-4.363505* (0.0000)	13.38440	4.361441* (0.0000)	0.055809	18.56442* (0.000016)
NSE	COVID-19	-33.15121	-2.681235* (0.0073)	8.154886	2.679328* (0.0074)	0.020936	6.964351* (0.008315)
NYSE	COVID-19	-66.10046	-4.852375* (0.0000)	16.04782	4.847346* (0.0000)	0.068309	23.16678* (0.000001)
LSE	COVID-19	-84.49177	-8.152136* (0.0000)	22.07713	8.178471* (0.0000)	0.466652	159.1114* (0.00000)
SCI	COVID-19	34.44240	1.266073 (0.2055)	-7.029121	-1.263955 (0.2062)	0.005397	1.622477 (0.202747)

Source: Author's own calculation

***Significant at 5* level**

The marginal effects of the exogenous variables for LOGIT and PROBIT models are depicted in table 6 and 7. The marginal effects are given in the last column in the tables. It is found that index value is the significant variable for determining the impact of COVID-19 in the economy. According the ranking of the marginal effect NYSE comes first and followed by NSE, BSE, LSE and SCI in LOGIT model but in case of PROBIT model the pattern is slightly different. Here, LSE comes first and followed by NYSE, BSE, NSE and SCI.

Table 6 Marginal Effects for Estimated LOGIT Model

Variable	Mean of the Variable	Constant	Estimated Coefficient	Mean value of the Variable X Estimated Coefficient	z_i	$\frac{dp_i}{dz_i}$	Marginal effect = Estimated Coefficient X $\frac{dp_i}{dz_i}$
BSE	4.59104	-150.6869	32.80411	150.605014	-0.081886	0.47953974	20.31022841
NSE	4.06309	-66.92907	16.46108	66.88284954	-0.046220	0.48844694	20.68747203
NYSE	4.11624	-174.4831	42.35357	174.3375	-0.1456	0.536335	22.71570197
LSE	3.8153	-144.4108	37.72448	143.9302085	-0.480591	0.38211254	16.18383053
SCI	3.47162	38.69591	-11.12768	-38.63114321	0.0647667	0.48381397	-5.383727049

Source: Authors own calculation

Note: z_i **= Constant + Mean value of the variable*slope coefficient and** $\frac{dp_i}{dz_i}\hat{\beta}_i = \frac{e^{-z_i}}{(1+e^{-z_i})^2}\hat{\beta}_i$

Table 7 Marginal Effects for Estimated PROBIT Model

Variable	Mean of the Variable	Constant	Estimated Coefficient	Mean value of the Variable X Estimated Coefficient	z_i	$f(Z_i)$	Marginal effect = Estimated Coefficient X $f(Z_i)$
BSE	4.59104	-61.45915	13.38440	61.44832916	-0.010820	0.39896563	5.339915678
NSE	4.06309	-33.15121	8.154886	33.13403576	-0.017174	3.25380864	3.253808645
NYSE	4.11624	-66.10046	16.04782	66.05669464	-0.043765	0.39932443	6.408286705
LSE	3.8153	-84.49177	22.07713	84.23087409	-0.260895	0.41275319	9.112405952
SCI	3.47162	24.44240	-7.029121	-24.40247922	0.0399207	0.39862451	-2.801979961

Source: Authors own calculation

Note: $f(Z)\times\hat{\beta}_i = \left(\frac{1}{\sqrt{2\pi}}e^{\left(-\frac{z^2}{2}\right)}\right)\times\hat{\beta}_i$ **Where, e = 2.71828 and** π **= 3.14159265**

Conclusion:

We should never have under-estimated the potential seriousness of new COVID-19 pandemic and even of seasonal flu as a global public health problem. This study tries to examine the impact of COVID-19 attack in the stock market and thus, five major stock indices are considered. It is found that

the daily closing value of the indices is not normal but they are stationary at their level forms except LSE which is stationary at its 1st difference. According to the OLS method it is observed that three indices are mostly affected by COVID-19 except Shanghai Composite Index from China and the evidence is same when LOGIT and PROBIT models are applied. According to the marginal effect, daily index value appears to be the most important factor in determining the effect of COVID-19. From the above discussion it is found that COVID-19 affects all the selected major stock markets but it is also noticed that Shanghai Composite Index in China is not affected by COVID-19 attack. So, it may be opined that where all the major stock markets in the world are directly affected by the sudden attack of COVID-19 whereas China's economy is not so affected by COVID-19 attack. Although, the world population from various countries are largely affected by COVID-19 and this is very natural scenario. The investors may think that China market is safe during this emergency and thus, they invest more money which is withdrawn from other economies and it may be happened that China government has won the faith of the investors. But, the most surprising thing is that what the probable reasons behind China's stock market are till now is in safe position in a turbulence situation and it's sure that academicians, politicians, policy makers, professionals and researchers should give attention to this issue critically for policy making and future research.

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SUSTAINABLE MANAGEMENT PRACTICES: AN EMPIRICAL STUDY OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Higher education institutes conceptualized as universities although have started to realize their role in minimizing environmental impact on the contrary the magnitude of such responsiveness is still at the inception stage mostly in the backdrop of emerging economies. Greening of Universities and Education for sustainable development are the two major initiatives taken by universities to play a pivotal role towards sustainable development and in reducing the attitude-behavior gap towards green consumption and resource conservation and recycling among the students. A structural equation modeling was applied to test the hypothesized model based on data collected from a virtual sample of university students. The results concords the high impact of education for sustainable development in swaying environmentally responsiveness behavioral outcomes among students following the green curriculum.

Keywords- Education for sustainable development, sustainable consumption, greening of universities, environmental attitude

Introduction

The notion of sustainability has deduced several interpretations with the principal thrust on rational use or exploitation of natural resources and analysis of interaction among economy, society and environment (Mitchell, 2000; Ferreira et al., 2003). Sustainable lifestyle practices can be propagated through unanimous recognition of the active and reactive human role in reducing environmental downturn. Education has always been perceived as a tool for improvement in the quality of life both at individual and societal level (Tilbury, 2012; Rodriguez-Barreiro et al., 2013; Biswas, 2020). It has been rightly stated that the future leaders, goal-setters, decision-makers and intellectuals are shaped, nurtured, motivated within the boundaries of world's higher education institutions conceptualized as universities who often deploy reactive environmental responsiveness measures specially those instituted in the emerging economies (Lozano, 2006; Lidgren et al., 2006; Desha and Hargroves, 2010). Few studies have enthralled on the importance of environ-

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mental education in higher education institutions or education for sustainable development in fostering sustainable behavior, practices and lifestyle among students who are perceived to be the largest segment of potential consumers as well as potential budding entrepreneurs (Juarez-Najera et al., 2010). The concept of education for sustainable development incorporates environmental protection and interaction and interrelation across a vast paradigm of socio-economic spheres. The concept of education for sustainable development has not been fully explored and requires attention of environmental and academic stakeholders as in several cases the courses offered in the higher education institutions do not encompass vital aspects of sustainable development (Croftson, 2000; Jansen, 2003).

Past researches have reinforced on the strong impact of attitude on environmental behavioural intention (Buchan, 2005). Consumer research have recognized the gap between attitude and behaviour as all consumers exhibiting a positive attitude to buy a product may not actually end up buying it thus intentions are not fully realised (Bass, 2004; Chandon et al., 2005; Morrison, 1979).

The present paper purports to study the impact of education for sustainable development offered at universities or green curricula taught coherently with other subjects and greening of Universities in subduing the environmental attitude-behaviour gap among university graduates across two environmental responsiveness dimensions- green consumption and resource conservation and recycling in the backdrop of an emerging economy. This paper is structured in the following way. It starts with unfolding the relationship among education for sustainable

development, greening of universities and attitude-behavior gap of university students across two the environmental responsiveness dimensions taken into consideration, followed by hypotheses development and research methodology. In the next section results and analysis have been discussed and conclusion at the final section.

Theoretical background

The value-belief-norm theory has postulated that the relationship between individual‘s environmental values, beliefs and responsibility exhibited towards solving environmental issues result into environmentally responsive behaviours (Stern, 2000). Responsibility ascribes individuals‘ ideals in owing certain moral obligation towards protection of something which they value. Studies have cited the impact of individual behavioral intentions which may lead to actual behavioral outcome, however attitudes may not necessarily translate into actual behavior (Bamberg et al., 2003; Wang et al., 2013b; Lukman et al., 2013).

Education for sustainable development (EfSD)

United Nations (UN) Decade of Education for Sustainable Development's (DESD) vision focuses on providing opportunities to individuals with quality education and make them aware about the acceptable behaviors and lifestyles needed for a sustainable future thus necessitating the importance of education for sustainable development and environmental literacy (Wang et al., 2013a; Lozano, 2006). Education for sustainable development is a prerequisite in shaping the attitude of younger generation towards adoption of environment friendly practices and lifestyle (Kopnina, 2014). Improvement in the environmental quality strongly depends on knowledge, attitude, values and individual practices, whereas knowledge and awareness are most essential for education for sustainable development which embarks the foundation of sustainable societies (Hens et al., 2010; Biswas and Roy, 2015b; Biswas, 2020). This concept entails a multidimensional approach through maintenance of stability in higher education by virtue of successful combination of intellectual properties, faculty and students' competencies and achievement of long-term educative action plans and objectives in an integrated manner (Wang et al., 2013a; Biswas, 2020).

Greening of Universities (GoU)

There has been an unprecedented escalation in the number of universities with focus on several green paradigms such as changes in campus planning with sustainable architectural design plans, effective management and operation for their effective transformation into green universities (Wang et al., 2013). Greening of universities may be modeled upon the realization of triple-bottom line benefits as was the case for Green Shenyang University in China (Geng et al., 2013; Wang et al., 2013). The concept of greening of universities coupled with integration of education for sustainable development principles into their core curricula, research and practices would help to educate students as responsible consumers, producers or change-agents in tackling the pace of environmental downturn as applied in TERI University in India (Jain et al., 2013). Studies have also suggested the limited role of stakeholders such as faculties in modeling the framework of green universities in the emerging nations (Wang et al., 2013).

Based on the above discussion the following hypotheses can be deduced:

H1: Greening of Universities will have a positive impact in the propagation of education for sustainable development.

Attitude Behavior – gap (ABG)

A conglomeration of informational, emotional and behavioural attributes has been identified as attitude towards a particular behavior (Luthans, 2002). Studies have cited attitude as a direct antecedent of intentions in shaping environmental decisions or actions and a moderator variable for behavioural outcome through impacting the behavior (Armitage and Conner, 2001; Bamberg and Schmidt, 2003; Webb and Sheeran, 2006; Biswas, 2017; Biswas, 2020). The knowledge-attitude-practice gap (Rogers, 1995) or value-action gap (Blake, 1999) or Informational-Emotional-Behavioural gap (Lozano, 2009) appears due to discrepancy between emotional, informational or behavioural attitude (Rogers, 1995). The role of education, learning, motivation, teachers' environmental attitude and institutional encouragement is indispensable with regard to inculcating willingness to act for environmental initiatives among students (Bradley et al., 1999; Summers, 2000; Stir, 2006; Zsoka, 2008; Biswas 2020). The curriculum of education for sustainable development offered by higher education institutions under the pursuance of academic practitioners may imbibe intention to act in an environmentally favourable manner among students pursuing such course (Kaiser et al., 1999; Scott and Gough, 2003; Bradley et al., 1999; Stir, 2006; Biswas, 2020). Actual behavior can be monitored for fostering stability and success through effective awareness-shaping process (Zsoka, 2008). A distinct attitude-behaviour gap exists with regard to sustainable consumption practices with a strong relation between the two (Bergin-Seers and Mair, 2009; Bamberg, 2003; Michalos et al., 2009; Biswas et. al, 2014; Biswas, 2020).

Green consumption behavior (GrCon) and Recycling and resource conservation Behavior (RecB)

Green consumption refers to the composite concept of buying and consuming of environmental friendly products barred of toxic substances and usually has a longer lifespan than traditional alternatives for the goal of long-term environmental preservation (Biswas and Roy, 2015b).

Previous models have assessed the green consumption behavior across diverse consumer segments based on a wide paradigm of explanatory variables (Wang et al., 2013b; Zsoka et. al., 2013; Biswas and Roy, 2015a; Biswas and Roy, 2015b; Biswas, 2017).

Attitude towards household recycling, energy resource conservation, water conservation have a wide impact on actual environmental behavior however, the predisposition of attitude may not lead to similar behavior (Barr et al., 2005; Gadenne et al., 2011). Environmental knowledge, education or courses based on green curricula offered by the higher education institutes may play a pivotal role in the reduction of the attitude-behavior gap among students in disposition of the two environmental responsiveness outcomes. Since availability of adequate institutional infrastructure

coupled with comprehensive education, training and research may foster environmental behavioral exhibition, thus impact of greening of university initiatives in reduction of attitude-behavior gap cannot be undermined (Rodriguez et al., 2013).

Based on the above discussion the following hypotheses can be deduced:

H2: Greening of Universities help to reduce the attitude-behavior gap towards green consumption.

H3: Greening of Universities help to reduce the attitude-behavior gap towards recycling and resource conservation.

H4: Education for Sustainable Development helps to reduce the attitude-behavior gap towards green consumption.

H5: Education for Sustainable Development helps to reduce the attitude-behavior gap towards recycling and resource conservation.

Survey design and Methodology

Sample design

The research was exploratory in nature. A survey instrument was prepared to assess the leverage of education for sustainable development and subjective norms in minimizing the attitude-behavior gap with regard to green consumption, recycling and environmental conservation among University students. These students came from diverse field of study (engineering, mathematics, management, economics and others) and are considered to be the pace-setters or change agents for future (Wang et al., 2013; Biswas, 2020). The sample for the study comprised of only university students rather than both high school and university students due to their age and enhanced focus on environmental problems and stronger decision-making ability (Asunta, 2004; Biswas & Roy, 2015a; Biswas & Roy, 2015b; Biswas, 2017; Biswas, 2020). Thus the selection of sample was justified. A total usable sample of 237 responses was used for the study.

Questionnaire design

The responses were measured upon a 5 point likert scale ranging from 1 [strongly disagree] to 5 [strongly agree]. The items in the questionnaire were validated and adapted from the Environmental attitude scale (Rodriguez et al., 2013), green consumption and recycling behavior (Wang et al., 2013b; Biswas, 2020) and Education for sustainable development and Greening of universities (Wang et. al., 2013a).

Results and Analysis

Psychometric model properties

The standardized factor loadings, composite reliability and Cronbach's Alpha coefficients for the attitude-behavior gap among university students with regard to the two environmental responsiveness outcomes in the light of greening of universities and education for sustainable development have been presented in Table I. The standardized factor loadings were high above the minimum threshold value of 0.50 (Ford et al., 1986). The high composite reliability values and good cronbach's alpha suggests internal consistency and reliability for each dimension. The convergent was supported by high average variance extracted above 0.50 (Fornell and Larcker, 1981).

Fit indices of the measurement and structural model with path analysis

The fit indices for both the measurement and structural model are presented in Table II which indicates that all the fit indices such as Chi2/df, Goodness of fit, Normed fit index or the Root mean square error of approximation suggests a good fit to both the measurement model after conducting of the confirmatory factor analysis and then to the structural model through performance of path analysis. The estimated path coefficients (Table III) and the R2 value for the two attitude-behavior environmental responsiveness outcomes, i.e., were significantly impacted due to greening of universities and education for sustainable development.

Discussion

The study has the following findings.

Greening of Universities coupled with education for sustainable development will help in the transition of sustainable lifestyles and societies (0.49). Education for sustainable development acts as a major explanatory variable in reduction of the gap between attitude and behavior towards green consumption (0.60) and resource conservation (0.29). Thus the university students will be inclined to display actual environmental behaviors based on a positive environmental concern through adoption of green consumption habits, active recycling of household wastes such as glass or plastics and enhanced conservation of water or energy resources or optimization in their usage, when they are exposed to green curricula and models on sustainable development offered at their institutes which they find to be reliable, objective and practicable.

On the contrary, even though the impact of greening of universities in reduction of attitude-behav-

ior gap for the two studied environmental responsiveness outcomes have been supported but the quantum of impact is less (0.16 and 0.18) in comparison to that of education for sustainable development. Thus only greening of university campus may not have huge impact but when coupled with the integration of green methods, models or values in curriculum will indeed pose a stronger effect in reduction of the studied gap.

Conclusion

Universities help to nurture the inherent skills among individuals by inculcating moral and environmental conscience through various comprehensive environmental initiatives such as greening of campus or incorporation of subjects on sustainable development and triple-bottom-line approach coherently with students' core papers will help to propagate their environmental attitude and optimize the actual environmental actions. Sustainable Universities that built on the concept of high apprehension towards environmental problems reflected across all domains of university activities and operations through congruent teaching-learning-sharing and enhanced research and improved curricula with a global approach, partnership and stewardship will help in the transition of sustainable lifestyles among the students in a comprehensive manner. The paper provided an overview as to how greening of universities in congruence with the integration of education for sustainable development in the curricula will help to minimize the gap in attitude or perceptions about environmental problems, environment-friendly products, water or electricity conservation or household recycling and actual environmental actions as the resultant outcome of such perceptions. The role of university stakeholders especially the board of management and research in case of autonomous bodies should take active initiatives for the deployment of environmental role. In case of government-funded universities, the role of active or reactive governmental policies and budget allocation towards the propagation of green principles, practices and projects within such universities is indispensable. Since the universities students have a wider sense of perception with a wider knowledge base, their dynamic lifestyle and enthusiasm and participatory approach if properly nurtured by the faculties or management at different institutes will open new avenues of research on sustainable development, sustainable technologies, environmental design or sustainable manufacturing practices as a large segment of these students often emerge as innovators and successful entrepreneurs. Thus apart from adoption of responsive consumption practices and resource conservation and recycling behavior, the knowledge on sustainable development gained at the university level coupled with hands-on-training, workshops and projects will enable them to design or conceive sustainable production designs to tackle the environmental downturn in a congruent manner.

Table I

Psychometric properties of the scale

Constructs	Loading	Cronbach's alpha	AVE	CR
Greening of Universities		0.70	0.58	0.94
University has been taking active initiatives for greening of its campus.	0.76			
The architectural design of university recognizes pertaining environmental problems	0.71			
Universities should schedule more field activities because this will help in understanding of environmental problems and concepts	0.82			
Education for Sustainable Development		0.70	0.56	0.92
Incorporation of green curricula within the framework of regular courses will help in considerable understanding of environmental issues	0.73			
The concept of green is very well integrated into all academic disciplines offered by the university	0.82			
We are introduced to sustainable technologies with design for environment strategies through projects and regular curriculum	0.66			
Attitude-Behavior gap for green consumption		0.94	0.56	0.93
I am willing to consume less and go without some comforts if it helps to protect the environment.	0.63			
When I buy a product, I assess the type of packaging and choose one that is recyclable	0.77			
Among the people around me, there are few people to buy green products or understand my choice to green products.	0.78			
Knowledge about environmental problems gained through education for sustainable development programs largely influences my consumption decisions	0.77			
Attitude-Behavior gap for resource conservation and household recycling		0.79	0.85	0.97
Knowledge about environmental problems gained through education for sustainable development programs have largely influenced me to recycle plastics and glass materials.	0.93			
Knowledge about environmental problems gained through education for sustainable development programs has largely influenced me to conserve water and electricity.	0.90			
Knowledge about environmental problems gained through education for sustainable development programs has largely helped me to prevent misuse of water and electricity.	0.92			

Table II

Model fit indices for the overall model

Index	Structural model Value	Recommended Value*
$\chi 2$ /d.f.	1.81	<3
RMSEA	0.06	<0.10
GFI	0.94	≥0.90
AGFI	0.91	≥0.90
CFI	0.96	≥0.90
IFI	0.96	≥0.90
NFI	0.92	≥0.90

Table III

Standardized regression coefficients

Path		Estimate	Hypotheses
GoU →	EfSD	0.49	H1- Supported
GoU →	ABgapGcon	0.16	H2- Supported
GoU →	ABgapRec	0.18	H3- Supported
EfSD →	ABgapGcon	0.60	H4- Supported
EfSD →	ABgapRec	0.29	H5- Supported

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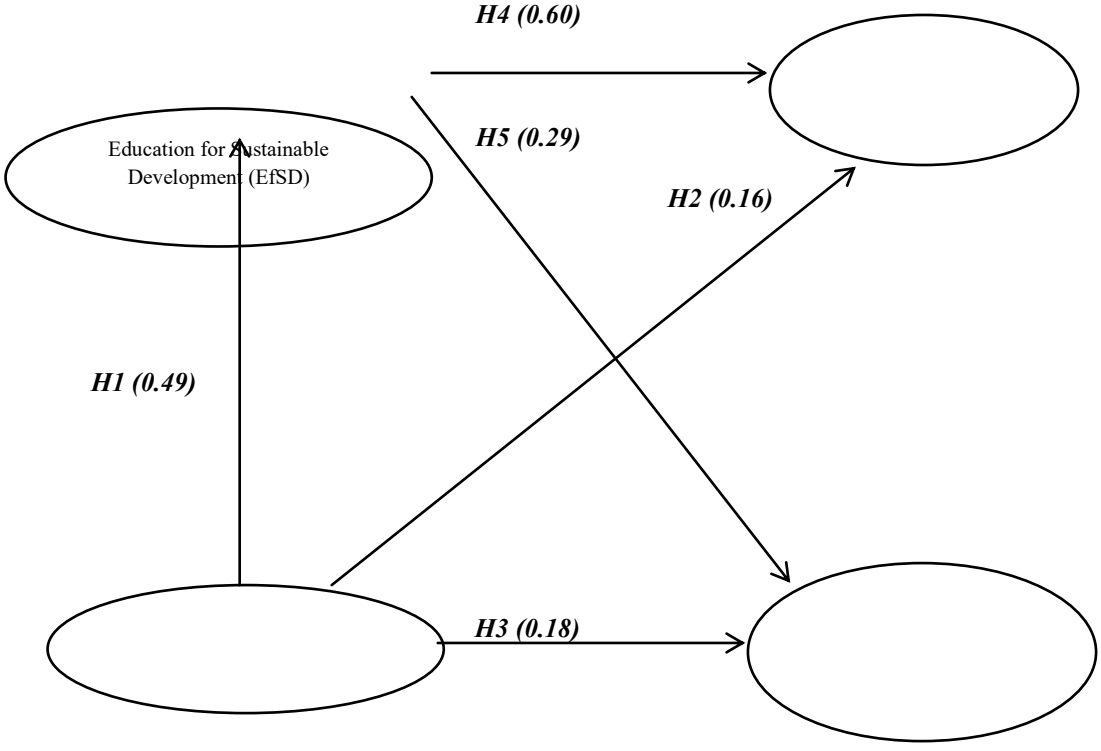

Figure I

CARBON DISCLOSURE PROJECT (CDP) SCORES ON CLIMATE CHANGE: AN EMPIRICAL INVESTIGATION ON INDIAN COMPANIES

Luxmi Jha *

ABSTRACT

The present paper examines the Carbon Disclosure Project (CDP) scoring of the Indian companies with reference to climate change factors from fourteen different industry sectors for the period 2018. The study tried to put the picture of Indian firms in case of environmental disclosure by presenting the status score of such companies obtained in CDP list, 2018. We have also highlighted the name of the companies falling under 'A-List' of the CDP ranking, 2018 andhave made detailed study of the annual report of such sample companies to know the convergence of information disclosed regarding Carbon Disclosure and related to carbon emission in their annual report. This paper finds that out of total 237 companies from fourteen different industry sectors under climate change sector of CDP , only two companies (Infosys and IndusInd Bank) fell under the preview of 'A-list' category and three companies(Tech Mahindra, Tata Motors and Wipro) were awarded with 'A-' score status. Most of the Indian companies i.e. 158 companies were awarded with 'F' status which represented failure to provide sufficient information to be evaluated. Thus, the study concluded that Indian firms will have to be more environmental conscious and are required to disclose their carbon emission data in the annual report.

Key words: Carbon Disclosure Project, climate change, Indian companies, carbon emission, A-list.

Introduction

The Carbon Disclosure Project (CDP) is an organisation situated in the United Kingdom which actually discloses the environmental impact of companies and cities of major corporations. The aim is to make environmental reporting and risk management part of business norms and action to be taken accordingly towards a sustainable economy.

This paper deals with the carbon disclosure project (CDP) scoring of Indian companies with respect to climate change. The role of Indian firms towards environment and sustainability is the ultimate goal. This chapter tries to draw the picture of Indian companies in CDP list, 2018.

Background of the study

CDP is working globally with over 6000 corporations along with 550 cities and 100 states with an intention to ensure that an adequate level of carbon emission reductions strategy is implemented as an integral process to their operations. CDP aim is to catalyse a global economic system that

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operates to regulate sustainable environmental boundaries by controlling and preventing three major sectors i.e. –

I. Climatic changes

II. Water security

III. Forestation

CDP works globally with market forces which try to motivate the companies to present their impacts on the environment so that adverse impacts can be reduced. It uses the disclosure scoring to encourage the companies to come up with more environmental friendly techniques and sustainable management system through participating in CDP's climate change, water, forests and supply chain programs.

In this backdrop, I have attempted to make a comprehensive study on disclosure of Indian firms on climate changes under the CDP disclosure score list. The scoring actually represents the progress towards environmental stewardship of the responder. In the present study the scoring has been evaluated on the sector- specific which actually represents better responders details and company's awareness about environment issues; its methods towards management and better alternatives and techniques undertaken towards environmental stewardship.

Research Question:

In the view of the above, the study tries to answer the following key research questions:-

I. To what position the Indian companies are in the CDP list under the sector of climate change?

II. How many companies fall under the category of 'A-List' in the CDP's scoring list?

III. To what level convergence of carbon disclosure information in the annual reports of companies falling under'A-List' and 'A-' category disclosed?

Research Objectives:

The study has set the following objectives for addressing the above research questions:-

I. To ascertain the position of Indian companies in the CDP list under the sector of climate change.

II. To ascertain number of companies falling under the category of 'A-List' in the CDP's scoring list, 2018.

III. To examine the level of convergence of carbon disclosure information made in the annual reports of companies falling under 'A-List' and 'A-'category.

Relevance of the Study:

The CDP disclosure scores are actually required to create awareness of how environmental issues

impact the business sectors. It aims that driving positive behaviour change towards environmental issues by increasing the reliability and quality of the data presented. It focuses on improving the environmental stewardship in the corporates by motivating the companies to disclose their impacts caused on natural resources and the environmental and taking necessary actions for reducing the adverse impact. The present research attempts to explore the knowledge of the position of Indian companies and the nature of such disclosed score information, which may help the investors to decide whether such information is enough or not. This will help the investors to know more about the Indian companies working towards environment.

LITERATURE REVIEW

Many studies were conducted on Carbon Disclosure Project (CDP) reporting in the context of different countries all over the world. The study conducted by Burritt and Tingey – Holyak showed importance of relationship established between academia and industrial practice focusing climate change.

Sullivan &Gouldson, (2012) have examined a paper to know whether the needs and requirements of the investors are met by the voluntary disclosure of Carbon reporting, which was supposed to be influencing the investor decision if accounting and reporting are made effectively.

Matisoff, Noonan, & O'Brien, (2013)have examined a study to analysis where Carbon Disclosure Project have been assessed for evaluating the extent of convergence in the environmental project by the countries. They have also examined the standard of disclosure reported and the variation of reporting behaviour across country and in the industries in which they have observed Japanese and EU firms have increased transparency, while firms of US have decreased their disclosure details.

Andrew &Cortese, (2012) conducted a study in which they made a comparison of carbon disclosure project with that of Greenhouse Gas Protocol. The findings of the study revealed that the carbon disclosure of Australasian mining companies with reference to CDP's voluntary carbon disclosure for last three years served as an important criterian for information and comparability.

Saka&Oshika, (2014) purposed a study with an aim to examine the effect of carbon emission and disclosure on corporate value of equity as predicted by carbon emissionsby using a unique and different data set on Japanese companies. The researcher found that carbon emission has got inverse relationship or negative relation with that of the market value of equity, but depicts relation between carbon management and value of equity; and between disclosures of carbon management with the market value of equity.

Guenther, Guenthe, Schiemann, &Webe, (2015) havepresented a study to investigate the explanatory factors of carbon disclosure made in the annual report. The authors used Tobit regression to analyse the relationship between the relevance of the stakeholder groups (government, general public, media, employees and customers) with that of carbon disclosure. The findings of the study revealed that all stakeholders are not only associated with carbon performance and carbon disclosure too. Only one among the entire stakeholder group (government) was observed as a modera-

tor for the relationship between carbon performance and carbon disclosure.

Hassan, Wright, & Struthers, (2013) have examined in the paper the link between the Carbon Disclosure Leadership Index (CDLI) Score with the extent of climate change disclosure as a method of promoting sustainability. The authors selected 100 UK FISE companies for the study and found that top importance and which effects related business risks that directly or indirectly will effect enhancing of sustainability.

In the Indian context very few researches has been conducted on Carbon Disclosure Project (CDP) and on carbon accounting. Chaudhry, (2008) tried to show the recent and future trends of carbon markets by explaining through brief study. She tried to depict the picture with reference to Indian companies. findings of her study stated that not only the smallest of smallest Indian companies are required to disclosed their emission data but are also required to reduce them so as to attain sustain in their business.

Kumar &Firoz, (2017) investigated in their paper the impact of voluntary environmental disclosure on the industry sector and the linkup between the costs of equity with the firm's carbon- related risk. The author used ET Top 20 Indian firms under seven different Industry sectors from 2011-2014. The findings of the study stated a positive linkup between the carbon-related risk exposures with that cost of equity capital. The authors used panel data regression analysis for the study. It also found that the disclosure of carbon related information is more likely in the firms operating in the highly environmental sensitive industry sectors as compared to operating in the less environmental- sensitive industries.

Research Gap

Due to lack of researches on carbon Disclosure Project(CDP) with respect to Indian context, an empirical knowledge on Indian Corporates disclosure information is very much inadequate. In this backdrop, I have attempted to make a comprehensive study on disclosure of Indian corporate on basis of climate change under CDP disclosure list, 2018.

PRESENTATION, ANALYSIS AND DISCUSSION

Introduction

CDP's scoring works with the market forces conducted. With a score based evaluation to motivate the companies to take and disclose steps towards environment and natural resources and also reduces negative effects or impacts. CDP seeks improvement of the environment by ensuring effective level of carbon emission strategy by focusing on sectors like climate change, water and forests.

The methodology of scoring is basically done to assess the responder's progress towards natural resources and environment by the company's CDP response as communicated and collected. In this chapter, we are addressing first and second research question of the study, namely,

I. What is the position of the Indian companies in the score list of CDP under 'Climate Change'?

II. How many companies fall under the disclosure score of List-A?

Research methodology for analysing the position of Indian Companies

For analysing the position of Indian companies in CDP scoring list for the year 2018, a table has been prepared, that examined the position of companies under sector specific 'Climate Change' with respect to its 14 different sub sectors or industries. The study has been conducted with reference to Indian context. The details of the research methodology are discussed used-

Selection of sample companies

This study has been done on Indian companies with respect to first sector of CDP list i.e. climate change under its different industries. The names of the companies have been selected CDP website under the sector 'Climate Change' with sub sectors of different industries respectively. The names of the companies are arranged according to the industries they belong with their CDP scoring. There are 14 industries under the sector 'Climate Change'. The names of the industries are as follows:

Table 1: List of industries under the sector 'Climate Change'

Sl.No.	Names of Industries
1.	Agricultural Commodities
2.	Cement
3.	Chemicals
4.	Coal
5.	Electric Utilities
6.	Food, Beverages and Tobacco
7.	General
8.	Metals and Mining
9.	N/A
10.	Oil & Gas
11.	Paper & Forestry
12.	Steel
13.	Transport OEMS
14.	Transport Service

Source: www.cdp.net/en/companies/companies-score

Research methodology for assignment of scoring:

CDP scoring methodology is basically based on evaluation conducted from the survey which enables to know the level of detail and comprehensiveness reactions as well as of the company's awareness towards sustainable development, environment and management methods. Scoring provides awareness among the company behaviour to achieve best practice and work towards attainment for improving better environmental performance. The scoring methodologies are designed on a generalised manner for each of CDP's programs which are applicable to all companies in all sectors and in all geographies neutrally.

The methodology of scoring is designed on the responding companies which in turn are assured in four consecutive levels which actively represents company's steps towards environmental stewardship. These levels are as follows:

I. Disclosure; II. Awareness; III. Management; and IV. Leadership.

Once the scoring has been done, the awarded points at 'Disclosure'and 'Awareness' level of the company is divided by the maximum number that could have been awarded. The fraction obtained is converted into percentage form by multiplying by 100 and considered the nearest whole number. For the next two levels i.e. 'Management and 'Leadership' levels, the points gathered or collected per scoring category are used as final score, according to the scoring category weighting.

One has to choose a minimum number of score or number of indicators on one level in order to step on to the next level. If the minimum score is failed or not achieved, the company will not be able to score on the next level. The following table represents the scoring method-

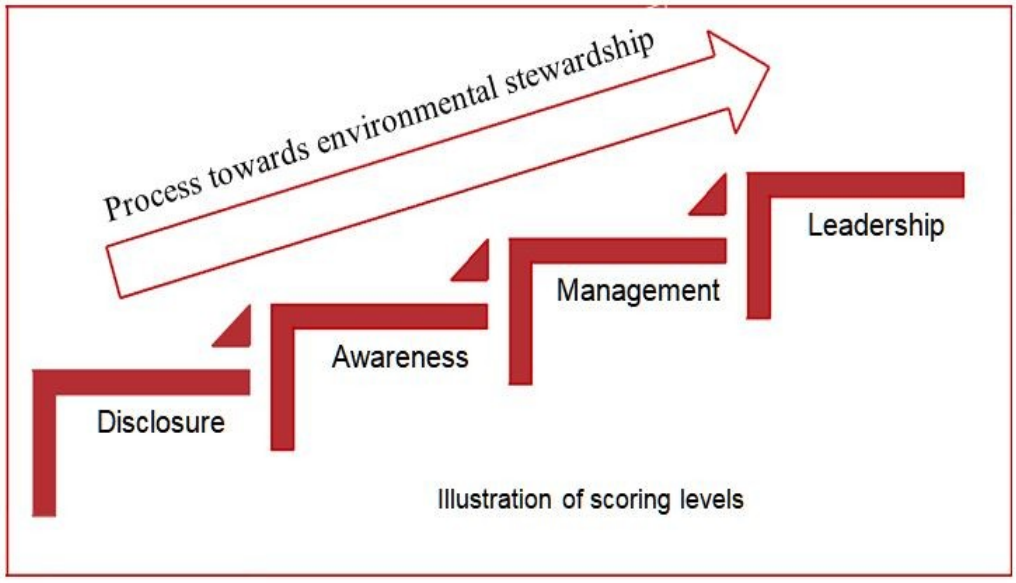
Table 2: Disclosure of scores

Level	Climate Change	Water	Forests	Score Board
Disclosure	0-44%	0-44%	0-44%	D-
	45-79%	45-79%	45-79%	D
Awareness	0-44%	0-44%	0-44%	C-
	45-79%	45-79%	45-79%	C
Management	0-44%	0-44%	0-44%	B-
	45-79%	45-79%	45-79%	B
Leadership	0-79%	0-79%	0-79%	A-
	80-100%	80-100%	80-100%	A

Source: www.cdp.net

The final letter grade is rewarded based on the scores obtained in the first level of the scoring i.e. the highest achieved level. Then the results are communicated with their current level, which indicates the level of environmental stewardship the company is performing and the actions should be taken accordingly.

Chart 1: The diagram represents the overall status of progress of the companies-



Source: www.cdp.net

F= It represents failure to provide sufficient information to CDP for the evaluation.

3.3 Empirical results relating to the score obtained by the Indian companies in CDP list:

By scoring business from A to D- and F, CDP actually represents the journey through disclosure to awareness, management and finally to leadership. In the present study we are representing the CDP scoring of Indian companies for the year 2018 which actually evolves the process of disclosure and update of scoring methodology according to market needs and raising urgency of the environmental challenges and their awareness towards environment. The study has been conducted to know the position of scoring of the Indian companies under the sector 'Climate Change' with where the companies are placed under according to the industries they belong.

The company under different industry sector marked with 'F' represents a failure to provide sufficient information to the CDP so as to get evaluated. Thus, we have considered only those companies whose scoring status is awarded from 'A to D-' as per CDP Scoring status. The following are the observation drawn:-

3.3.1Under Industry 'Agricultural Commodities' there were two companies, out of which only one company (i.e. 0.42%)

3.3.2Under Industry ' Cement' there were thirteen companies out of which only four companies have scored with 'B' and one of the company was awarded with 'C' (i.e. 2.11%); two of them falls under 'See Another' status and six companies were marked 'F'.

3.3.3Under 'Chemical' Industry, twelve companies were observed out of which only one company was awarded with score 'C' (i.e. 0.83%), two of them were scored 'See Another' and nine of them were marked with 'F' status.

3.3.4Under 'Coal' Industry there were two companies and both were awarded with 'F' score.

3.3.5Under Industry 'Electric Utilities' fourteen companies were seen out of which two companies represented with score 'C' & 'D' respectively (i.e..84%); one company fell under 'See Another' category and the rest were given status 'F'.

3.3.6Under 'Food, Beverages & Tobacco' there were eight companies in which only one company was observed with 'C' status(i.e.12.5%) and the rest seven companies belonged to 'F' score.

3.3.7Under the industry sector 'N/A' all the six companies were marked with 'N/A' status.

3.3.8Under 'Metal and Mining' Industry seven companies were there out of which only two companies were awarded with 'B' &'D' respectively (i.e.42.86%); two felt under 'See Another' category and two were marked 'F'.

3.3.9Next comes 'Oil & Gas' Industry having thirteen companies under it, out of which two companies have been awarded with status 'D'(i.e. 15.38%) and remaining eleven companies were given 'F'.

3.3.10Under 'Paper & Forestry' industry only one was observed and that was awarded as 'F'.

3.3.11Next industry is 'Steel' which consists of eight companies out of which two companies were with 'B' scoring, while one company was marked with 'D' (i.e. 37.5%); remaining five companies fell under 'F' category.

3.3.12Under 'Transport OEMs' eight companies fell out of which only two companies were observed with scoring 'A-' & 'B' respectively. One of them was marked as 'Not Available' while rest five companies were given 'F' score.

3.3.13In 'Transport Service' Industry only two companies were observed and both of them were awarded with 'F'.

3.3.14The last Industry 'General' sector was having 141 companies under which 99 companies were awarded with 'F' score; one of them was observed with 'D-' scoring. While six companies were awarded with 'D' and nine of them were marked 'C'. Four of them were awarded with score 'B'; two companies with 'A-'score and only one company was having marked as 'A' score (i.e. 29.79%) and the rest twelve companies were given 'See Another' status.

3.4 Empirical result relating to number of companies falling under A-List:

The study moves on to the next research problem of identifying the number of companies falling under 'A-List' category. As per the above observation and analysis it is very clear that maximum Indian companies failed to provide sufficient information about carbon disclosure level and so were awarded with score 'F'.

The CDP awards companies with 'A' status only when companies are acknowledged with positive and ef-

fective actions that mitigate risks due to climate change, water issues and deforestation and the companies have been awarded with high leadership score via inclusion in the 'A-List'.

For inclusion in 'A-List' the companies must include certain items (in blue) and must pass certain items (in red) that the companies need to check in order to fall under the standard for A- list status in each program.

Table 3: Items required being present for A-list

	Climate	Water	Forests
No significant relevant exclusions present (C6.4, C6.4a, F0.6a, F0.7a, W0.6)	✓	✓	✓
Verification of at least 70% of both Scope 1 and Scope 2 total emissions (C10.1a)	✓		
Obtain minimum Leadership points (dependent on program)	✓	✓	✓
Submit a public response to the investor Request	✓	✓	✓
Demonstrate action towards their deforestation and forest degradation related commitments			✓
Pass manual Leadership question check by CDP scoring team	✓	✓	✓
Pass RepRisk check for reputational risk Issues	✓	✓	✓
Pass CDP local offices check	✓	✓	✓
Pass CDP Scoring Steering Committee Approval	✓	✓	✓

Source: www.cdp.net

The company is required to achieve an 'A' score before it is included in the A- list. If in any case a company fails to meet any of the above criteria, the score goes downgraded to A-.

On the other hand, companies with 'A-' grade are considered as a strong performers but not eligible for A-list as they have failed to meet all requirements of the A- list scoring. The steps that needed to be achieving for inclusion in A- list are as:-

a) Question revision by CDP scoring team.

b) Rep Risk check for reputational risk issues.

c) CDP local offices check.

d) CDP Scoring steering committee approval.

After examining the table obtained from CDP's scoring under the sector 'Climate Change' from fourteen different industry sectors, it was observed that out of 237 companies all total only three companies were awarded with 'A-' score and two companies were awarded with 'A' score as per CDP list, 2018. 'Infosys Limited and IndusInd Bank' were included in the 'A-List'. The name of the companies having 'A-' and 'A' score are as follows:-

Table 4: Name of the companies having 'A-' and 'A' score

Sl. No.	Name of the company	Industry	Score
1.	Infosys Ltd.	General	A
2.	IndusInd Bank	General	A
3.	Tech Mahindra	General	A-
4.	Tata Motors	General	A-
5.	Wipro	Transport OMEs	A-

Source: self- constructed

Discloser of information:

In this section we have disclosed the nature of information provided by only those companies whose CDP scores are 'A-' and 'A' in the list. As per the survey we have observed there are only four companies who scored 'A-' in the CDP scoring list and only one company was awarded with 'A' status in the list out of 237 companies for the year 2018.

In this section we have tried to disclose the nature of information provided by these sample companies in their annual report. The following are the observation made from the annual report of these five companies with respect to Carbon Discloser Project (CDP).

3.5.1 Infosys Ltd.:

In the Infosys 'Sustainability Report 2017-18' it has stated the following information:

A. The company's carbon credit accrued will be used to meet if carbon neutral committee in fiscal year 2020. The company has provided a detailed purification status and verified offset volumes in its report.

B. The company has successfully reduced its carbon emission intensity by 3.03% in fiscal year 2018 as compared to last year 2017.

C. The goal of the company of carbon neutrality goals has shifted 2017-18 to 2019-20 due to change in policy level challenges in the country.

D. The company was first in the world to set a goal of becoming carbon neutral and had also reduced per capacity electricity consumption by 50% from 2008 as a baseline year and looking forward to 100% renewable power in the coming year.

E. The company is following a strategy of three pronged so as to achieve carbon neutral commitment. The strategies are as follows:

I. Use of energy efficiency measure so as to reduce energy consumption.

II. To meet their electricity requirements, the company focuses to use renewable energy both captive and purchased.

III. The company focuses to invest in carbon offset for the footprint even if it has to go beyond the company's control.

3.5.2 Induslnd Bank:

This company was awarded with 'A-' status in the CDP score list for the year 2018. The company's 'Sustainability Report' states the following observations:

A. Under 'Corporate Social Responsibility' the bank had stated that it currently featured in the 'A' list in the CDP list whereas our survey observed that it was awarded with 'A-' score in the CDP list (last accessed on 15th of October, 2019 at 16.12pm).

B. The bank also stated that it was featured with 'A-' list in the CDP India for the F.Y 2016-17 and was the only financial service organisation that was recognised.

C. The bank has identified an opportunity that can be optimising diesel use which ultimately has reduced by 15-20% in the DG sets and has reduced their overall carbon footprint.

D. The bank has reported that its emission intensity per revenue in terms of INR Million has decreased from 55.7 to 51.91 in the F.Y 2017-18, which represents a

commitment of Bank towards reduction of their carbon footprint and a step towards growing sustainability.

3.5.3 Tech Mahindra:

This company was awarded 'A-' status in the CDP scoring list as per our observed survey. The following information are furnished in their annual report regarding CDP and sustainability:

A. The company was identified as a 'Global Leader' for its strategies towards carbon control and climate change and has been awarded with the SupplierEngagement Leader Board by CDP in the F.Y 2018 , considered as only Indian company who got such recognition.

3.5.4 Tata Motors:

This company has been awarded 'A-' status in the CDP score list. The annual report of the company states the following information:

A. The company has reported that the consumption of energy per vehicle has decreased by 5.94% as compared to last fiscal year whereas there was reduction by 4.05% per vehicle on specific GHG (Green House Gas) emission as compared to last reporting period which marked the increase in renewable energy.

B. The company reported that fourteen of its suppliers have achieved 7.3% reduction in the annual carbon footprint for this financial year.

3.5.5 Wipro:

The company is awarded with 'A-' status in the CDP score list 2018. The company's steps towards sustainability and carbon emission control as revealed from annual report are highlighted as follows:

A. The company stated its carbon emission and intensity reduction by 2050.

B. The company also revealed that the total carbon footprint of ICT (Information and Communication Technology) sector is set to increase by 6% per year as the demand of ICT is expected to increase by 2020. So, the company is trying its best to limit the negative impact of climate change.

C. The company's aim was on reduction of operational emission programs across their value chain.

4. CONCLUSIONS

The major findings of the study including some limitations are stated as follows:

4.1 Major findings of the study:

The findings of the study are classified into three sections.

4.1.1 **Findings** relating to the position of Indian companies as per CDP's list score under climatic changes.

The findings with respect to first objective of the study are as follows:

I. Under the sector 'Climate Change' there were fourteen industries under which 237 companies were exists.

II. Out of 237 companies under different industries only 158 companies i.e. 66.67% were awarded with score 'F' which indicates failure to provide sufficient information to be evaluated.

III. Out of 237 companies 22 companies i.e. 9.23% marked as 'See Another' status on the CDP list 2018, which indicates that other two sectors i.e. 'Water and Forestation' are to be evaluated.

IV. Only one company out of 237 companies i.e. 0.42% was awarded with 'D-' score of the CDP scoring list.

V. 12 companies out of 237 companies i.e. 5.06% were awarded with 'D' score in the CDP list.

VI. Out of 237 companies 15 companies i.e. 6.33% were observed with 'C' score status in the CDP scoring list.

VII. Out of 237 companies 14 companies i.e. 5.907% were awarded with status 'B' in the CDP scoring list.

VIII. Out of 237 companies 4 companies i.e. 1.26% observed with awarded status 'A-' in the CDP list. Whereas, one of such companies as observed from the annual report was marked with status 'A' in the CDP list.

IX. Out of 237 companies only one company i.e. Infosys Ltd. was observed and awarded with status 'A' score in the CDP list in the year 2018. On the other hand, as per the survey of annual report it is observed that 'Induslnd Bank' stated it with status 'A' of CDP ranking. So, as per the annual report statement two companies i.e. 0.84% were observed with status 'A' in the CDP list 2018.

X. Out of 237 companies 10 companies i.e. 4.2% are either marked as 'Not Secured' or 'N/A' in the CDP list.

4.1.2 Findings relating to number of companies falling under 'A' list of CDP ranking score.

Our study reveals the following findings relating to the second objective:

I. Out of 237 companies 4 companies were awarded with status 'A-' as per our survey through CDP listing. But, one of the company i.e. Induslnd Bank was found to be under 'A-' category as per the evaluation and observation drawn from CDP scoring list, 2018 but from its annual report for F.Y 2017-18 it was observed as 'A listed' category. So, we considered three companies with status of 'A-' scoring as per CDP listing.

II. Out of 237 companies one company i.e. 'Infosys Ltd.' was both observed as per survey in CDP list and annual report under 'A' list category. Again, we included 'Induslnd Bank' to be a part of 'A' score. Therefore, two companies were falling under the purview of 'A' list category in CDP list 2018.

4.1.3 Findings regarding the information provided by the sample companies in relation to CDP information.

We have considered only those companies whose scores were 'A-' and 'A' in the CDP list, 2018 for the information discloser. Three companies were under 'A-' category and two companies were under 'A' list category of CDP listing 2018. So, we have disclosed the information of these five companies only. The following are the observations drawn from the annual report of such sample companies:

I. Infosys Ltd.: The Company has stated its target for carbon emission reduction. They have mentioned that by 3.03%, they have reduced their carbon emission successfully as compared to last year. The company has disclosed all the basic details regarding the carbon emission and its reducing effect.

II. IndusIndBank:The bank has identified an opportunity that can optimise diesel and with the use of that ultimately it reduce 15-20% in the DG sets. It also reported a decrease in emission and intensity from 55.7 to 51.91 in the year 2018 which indicated reduction of carbon footprint.

III. Tech Mahindra:The company was awarded with 'A-' score in the CDP list 2018. But it was identified as a global leader for its strategies towards carbon controllability and climatic change and supplier Engagement Leader Board by CDP.

IV. Tata Motors:The company was awarded with a status of 'A-' score in the CDP list, 2018. The company reported a decrease by 5.94% in energy consumption as compared

to last year. They have also achieved 7.3% reduction in annual carbon footprint for this financial year.

V. Wipro:The Company was awarded with a status of 'A-' score in the CDP list 2018. It stated that total carbon footprint of ICT sectors in set to increase by 6% as demand of ICT is expected to increase by 2020. The company is aiming to reduce its operational emission programs across their value chain.

4.2 Conclusions:

The study reveals the position of Indian companies in Carbon Discloser Project (CDP) under the sector 'Climate Change' with its fourteen industries. Out of total 237 companies under different industries were observed that very few fell under the purview of good scoring status of the CDP list 2018. Only three companies were observed as awarded with a status of 'A-' in the CDP list out of 237 companies and only two companies would comply with all the requirements of 'A' list in the CDP listing i.e. 0.84% companies would fulfil all the requirements of Carbon Discloser Project. Indian companies are still lacking behind when question arises about sustainability and environmental reporting. Maximum numbers of companies are not taking sustainability as an urgent matter. The picture of Indian companies as drawn from CDP list is quite disappointing and serious. Indian companies have to work on 'Carbon Reporting' and consider this as an important and compulsory matter for long-term stability.

4.3 Limitation of the study:

1. The sample size of this research work was based on only one factor out of three factors i.e. Climate Change. If we had considered all the factors of CDP then the results might have be changed.

2. The study is based on non-probabilistic sampling method. So, the study might provide different results if it would be done on the basis of probabilistic sampling.

4.4 Specific Suggestions:

As per the present study, the following are offered for conducting further research:

I. A longitudinal study for a number of years can be made in order to get better result in Indian context.

II. Discloser practices with respect to other two sectors i.e. water and forestation may be conducted to get better observation.

III. Comparative study can be conducted on CDP listing on Indian companies that with developed countries.

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MUTUAL FUND INVESTMENT BEHAVIOUR IN INDIA DURING HIGH MARKET VOLATILITY

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ABSTRACT

The study examines the investment behavior of Indian mutual funds (MF) during the period from 1 January 2019 to 30 November 2020, a period of high volatility during which the COVID-19 pandemic unfolded. Specifically, the study examines whether there has been any change in the relationship between MF investment in equity and debt and the Nifty recent volatility, and, between MF investment in derivatives (index/stock options/futures) and the NSE India VIX (NVIX) during the period from 2019 to 2020 as compared to the corresponding relationship during the period from 2014 to 2018. The study finds that at high market volatility, MF investment decreases for most investment types. The negative trend is the strongest in the case of derivatives, followed by debt and equity, in that order.

The study spans a very recent period (2019-2020) and analyses the impact of an extremely high volatility event like the COVID-19 pandemic outbreak on MF investment flows. Mutual fund investment is critical to the growth of capital markets and the Indian economy. The insights provided by the study will be useful for fund managers as well as other capital market stakeholders.

Keywords: Mutual Funds, Nifty, Volatility, India VIX, NVIX

JEL Classification: C12, G11

Introduction

Stock markets around the world, including India, of late have been having an eventful time. Market volatility has been high due to the severe economic impact of the COVID-19 pandemic. The impact of the pandemic is still to be fully ascertained. While many traditional industry sectors have been hit hard, others, like information technology (IT), energy and pharmaceuticals, are performing strongly. Global stock markets indices, badly rattled in March 2020, have recovered mainly on the back of the technology stocks and financial stimuli from the governments. This nearly V-shape recovery from the nadir of 23rd March 2020 has been accompanied by high market volatility due to the general confusion about the potential economic impact of the pandemic.

In this scenario, mutual fund investment behavior can be hard to predict. While some investors fearing further erosion of fund value may rush for redemption, others may see an opportunity for reduc-

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ing the average acquisition cost by buying afresh at unexpected low price levels. Their behavior could also be different across asset classes, e.g. equity, debt, derivatives, etc., and investment horizons and styles, e.g. short term, long term, systematic, etc. Fund managers themselves cannot always deliver market-beating results, and an unexpected event like the COVID-19 can impair their best laid plans. To top these all, investors' capability to fathom market upheavals is limited and there are times when general panic overrides all rational considerations.

Mutual funds, due to their sheer size wield significant influence on stock prices, both in the short and the long term, and give rise to the 'herding behaviour' among retail investors (Wermers, 1999). According to Qureshi et al (2017), "Trading activities of mutual funds are likely to be followed by other institutional and individual investors resulting in herding patterns. The resultant herding behaviour can further move prices up or down." It is fair to assume that investment decisions by fund managers are based on better knowledge and experience than retail investors. While during periods of low and moderate volatility, such decisions by fund managers play a leading role in influencing price movements and market volatility, during high market volatility the redemption pressure from retail investors may not allow for such a role.

The Indian mutual fund industry has posted tremendous growth during the last decade. According to the Association of Mutual Funds in India (AMFI), as of 31 October 2020, the Average Assets Under Management (AAUM) of Indian mutual fund industry stood at INR 28.23 trillion, a fourfold growth over a decade. The total number of accounts (folios) stood at 93.7 million, continuously rising for the last 77 months. The industry size when compared with that of the developed markets like the US ($ 21.29 trillion AUM in 2019, per Statista) has a lot of room for growth.

Stock market volatility plays a key role in mutual fund investments in many ways. It provides an opportunity to a 'better' portfolio manager to beat peer performance by picking the right stocks in the given market situation, e.g. stocks which have a higher potential for upward movement. Volatility also play an important role in determining investor sentiment. While the going is good, i.e. the fund value is increasing, especially the passive investors do not mind heightened volatility. However, should the volatility increase beyond an untrained mind's comprehension, they might panic and withdraw from the market and wait on the sidelines. Institutional investors, who are a major player in the mutual fund market, driven by their return on investment (ROI) goals and liquidity needs may also check out of a fund in periods of high uncertainty. This article examines this phenomenon in the Indian context.

Market volatility is measured as the volatility of Nifty daily returns and the implied volatility is represented by the NVIX index. NVIX tracks the implied volatility of the Nifty. It is computed by considering the prices of the out of the money Nifty options. The latest available traded price of the NIFTY futures of the respective expiry month is considered as the forward index level and the NSE MIBOR (Mumbai Inter-Bank Offered Rate) (i.e. 30 days or 90 days, as applicable) is used as the risk-free interest rate.

Since the NVIX is computed from prices of the Nifty Out of the Money (OTM) options, it is a suitable representative of the volatility implied in the derivative prices.

Volatility indices, such as the VIX and the India VIX (NVIX), around the world are attracting increased attention, mainly due to two reasons: One, as forecasts of future market volatility (Fassas and Hourvouliades, 2019) (Edwards and Preston, 2017) (Shaikh and Padhi, 2014) (Kumar, 2012) (Chandra and Thenmozhi, 2015); and, two, as an asset class in portfolio diversification strategies. Portfolio managers use volatility indices for investment decisions, specially while managing portfolios containing derivatives of all kinds, e.g. futures and options on indices, stocks, debt, interest rate, exchange rate and commodities, etc. (Moran, 2014) (Moran and Liu, 2020). The present study therefore uses the NVIX as a measure of volatility in the context of MF investment in derivatives.

The purpose of the study is to examine the investment behavior of Indian mutual funds (MF) in equity, debt and derivatives during 1 January 2019 to 30 November 2020, a period of high volatility during which the COVID-19 pandemic unfolded. Such an event provides a unique opportunity to examine the investor behavior during a period of high uncertainty. Specifically, the study examines whether there has been any change in the relationship between MF investment in equity and debt and the Nifty recent volatility, and, between mutual fund investment in derivatives (index/stock options/futures) and the NVIX, during 2019-2020 as compared to the relationship during 2014-2018.

High market volatility may lead to a reduction in mutual fund investment, indicating lack of investor confidence. While moderate volatility favours the performance of successful fund managers due to their better stock picking ability, extremely high volatility, like that seen in 2019-2020, erodes investor confidence. Mutual fund investments are critical to the growth of capital markets and the Indian economy. The insights gained through this study will therefore be useful for fund houses as well as other capital market stakeholders.

REVIEW OF LITERATURE

Research studies on mutual funds have covered a large number of areas, such as the performance of mutual funds (and, therefore, the fund managers) vis-à-vis the market and sectoral indices, relationship of market returns and volatility with mutual fund flows, fund management fees, disclosures, portfolio strategies, and investor behavior, etc. The body of knowledge is though large, however, the research outside of the US is not wide (Khorana et al, 2005). Some of the important studies from India and abroad relevant to the purpose of the study are discussed below. Qureshi et al (2017) have investigated the empirical relationship between aggregate mutual fund flows and stock market volatility in some of the ASEAN markets. Specifically, they have done a comparative analysis of equity and balanced funds with market-wide volatility using a panel VAR model. They find that market volatility increases with increase in equity fund flows but decreases with an increase in balanced fund flows.

While the equity mutual funds are positively correlated to the market volatility, suggesting positive feedback (momentum) trading behaviour, the balanced funds are negatively correlated with market volatility and exhibit negative feedback trading

behaviour (i.e., contrarian behaviour). They also find that macroeconomic variables influence both fund flows and market volatility. In another similar study on the Chinese stock market during 2005-2016, Qureshi et al (2018) have used the monthly and quarterly data to examine the relationship among equity fund flows, market returns, and market risk by using the structural VAR (SVAR) and reduced-form VAR models. They found that market volatility and stock returns are contemporaneously related to aggregate fund flows. Narayan, Narayan and Prabheesh (2014) have used a generalized VAR model to study the dynamic relationship between stock returns and mutual fund flows in India during the period from August 2000 to December 2011. They found that stock return shocks and mutual fund shocks explain around 20 per cent of the total forecast error in the variance processes. To exploit this behaviour, they constructed a 'spillover index' to forecast stock returns and fund flows, the 'spillover' referring to the shocks to stock returns and mutual fund flows. Their study is consistent with that of Diebold and Yilmaz (2009, 2012).

Ben-Rephael, Kandel and Wohl (2011) in their study on the mutual funds in Israel found that aggregate daily fund flows are positively autocorrelated and positively correlated with lagged returns. However, half of the price change is reversed within the next 10 trading days, meaning that that investor flows only temporarily shift prices from their fundamentals. The authors, in another study (2012) on the US equity funds, found that aggregate net exchanges to equity funds in the US, as a proxy for shifts between bond funds and equity funds, are positively correlated with stock returns. However, around 85% of the change is reversed within four months. The findings of these two complimentary papers by the authors suggest that a part of the price noise induced by uninformed trading exists at the aggregate level but is difficult to detect because the reversal is not immediate.

Thenmozhi and Kumar (2009), in their study (NSE Working Paper) on the dynamic interaction among mutual fund Flows, stock market returns and volatility, have used the VAR technique to examine the dynamic interaction between mutual fund flows (purchase and sale) and stock returns, and, between fund flows and market volatility (estimated through a GARCH (1,1) process). They find a positive relationship between stock market returns and fund flows. Mutual fund outflows (sales) are significantly affected by stock return but not vice versa, suggesting the existence of negative feedback trading behaviour. Their results show a strong positive relationship between market volatility and fund flows, i.e. higher volatility leads to an increase in aggregate inflows and outflows. Market volatility is positively related to lag flow and shocks to the flows have a positive impact on market volatility. They also found the fund flows-return and fund flows-volatility

relationship to be stable even in the presence of exogenous variables such as trading volume and market fundamental variables such exchange rates, dividend and short term interest rates.

Oh and Parwada (2006) have analysed the relationship between stock market returns and mutual fund flows in Korea during 1997-2003. They found a positive relationship between stock market returns and mutual fund flows (purchase, sale and net volume). At an aggregate level, there is a negative feedback between returns and flows. From a causality point of view, returns drive flows. Further, the equity fund managers tend to increase their stock purchases with rising market volatility and tend to sell in times of wide dispersion in investor beliefs.

Wermers (1999) has analyzed the trading activity of mutual fund industry during the period from 1975 to 1994 to find if "herding" behaviour exists among the mutual funds themselves and the impact of such herding on stock prices. He finds little evidence of herding by mutual funds in the other stocks but greater evidence in the case of low capitalisation stocks and in trading by growth-oriented funds. The stocks targeted by MF herds outperform stocks that they sell during the following six months, and the difference in returns is much higher among small stocks.

Warther (1995) in his study on the US mutual fund market, found that aggregate security returns are highly correlated with concurrent unexpected cash flows (i.e., a 5.7% increase in stock returns for an inflow equal to 1% of total fund size) into mutual funds, but unrelated to concurrent expected flows. Further, fund flows are correlated with the returns of the securities held by the funds, but not with the returns of other types of securities. From the causality point of view, it was found that there is a positive relation between flows and subsequent returns and a negative relation between returns and subsequent flows.

The present study distinguishes itself from prior research in a number of ways: a) It covers the most recent period; b) It examines the impact of a rare event like the COVID-19 on the mutual fund market; and, c) It utilizes an implied volatility index to study the behavior of mutual fund investment in derivatives.

OBJECTIVES OF THE STUDY

The study empirically analyses mutual fund investment in equity, debt and derivatives during the period from 1 January 2019 to 30 November 2020 – a period of high volatility during which the COVID-19 pandemic unfolded – with the following objectives:

1. Whether high Nifty volatility leads to an increase or decrease in net mutual fund investment in equity and debt, and

2. Whether high levels of NVIX lead to an increase or decrease in open interest in derivatives, i.e. index futures & options, stock options & futures, and interest rate futures.

RESEARCH METHODOLOGY

The sample, the dataset, the sources of data and the step-wise computation methodology used in

conducting the study are described in the following paragraphs. EViews 11 and Microsoft Excel have been used for statistical analysis.

The Sample

The study sample comprises the following:

1. Daily prices of the market indices, viz. the Nifty50 (Nifty) and the India VIX (NVIX). While the Nifty represents the market portfolio, the NVIX represents the Nifty implied volatility.

2. Daily net mutual fund flows into equity and debt.

3. Daily net mutual fund flows (open interest) into index futures, index options, stock futures, stock options and interest rate futures.

Dataset and Data Sources

The Nifty and NVIX daily closing price data for the period from 1 January 2019 to 30 November 2020 has been taken from the NSE website. For the purpose of historical comparison, similar data has also been taken for the period from 1 January 2014 to 31 December 2018 from the same source. Similarly, for the two periods, data on mutual fund flows and open interest has been taken from Securities Exchange Board of India (SEBI) website. SEBI, on its website, reports the daily fund flows by aggregating the trading data submitted by the NSE and the BSE.

Measures of Daily Return and Volatility

Daily return and volatility are computed as log differences of prices on consecutive trading days and as the standard deviation of returns during a specified period, respectively, as shown in Table 1.

Table 1: Computation of Return and Volatility

Daily Return (%)	$r_t = [\log n (p_t) – \log n(p_{t-1})] * 100$	p_t = price on day t p_{t-1} = price on day t-1
Volatility (%)	$\sqrt{\frac{1}{n}\sum_{t=1}^{n}(r_t - R)^2}$	n = number of observations r_t = return on day t R = Mean return during the period
Monthly Volatility (%) is computed as the volatility of daily returns in a month multiplied by the square root of number of trading days in a month. This number is around 20 days in the case of the NSE.		
Annualised Volatility (%) is computed either by multiplying the monthly volatility by the square root of number of months in a year, i.e. √12, or, by multiplying the daily volatility by the square root of number of trading days in a year, i.e. √245 in the case of the NSE.		

Description of some of the terms used in the paper are as follows:

Realized Volatility (RV) on a trading day refers to the standard deviation of daily returns during the previous 20 trading days. A sliding window of 20 trading days is applied to compute realized volatility on each trading day. Unit of measurement is '%' or 'per cent'.

Open Interest at the end of each trading day, is the total value (in Rupees) of outstanding derivative (options and futures) contracts that have not been settled. A net inflow of money into a type of contract will lead to an increase in the open interest, and vice versa. Options and futures contracts on indices, stocks, debt and interest rates are available both on the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). Indian mutual funds invest into these products on both the markets. The study uses the aggregated open interest in the contracts held by the mutual funds on the NSE and the BSE, as reported by the SEBI.

Hypotheses to be Tested

In order to meet the objectives of the study, the following hypotheses have been tested:

Hypothesis 1: High Nifty volatility leads to a decrease in mutual fund net flows into debt and equity.

Hypothesis 2: High levels of NVIX lead to a decrease in mutual fund open interest in derivatives.

Method of Analysis

Statistical analysis software package EViews (version 11) has been used to carry out various analyses. Where required, charting has been done using Microsoft Excel. The following steps have been followed in order to compute descriptive statistics on the indices and MF flows, and run linear regression on the relevant variables.

1. Synchronize the Nifty, NVIX, mutual fund net flows and open interest time series in time. Estimate missing values by using the cubic spline fitting technique available in EViews.

2. Compute daily return on the Nifty as log normal difference of consecutive day prices. Monthly return is computed as log normal difference of prices on the first and last day of the month. Returns are represented as percentages.

3. Compute realized volatility of the Nifty daily returns in a month as the sample standard deviation of daily returns on all trading days in a month. For annualizing the monthly volatility, it is multiplied it by √12.

4. Compute the overall mean, median and quartile means of the NVIX, Nifty realized volatility (RV), mutual funds net flows and open interest time series. This is done in order to study the nature of the distributions.

5. Define the variables listed in Table 2 to represent the various time series used in the study:

Table 2: Regression Variables

S. No.	Variable Name	Time Series	Frequency	Unit
1.	ANNUALIZED_RV	Nifty Realized Volatility (annualized)	Daily	Per cent (%)
2.	NVIX	NVIX	Daily	-
3.	MF_NET_EQUITY	Net MF investment in equity	Daily	Rupees crore
4.	MF_NET_DEBT	Net MF investment in debt	Daily	Rupees crore
5.	MF_NET_TOTAL	Net MF investment in equity and debt	Daily	Rupees crore
6.	OI_INDEX_FUT	Open interest in index futures	Daily	Rupees crore
7.	OI_INDEX_OPT	Open interest in index options	Daily	Rupees crore
8.	OI_STOCK_FUT	Open interest in stock futures	Daily	Rupees crore
9.	OI_STOCK_OPT	Open interest in stock options	Daily	Rupees crore
10.	OI_INTRATE_FUT	Open interest in interest rate futures	Daily	Rupees crore
11.	OI_TOTAL	Total open interest in derivatives	Daily	Rupees crore

6. To reveal the nature and strength of their relationship during the period of study and the historical period, run a linear regression between following set of variables:

a. MF_NET_EQUITY and ANNUALIZED_RV (independent variable)

b. MF_NET_DEBT and ANNUALIZED_RV (independent variable)

c. MF_NET_TOTAL and ANNUALIZED_RV (independent variable)

d. OI_INDEX_FUT and NVIX (independent variable)

e. OI_INDEX_OPT and NVIX (independent variable)

f. OI_STOCK_FUT and NVIX (independent variable)

g. OI_STOCK_OPT and NVIX (independent variable)

h. OI_INTRATE_FUT and NVIX (independent variable)

i. OI_TOTAL and NVIX (independent variable)

7. Sort the daily values of MF_NET_EQUITY and MF_NET_DEBT on ANNUALIZED_RV from low to high and divide the sample into sub-samples (buckets) of around five percent values each. Compute average values of each percentile bucket for all variables. This is done to examine the relationship of net flows purely on the volatility scale and not contemporaneously.

8. Sort the daily values of all the open interest variables (defined in step 5) on NVIX and compute all the bucket averages as done in step 7.

9. Repeat linear regression on variable pairs runs of step 6 by using the bucket averages instead of daily values. This is done to examine the various relationships along the volatility scale instead of time scale.

DATA ANALYSIS & FINDINGS

The results of the computations done and the interpretation of results are presented in the following paragraphs. A quick look at the descriptive statistics on various time series is followed by results of regression analysis done on the relationships between the Nifty volatility and MF net flows into equity and debt, and, between the NVIX and MF open interest in derivatives.

Descriptive Statistics

The monthly average values of various variables used in the study are plotted in Figures 1 and 2. The monthly averages of Nifty realized volatility and MF net flows into equity and debt are shown in figure 1. The monthly averages of NVIX and MF net open interest in derivatives, including index options, index futures, stock futures, stock options and interest rate futures are shown in figure 2.

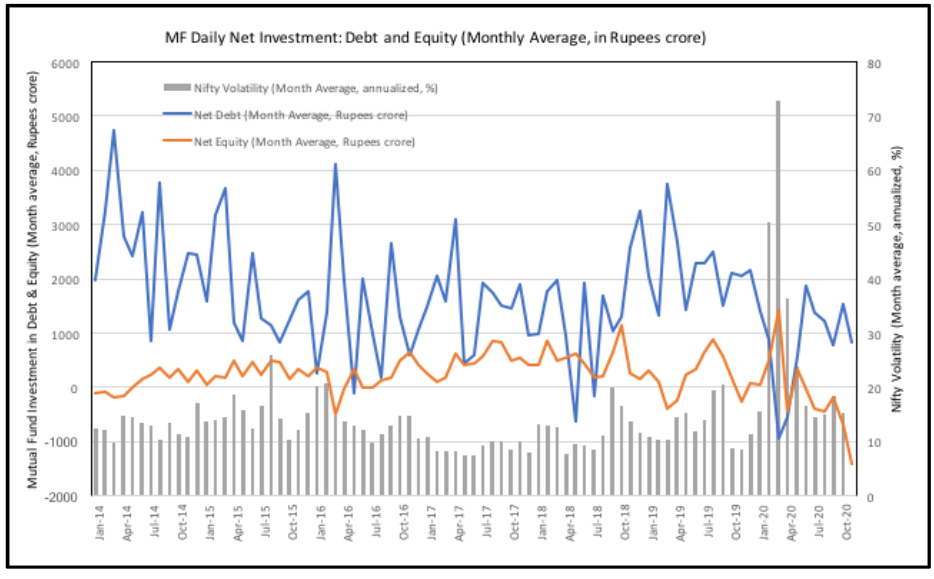

Figure 1. Monthly averages: Nifty Realised Volatility, MF Net investment in Debt & Equity

(1 January 2014 – 30 November 2020)

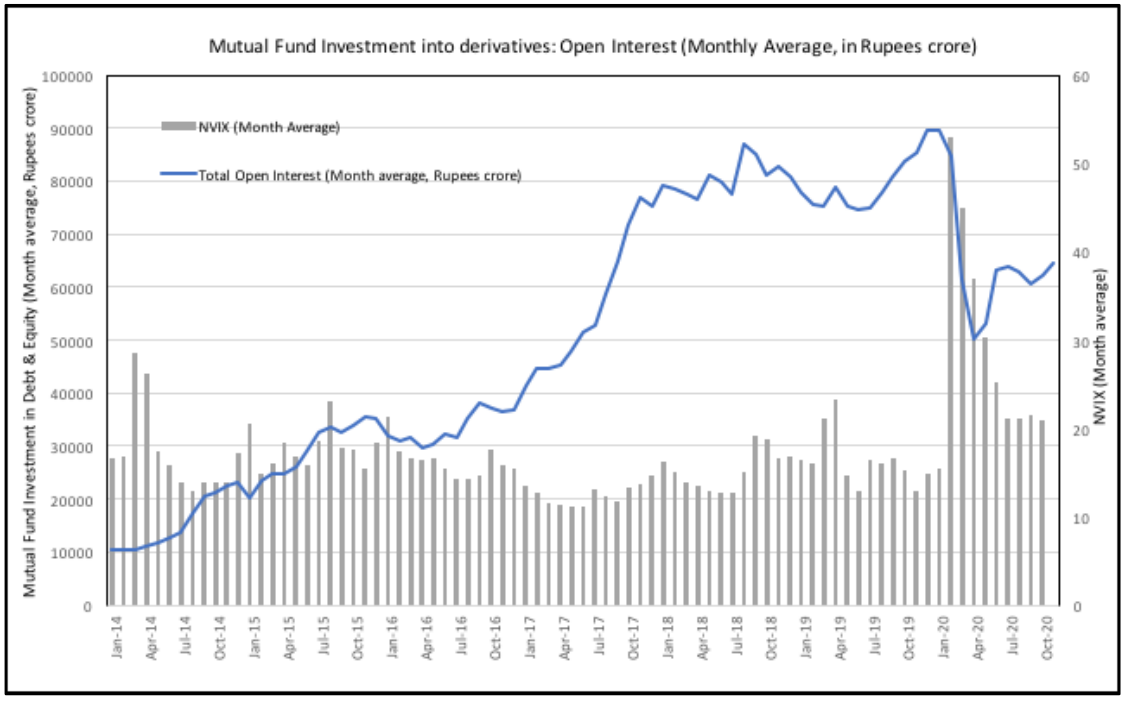

Figure 2. Monthly averages: NVIX, MF net open interest in derivatives

(1 January 2014 – 30 November 2020)

A quick look at figure 1 indicates that MF investment in debt instruments has generally been higher than in equity during the 2014-2020 period and investment in both asset classes has stayed net positive for most months. These trends though were violated during the extremely high volatility period of February-April 2020. Post May 2020, though debt inflows show recovery, equity flows continued to be depressed. Similarly, it can be seen from figure 2 that the MF net investment (open interest) has steadily risen during 2014-2020 only to fall during the January-April 2020 period before showing recovery. A closer look at the high volatility period of 2019-2020 is presented in Figures 3 and 4.

The descriptive statistics on the daily values of various time series are presented in Tables 3 and 4. The mean, median and range of Nifty volatility (table 3) all were higher in 2019-2020 (19.05%, 12.63 %, 81.11%) than during 2014-2018 (12.16%, 14.41%, 24.63%). In fact, this is true for all the quartiles, indicating a higher volatility regime. The average daily MF net flows in equity as well as debt reduced during 2019-2020 as compared to the 2014-2020 period – average equity inflows decreased from Rupees 311.21 crore to Rupees 68.48 crore, and, average debt inflows decreased from Rupees 1704.14 crore to Rupees 1536.86 crore. These numbers add up to a total reduction in average daily net fund flows from Rupees 2015.35 crore to Rupees 1605.33 crore.

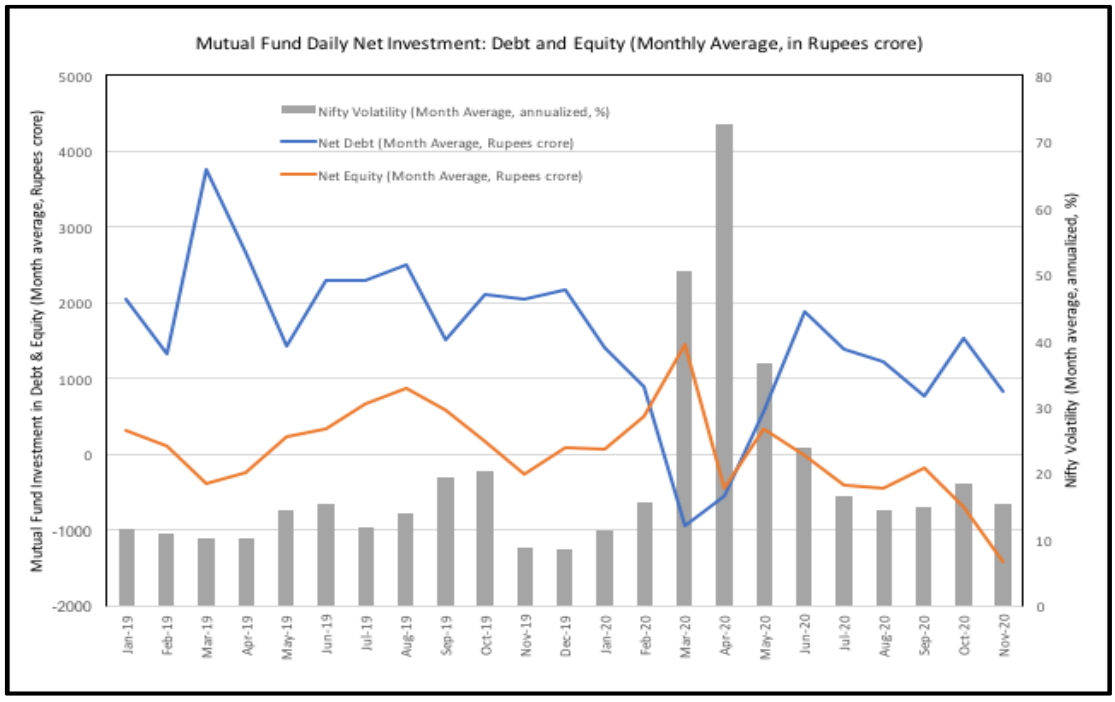

Figure 3. Monthly averages: Nifty Realised Volatility, MF Net investment in Debt & Equity

(1 January 2019 – 30 November 2020)

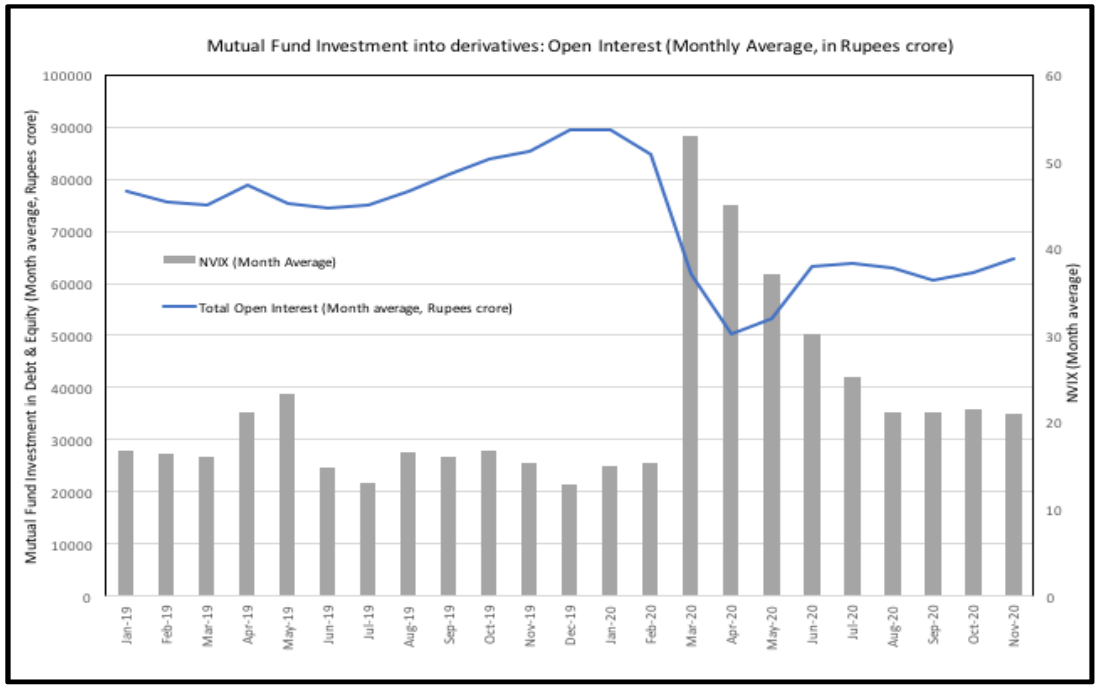

Figure 4. Monthly averages: NVIX, MF net open interest in derivatives

(1 January 2019 – 30 November 2020)

Table 3. Descriptive Statistics on

Nifty Volatility (%) and Daily MF Net Investment in Equity & Debt (Rupees crore)

2014-2020	Annualized_RV	MF_Net_EQUITY	MF_Net_DEBT	MF_Net_TOTAL
Mean	**14.41**	244.11	1657.90	1902.02
Min.	4.90	-5266.40	-18659.21	-17074.21
Max.	88.64	6832.67	16318.49	16080.70
Range	83.74	12099.07	34977.70	33154.91
Q1	10.19	-103.91	177.51	410.35
Q2 (Median)	**12.53**	204.78	1539.29	1770.25
Q3	15.22	571.83	2969.62	3398.98
Q4	88.64	6832.67	16318.49	16080.70
2014-2018	Annualized_RV	MF_Net_EQUITY	MF_Net_DEBT	MF_Net_TOTAL
Mean	**12.63**	311.21	1704.14	2015.35
Min.	4.90	-5266.40	-11556.84	-11518.48
Max.	29.53	4008.34	16318.49	16080.70
Range	24.63	9274.74	27875.33	27599.18
Q1	9.77	-24.37	87.04	430.76
Q2 (Median)	**12.16**	228.00	1547.08	1824.63
Q3	14.16	566.04	3096.10	3496.53
Q4	29.53	4008.34	16318.49	16080.70
2019-2020	Annualized_RV	MF_Net_EQUITY	MF_Net_DEBT	MF_Net_TOTAL
Mean	**19.05**	68.48	1536.86	1605.33
Min.	7.53	-5201.37	-18659.21	-17074.21
Max.	88.64	6832.67	11280.53	11003.24
Range	81.11	12034.04	29939.74	28077.45
Q1	11.14	-552.15	456.19	329.92
Q2 (Median)	**14.41**	80.78	1516.91	1645.44
Q3	18.67	609.13	2763.64	3114.84
Q4	88.64	6832.67	11280.53	11003.24

Source: The author.

During the complete 2014-2020 period, average net flows into derivatives were much higher than the flows into equity and debt. The average net flows into derivatives increased during 2019-2020 as compared to 2014-2018 on aggregate level from Rupees 43,056 crore to Rupees 72876 crore. During 2019-2020, the net flows into the three main contributors to derivative flows showed a mixed trend. While the flows into futures increased quite significantly – more than doubled in the case of stock futures (from Rupees 29835.62 crore to Rupees 59931.08 crore) and almost doubled in the case of index futures (from Rupees 2953.77 crore to Rupees 5229.10 crore), the flows into index options decreased by around 30% to Rupees 7200.48 crore. As expected, all the quartile means of NVIX were higher in 2019-2020 as compared to 2019-2020.

Table 4. Descriptive Statistics on NVIX and MF Open Interest in Derivatives (Rupees crore)

2014-2020	NVIX	OI_Index_FUT	OI_Index_OPT	OI-IntRate_FUT	OI_Stock_FUT	OI_Stock_OPT	OI_TOTAL
Mean	17.46	3582.69	9589.47	170.00	37828.65	44.97	51215.61
Min.	10.45	31.62	2427.12	0.00	3076.17	-6.60	9619.70
Max.	83.61	11181.44	15802.36	1972.36	78470.97	668.77	92653.93
Range	73.16	11149.82	13375.24	1972.36	75394.80	675.37	83034.23
Q1	13.85	1505.66	8517.42	0.00	19333.32	0.00	31080.28
Q2 (Median)	15.83	3056.17	10028.54	66.20	35589.74	7.22	49449.23
Q3	18.27	5463.42	11135.00	211.84	59730.80	38.47	76758.44
Q4	83.61	11181.44	15802.36	1972.36	78470.97	668.77	92653.93
2014-2018	NVIX	OI_Index_FUT	OI_Index_OPT	OI-IntRate_FUT	OI_Stock_FUT	OI_Stock_OPT	OI_TOTAL
Mean	**15.80**	2953.77	10502.05	200.39	29385.62	14.27	43056.01
Min.	10.45	31.62	6053.60	0.00	3076.17	-6.60	9619.70
Max.	37.71	11181.44	15802.36	1972.36	68012.90	141.33	91066.99
Range	27.26	11149.82	9748.76	1972.36	64936.73	147.93	81447.29
Q1	13.42	1141.45	9595.44	0.00	11460.15	0.00	24979.07
Q2 (Median)	15.20	2199.06	10411.80	94.06	21713.81	3.08	34856.36
Q3	17.29	3902.18	11666.53	237.78	50388.55	15.64	66890.39
Q4	37.71	11181.44	15802.36	1972.36	68012.90	141.33	91066.99
2019-2020	NVIX	OI_Index_FUT	OI_Index_OPT	OI-IntRate_FUT	OI_Stock_FUT	OI_Stock_OPT	OI_TOTAL
Mean	**21.81**	5229.10	7200.48	90.29	59931.08	125.34	72576.09
Min.	10.53	1299.62	2427.12	0.00	35500.66	0.00	43286.16
Max.	83.61	9368.53	11530.64	322.19	78470.97	668.77	92653.93
Range	73.08	8068.91	9103.52	322.19	42970.31	668.77	49367.77
Q1	15.44	3487.52	4555.78	0.00	55403.07	20.83	62873.34
Q2 (Median)	17.70	5516.30	8232.26	52.35	59261.03	71.76	75330.19
Q3	24.08	6902.51	9429.74	156.30	65234.10	167.87	80718.48
Q4	83.61	9368.53	11530.64	322.19	78470.97	668.77	92653.93

Source: The author.

Nifty Volatility and MF Investment in Debt & Equity

The relationship between the Nifty daily volatility and daily MF investment in equity and debt during the 2014-2018 and 2019-2020 period is analysed by individually regressing MF_NET_EQUITY, MF_NET_DEBT and MF_NET_TOTAL against ANNUALIZED_RV. A linear regression line is fitted to estimate the goodness of fit. The series pairs are plotted in Figures 5.

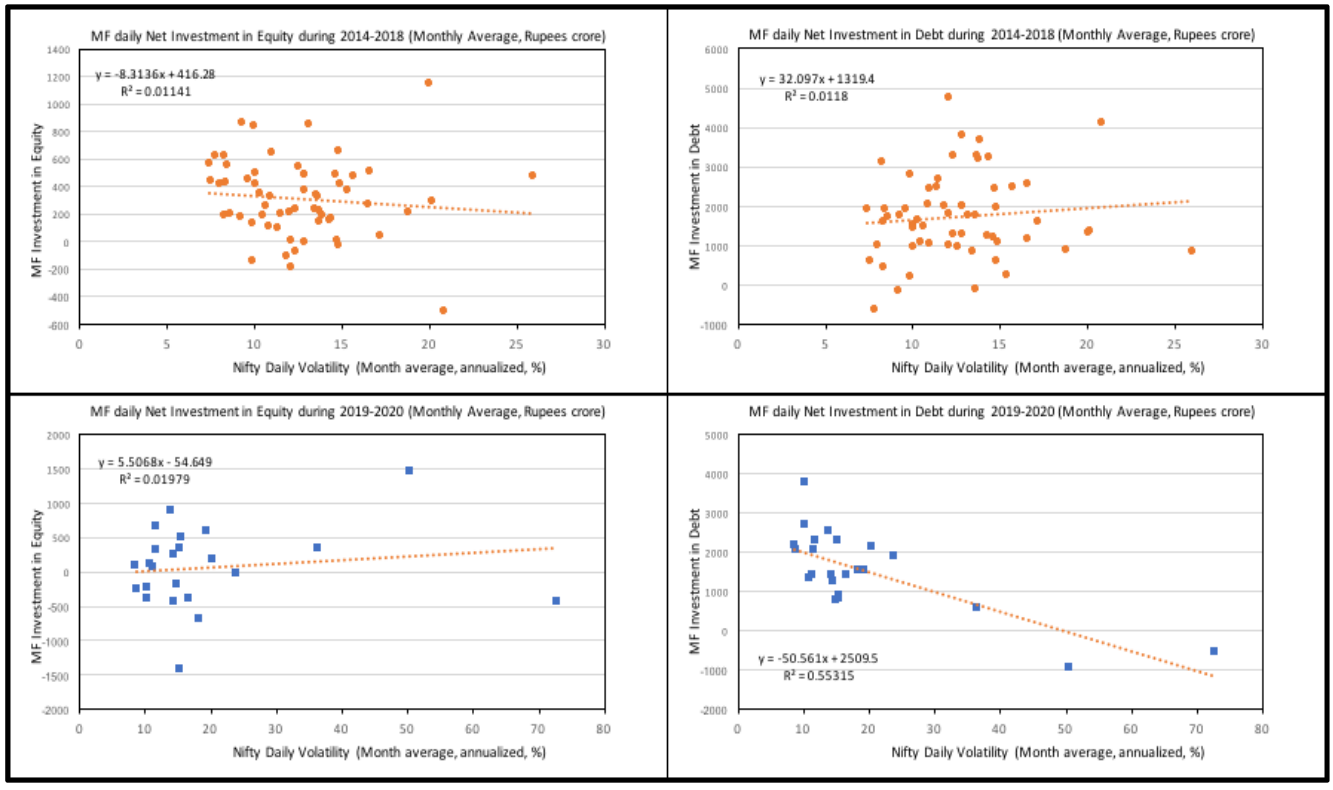

Figure 5. Linear regression plots of ANNUALIZED_RV – MF_NET_EQUITY and

ANNUALIZED_RV – MF_NET_DEBT (2014-2018 and 2019-2020)

During the 2014-2018 period, the relationship between the monthly averages of daily MF net investment in equity/debt and Nifty volatility is found not to be statistically significant (top two plots in figure 5). The slope of the regression line is negative for MF_NET_EQUITY and positive for MF_NET_DEBT. These relationships however changed during the high volatility period of 2019-2020 (bottom two plots in figure 5). While the MF_NET_EQUITY regression line slope became positive, the MF_NET_DEBT line slope changed to negative (figure 6). The MF_NET_EQUITY – ANNUALIZED_RV relationship is still not significant but the MF_NET_EQUITY – ANNUALIZED_RV relationship becomes fairly linear (R2 of 55.3 %). This means that during a period of high volatility, there is a significant reduction in MF net flows into debt, when examined along the month-wise time line. There is no significant change in MF net flows into equity.

For a more nuanced examination of these relationships along the volatility scale, the daily values of the Nifty volatility and MF net flows time series are divided into 20 percentile buckets of around 5 per cent each. The regression lines are now fitted between the same variable pairs as before but taking bucket averages instead of month averages. The results of regressions are shown in Figure 6.

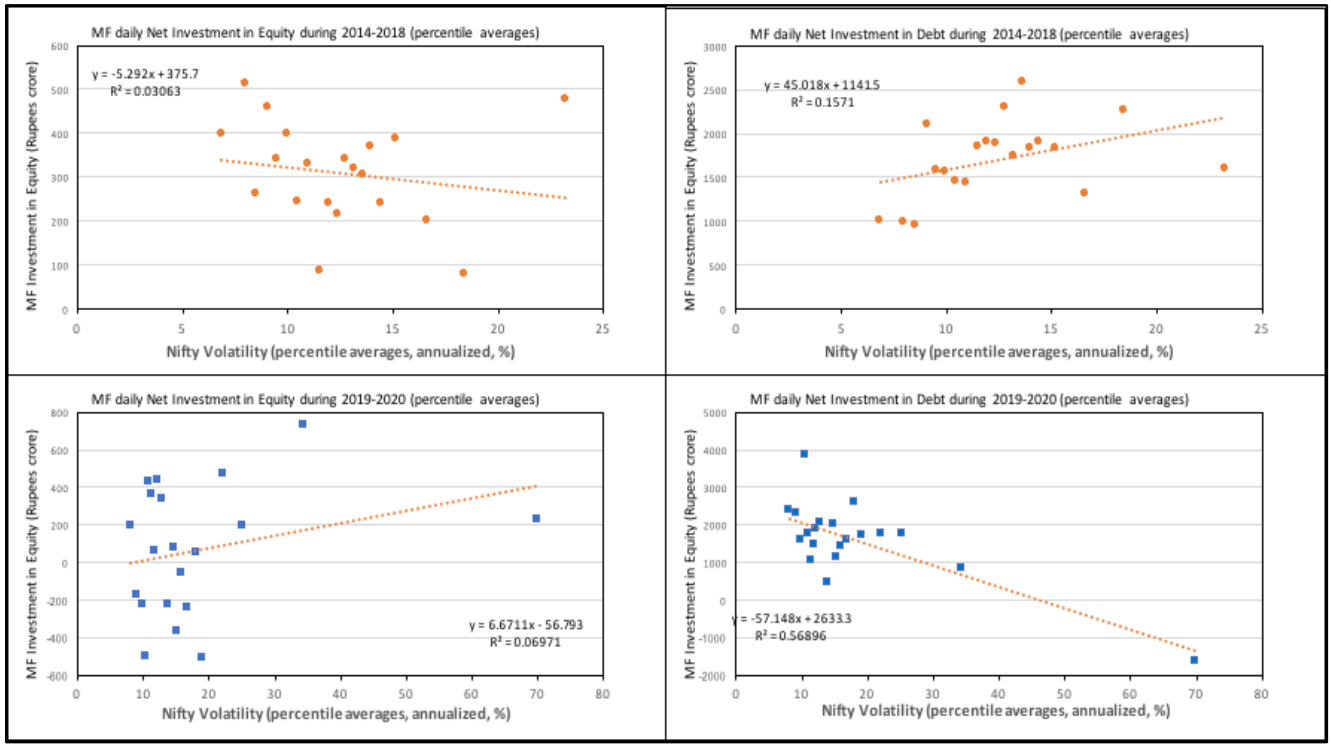

Figure 6. Linear regression plots of ANNUALIZED_RV – MF_NET_EQUITY and

ANNUALIZED_RV – MF_NET_DEBT (percentile averages) (2014-2018 and 2019-2020)

All the regressing lines plotted on the volatility scale (figure 6), i.e. in the increasing order of Nifty volatility over the 20 percentile buckets containing 5 per cent of the data points each, conform to the corresponding plots in figure 5. However, the goodness of fit is somewhat better in all the cases. In the case of MF net equity investment, the relationship with average Nifty volatility still remains statistically insignificant both for the 2014-2018 period and 2019-2020 period, though the slope of the line is negative for 2014-2018 and positive for 2019-2020. The relationship of MF net debt investment with Nifty volatility is slightly positive (R2 of 15.7%) for 2014-2018 period but negative (R2 of nearly 57%) for 2019-2020 period. In sum, it is confirmed that at high volatility, there is a significant reduction in MF net flows into debt but there is no significant change in MF net flows into equity when seen along the volatility scale.

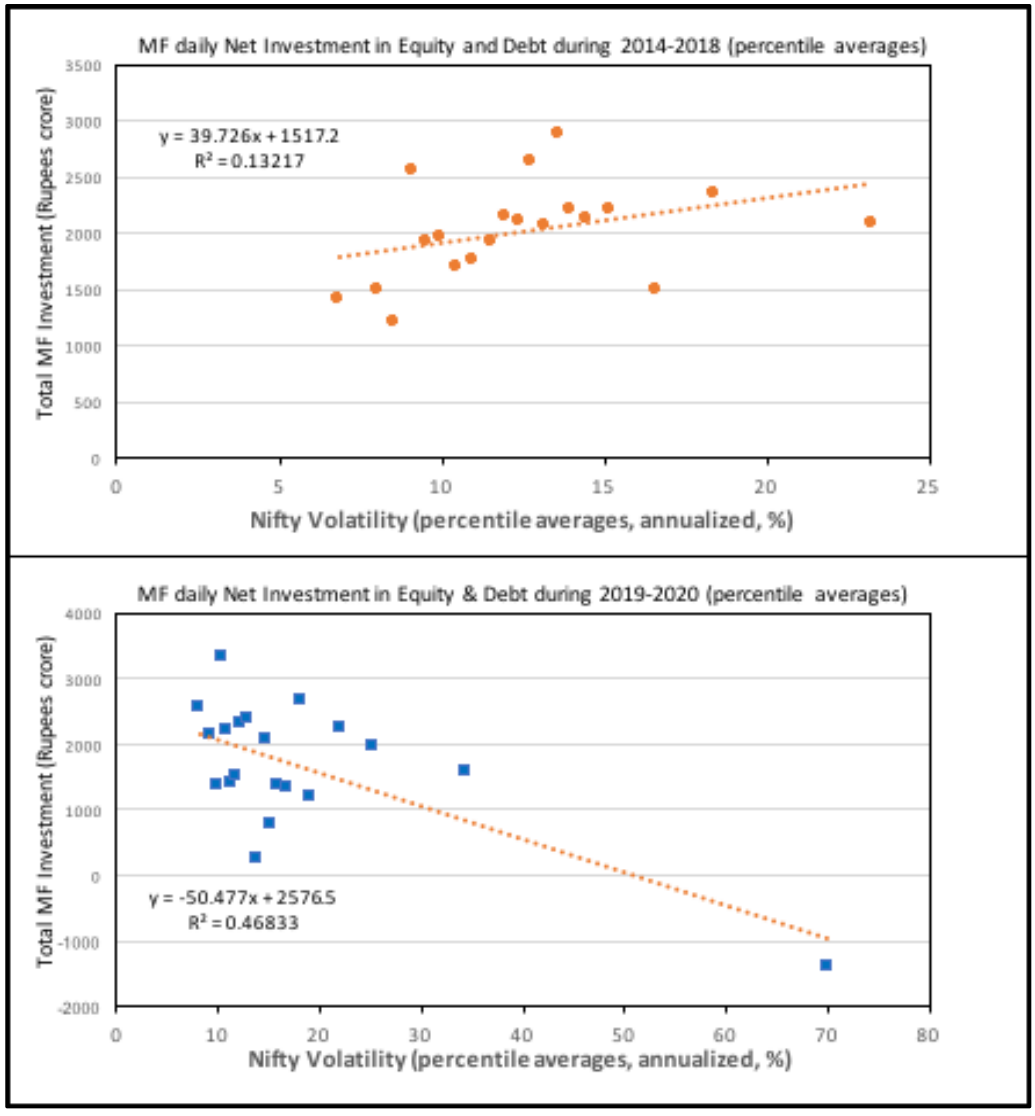

Figure 7. Linear regression plots of ANNUALIZED_RV – MF_NET_TOTAL

(percentile averages) (2014-2018 and 2019-2020)

Hypothesis 1, i.e. High Nifty volatility leads to a decrease in mutual fund net flows into debt and equity, is therefore accepted.

Nifty Volatility and MF Open Interest in Derivatives

The relationship between the Nifty daily volatility and daily MF investment (open interest) in derivatives during the 2014-2018 and 2019-2020 period is analysed by individually regressing OI_INDEX_FUT, OI_INDEX_OPT, OI_INTRATE_FUT, OI_STOCK_FUT, OI_STOCK_OPT and OI_TOTAL against NVIX, the independent variable. As already explained, for analysing derivative flows, the NVIX is a more

relevant variable than the ANNUALIZED_RV. Also, the greater relevance of observing changes in MF net flows across the volatility scale instead of along the timeline has already been demonstrated in case of equity and debt net flows. In the case of derivatives, therefore, we directly analyse the relationship of open interest with NVIX by considering the percentile averages.

Linear regression lines fitted to various variable pairs are shown in Figures 8, 9 and 10. In the case of index futures (figure 8), open interest decreases with increasing (implied) volatility. The negative relationship is more pronounced in 2019-2020 (R2 of 60 %) than in 2014-2018 (R2 of 40 %). This could be due the fact that during 2019-2020 there more, and some extremely, high volatility days which further accentuated the falling trend. Open interest in interest rate futures shows an interesting relationship with heightened volatility (figure 9). The OI_INTRATE_FUT and NVIX had a strong negative relationship during 2014-2020 (R2 of 59%) but it became less so (R2 of 10%) during the high volatility period of 2019-2020. During the 2014-2020 period, interest rate futures and stock options were not a popular asset class for mutual fund investment as compared to other types of derivatives. Also, many days existed with no change in open interest, i.e. trading was infrequent. It is therefore difficult to provide a robust explanation for this behaviour but it is safe to concluded that open interest in interest rate futures decreases with increasing levels of NVIX.

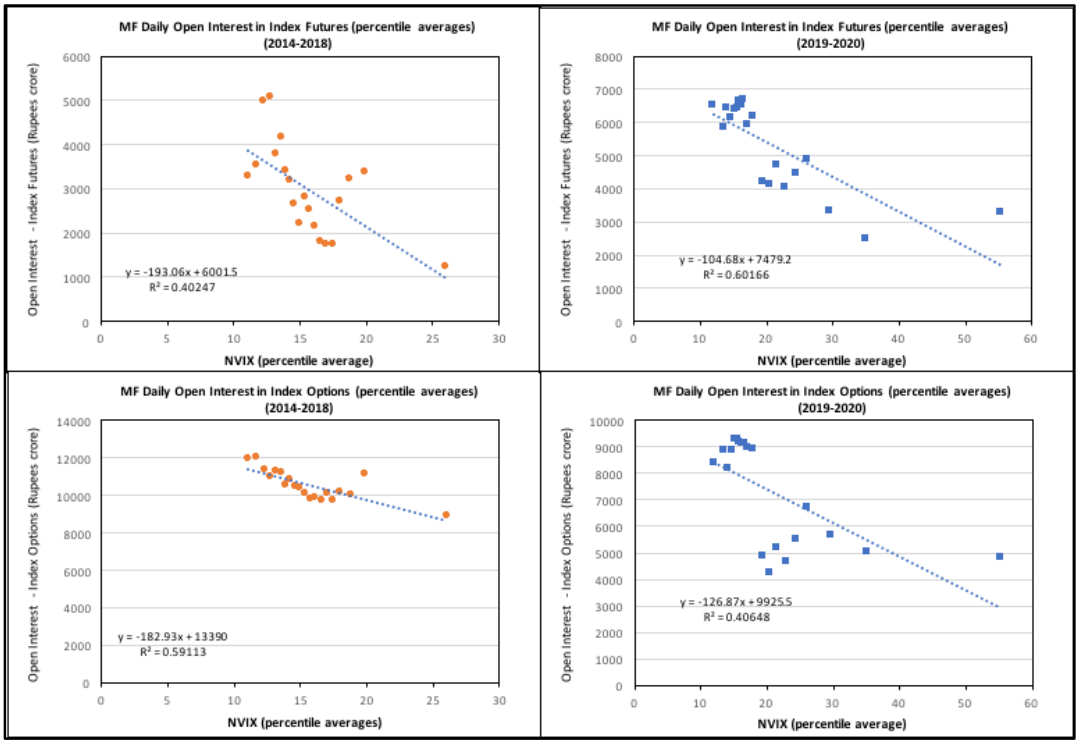

Figure 8. Linear regression plots of OI_INDEX_FUT and OI_INDEX_OPT with NVIX

(percentile averages) (2014-2018 and 2019-2020)

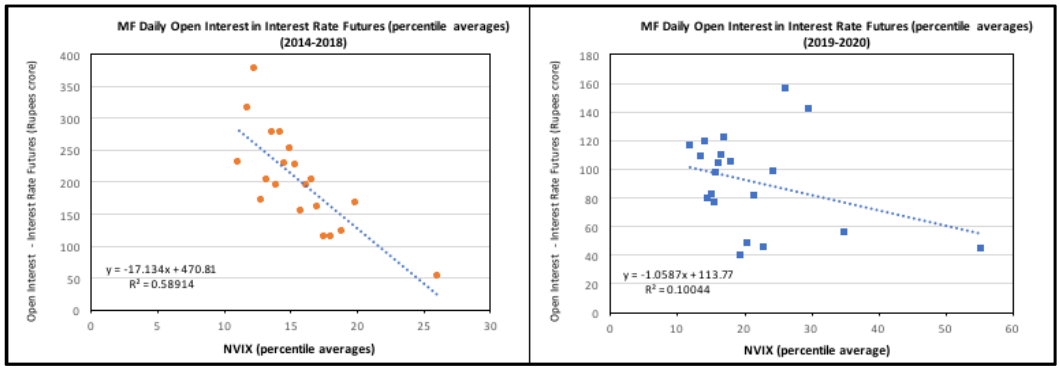

Figure 9. Linear regression plots of OI_INTRATE_FUT with NVIX

(percentile averages) (2014-2018 and 2019-2020)

Open interest in stock futures has a very strong linear and negative relationship with the NVIX (figure 10). The negative relationship during 2014-2018 (R2 of 61%) become even stronger in 2019-2020 due to generally higher levels of the NVIX (R2 of 83%). Among the derivatives, stock futures were found to have the strongest negative relationship with the NVIX. This finding is significant since stock futures also had the largest share of the total derivative open interest during the 2014-2020 period (table 4).

Open interest in stock options were found to have poor correlation with the NVIX, especially during 2014-2018 (figure 10). Like the interest rate futures, stock options as an asset class were not popular with the mutual funds. Open interest was low and the time series had many days with no activity at all. Even so, it noted that during the high volatility period of 2019-2020 open interest in stock options had a weak (R2 of 15%) but positive relationship with the NVIX.

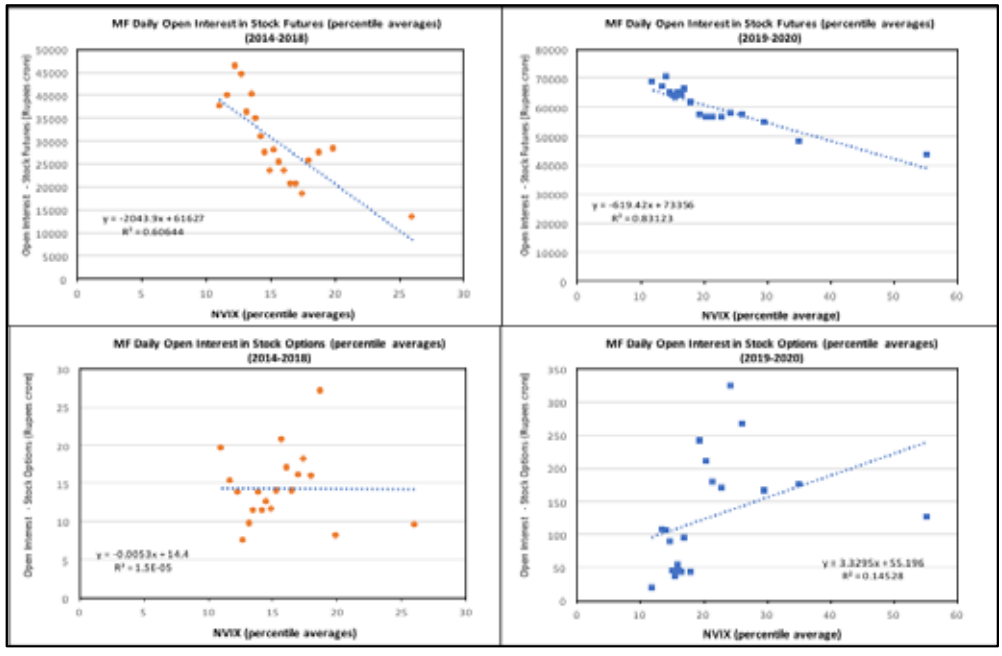

Figure 10. Linear regression plots of OI_STOCK_FUT and OI_STOCK_OPT with NVIX

(percentile averages) (2014-2018 and 2019-2020)

Finally, the relationship of open interest in all derivatives taken together is depicted in Figure 11. As can be expected, due to very high share of index futures, index options and stock futures in the total open interest and their negative relationship with the NVIX, the OI_TOTAL and NVIX relationship is fairly strong and negative during 2014-2018 (R2 of 60%), and even stronger and negative in 2019-2020 (R2 of 76%).

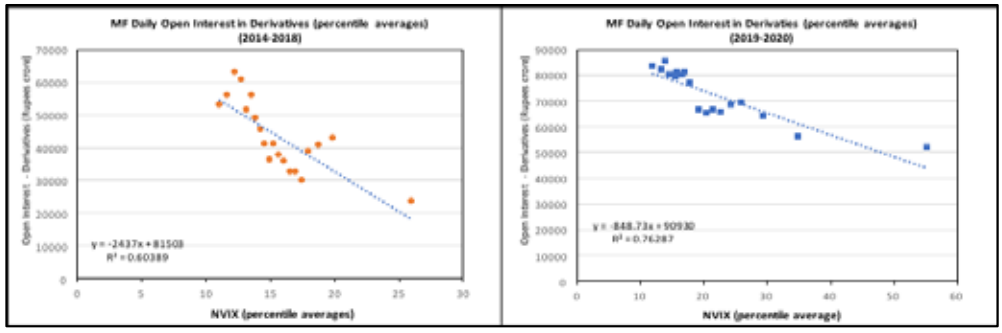

Figure 11. Linear regression plots of OI_TOTAL with NVIX

(percentile averages) (2014-2018 and 2019-2020)

Hypothesis 2, i.e. High Nifty volatility leads to a decrease in open interest in derivatives, is therefore accepted.

CONCLUSION

In line with the objectives of the study, viz. whether high market volatility has a detrimental effect on mutual fund investment, it is found that high levels of market volatility do adversely impact MF net investment in equity, debt and derivatives. The total period of study (2014-2020) was divided into a period of low to moderate volatility (2014-2018) and a period of moderate to high volatility (2019-2020). The latter period also had months of extremely high volatility (March to May 2020) clustered around the global sell-off of March 23, 2020. The following are the main findings of the study:

1. At high volatility, there is a significant reduction in MF net flows into debt but there is no significant change in MF net flows into equity when seen along the volatility scale. Total net investment in equity and debt has a weak but positive relationship with volatility during a period of low to moderate volatility but the net flows decrease sharply during a period of high volatility and the decrement scales with volatility.

2. The total open interest in derivatives – NVIX relationship was fairly strong and negative during 2014-2018 (R2 of 60%), and even stronger and negative in 2019-2020 (R2 of 76%).

3. Open interest in stock futures – the dominant asset class among derivatives –has a very strong linear and negative relationship with the NVIX. The negative relationship during 2014-2018 (R2 of 61%) became even stronger in 2019-2020 due to generally higher levels of the NVIX (R2 of 83%). Among

the derivatives, stock futures were found to have the strongest negative relationship with the NVIX.

4. In the case of index futures, open interest decreases with increasing (implied) volatility represented by the NVIX. The negative relationship is more pronounced in 2019-2020 (R2 of 60 %) than in 2014-2018 (R2 of 40 %)

5. Open interest in interest rate futures decreases with increasing levels of NVIX.

6. Open interest in stock options were found to have poor correlation with the NVIX, especially during 2014-2018. Interest rate futures and stock options as an asset class were not popular with the mutual funds as borne out by low open interest and the

time series having many days with no trading activity at all. Even so, it noted that during the high volatility period of 2019-2020 open interest in stock options had a weak (R2 of 15%) but positive relationship with the NVIX.

PRACTICAL IMPLICATIONS

The study confirms the negative relationship between MF net flows in equity, debt and derivative and high levels of realized volatility and implied volatility (NVIX). The negative relationship is more pronounced in the case of derivatives than debt and equity. These findings have immense practical utility for mutual fund managers and other stock market stakeholders.

The Indian mutual fund industry has exhibited strong growth in the last decade but still has lot of new ground to break in terms of AUM growth and household participation when compared with the developed markets. Stock market volatility is an important determinant of investor confidence in mutual funds. While moderate levels of volatility aid the performance of better fund managers and therefore returns on funds, high volatility could unsettle fund managers and investors alike. Volatility (and volatility of volatility) by itself is a separate asset class. Volatility indices like the VIX and the NVIX are used for portfolio diversification. This possibility has opened up a whole new dimension for the MF fund managers. In the developed markets, a large number of volatility-based products are already being used for portfolio diversification, and it is a matter of time before the Indian market catches up. The findings of the present study will be very useful in this context too.

This study distinguishes itself from prior research in a number of ways. It covers the most recent period (2014-2020), examines the impact of a rare event like the COVID-19 on the mutual fund market, and, utilizes an implied volatility index to study the behavior of derivative investment.

SUGGESTIONS FOR FURTHER RESEARCH

Mutual funds are a critical source of capital for economic growth. The industry is evolving further through constant innovation in terms of new product offerings and application of analytical insights for better portfolio performance. The field is therefore open for research, especially in the Indian

context. Further research could include a larger time period including multiple periods of high volatility, focus on specific product types or fund sizes, etc. More advanced econometric analysis methods and modelling tools could be employed to explore the relationship between market volatility and MF flows, and building forecasting models. More importantly, studies could be done to analyse if mutual fund portfolio performance can be improved by considering index volatility as an asset class by itself.

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A MEASUREMENT MODEL FOR ASSESSING IMPACT OF HAPPINESS ON NATIONAL GROWTH

Dr. Asha Sharma *

ABSTRACT

Growing economy and high performing countries are influenced by various factors. Other than the availability of resources and implementation of resources, there are life expectancy, social, economic development, living standard, and happiness, etc. Happiness is a positive emotion sources which affects the growth of a countries. Positive emotions and life expectancy enhance the working capacity of a person and it leads growth to an economy or a country. Happiness creates the ability to solve the problem. Happiness affects the success ratio, as it develops creativity and mindfulness. Happy minds and happy people are good resources, assets and wealth for a nation. Their productivity and capabilities are much and more than others. They can be proved as a great contributor to national growth.

The aim of the paper is to measure the impact of happiness on the performance of global countries. For this purpose, one sample t-test and artificial neural network statistical tools and techniques are used to measure the result. It is also tried to find out whether the performance of a developing nation is affected by the happiness of the people. It is found that the happiness and performance of the economy are highly correlated and affecting each other positively.

Keywords: Happiness, Happy Planet Index, Gross Development Product, Country Performance, artificial neural network

Introduction

"Foundational within Positive Psychology for providing a blueprint for how pleasant emotional states, as fleeting as they are, contribute to resilience, wellbeing, and health." (Broaden-and-build theory of positive emotions, Barbara Fredrickson)

Happiness is an indicator of the success ratio. There is a high relationship between happiness and success. It is feel to good activity. There is a significant correlation between positive emotions and life expectancy. There are 35 emotions out of which 17 are positive. Happiness creates the ability to solve the problem.

Global challenges have a big negative impact on the life of people. Thus, only the concept of the so-

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cial economy can help to solve these global problems and provide global well-being. (Nataliia Stukalo and Anastasiia Simakhova 2018).

Economic development leads a country high performing at all the financial criteria. It will add to the performance as social development rises.

2. LITERATURE REVIEW

The various research paper shows the relationship between happiness and success. Happiness at the national level enhance the gross domestic product means national growth. The following literature is reviewed for the study.

Fredrickson B. L. (2001) presented a new theoretical perspective on positive emotions and situates this new perspective within the emerging field of positive psychology is described. The broaden-and-build theory explained that positive emotions broaden has impact on people's thought-action, help people in enduring personal resources, ranging from physical and intellectual resources to social and psychological resources. The theory and findings explored that there is a great contribution of capacity to experience positive in human flourishing.

Frey, B. S. (2008), emphasized empirical evidence rather than theoretical conjectures. It was describes new ways for government to provide the conditions for people to achieve well-being. Happiness is demonstrated for the achievements of the economic happiness revolution and points the way to future research.

Veenhoven, R. (1991) explored the theory that happiness is combined impact of relative based on three postulates: comparison, standards of comparison adjust, arbitrary constructs. On the basis of these postulates the theory predicts: (a) happiness does not depend on the real quality of life, (b living-conditions do not effect happiness, (c) people are happier after hard times, (d) they are non-biased about their life.

Easterlin, R. A. (2003) explored a better theory of happiness builds on the basis of evidence of non-pecuniary and pecuniary domains. It is explored that adaptation and social comparison affect utility less in the non-pecuniary domains. Because expected utility in the pecuniary domain are focused most of the times and non-pecuniary areas are underestimated, they allocate an excessive amount of time to pecuniary goals, and short change non pecuniary ends such as family life and health, reducing their happiness. There is a need to devise policies that will yield better-informed individual preferences, and thereby increase individual and societal well-being

Stukalo, N., & Simakhova, A. (2018) explained that help decision-makers to identify the regions with the largest need for stimulating their development. It offers ideas on how to compare municipalities and how to search for common factors that influence development.

3. RESEARCH METHODOLOGY

The research methodology comprises the research design, sample design, sources of data, selection of data, various designs and techniques used for analyzing the data. The methodology used for the study at hand is as under:

3.1 Research Design: The research design used for the research problem in hand is causal research as the objective is to determine which variable might be causing certain factor. In order to determine cause and effect, it is important to hold the variable that is assumed to cause the change in the other variable(s), constant, and then measure the changes in the other variable(s). This type of research is very complex and the researcher can never be completely certain that there are no other factors influencing the causal relationship, the study is between dependent and independent variables.

Table 1 List of dependent and independent variables

Independent Variable	Dependent Variable
Social	Country Performance
Life Expectancy	GDP/ Capita
Average well being	
Happy Life years	
HPI	

Independent Variables:

Life Expectancy, Average well-being, happy life years, Happy Planet Index

Dependent Variables: Gross Development Product per capita (GDP)

3.2 Objectives

To find out the factors influencing happiness in a country.

To know the effect of happiness on the country‘s performance/ national growth.

3.3 Hypotheses

In order to realize the above objectives, the following hypothesis has been formulated.

H1: There is no significant impact of happiness on the country‘s performance

H2: There is a significant impact of happiness on the country‘s performance

3.4 Methods of data collection

For the study in hand, the secondary data was collected through the reports from the World Bank and Human Development Report, Happy Planet Index.

4. RESEARCH ANALYSIS AND IMPLICATIONS OF FINDINGS

Following statistical tests and tools will be used to meet with above-mentioned objectives and for proving the hypothesis:

- One-Sample T-Test
- Artificial Neural Network

For applying this statistical tool software SPSS 19 is used.

4.1 ONE SAMPLE T-TEST The one-sample t-test is used to determine the individual value to its sample mean. T-test compares the mean of one distinct group to the mean of another group.

Table 2 One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
lifeExpect	140	70.9243	8.75405	.73985
wellBeing	140	5.4079	1.14848	.09706
happylife	140	30.2493	13.25746	1.12046
HPI	140	26.4079	7.31940	.61860
GDP	140	13911.0786	19746.20518	1668.85893

Table 2 gives basic statistics and mentioning mean of all the selected variables.

Table 3 One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
lifeExpect	95.863	139	.000	70.92429	69.4615	72.3871
wellBeing	55.714	139	.000	5.40786	5.2159	5.5998
happylife	26.997	139	.000	30.24929	28.0339	32.4646
HPI	42.690	139	.000	26.40786	25.1848	27.6309
GDP	8.336	139	.000	13911.07857	10611.4479	17210.7093

The table 3 presented a Sig. (2-tailed) value of 0.000 which is statistically significant ($p < 0.05$). It shows there is difference between mean value and individual value of all the variables.

4.2 ARTIFICIAL NEURAL NETWORK

Neural network technique is used to predict the demand for higher education and to prove the hypothesis. ANN is the tool consisting of input and output layers plus one or two hidden layers.

Multilayer Perceptron (MLP) Procedure is applied to measure and predict further study. They map relationships implied by the data. The MLP feed-forward architectures, meaning that

data moves in only one direction, from the input nodes through the hidden layer of nodes to the output nodes.

Table 4 Case Processing Summary

		N	Percent
Sample	Training	72	51.4%
	Testing	41	29.3%
	Holdout	27	19.3%
Valid		140	100.0%
Excluded		125	
Total		265	

The case processing summary in table 4 shows that 72 cases or 51.4 % are assigned to the training sample, 29.3% are assigned to testing time, which is used to train the model and 27 cases or 19.3% are assigned to the holdout sample which is used to validate the model.

Table 5 Model Summary

Training	Sum of Squares Error	4.469
	Relative Error	.126
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00.03
Testing	Sum of Squares Error	3.353
	Relative Error	.150
Holdout	Relative Error	.109

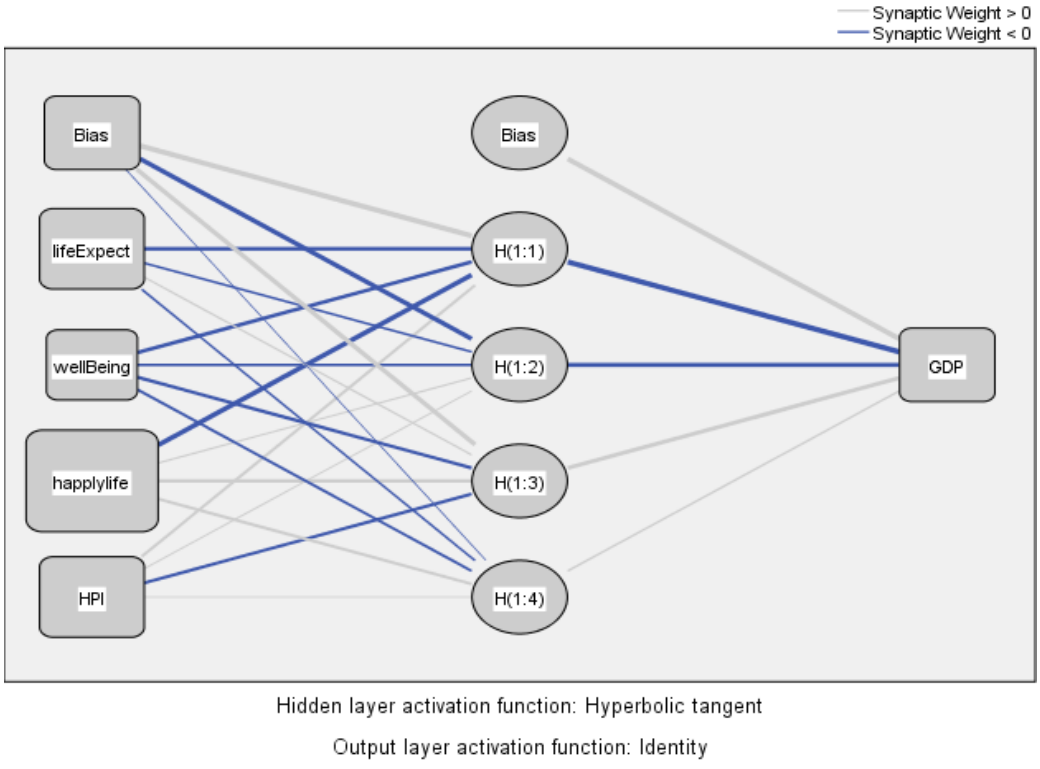
The following model summary table 5 displays information about the results of the neural network training the sum of square error is equivalent to 4.469 in the training samples and the relative error is .150 for testing. So errors are very minutes.

Table 6 Network Information

Input Layer	Covariates	1	lifeExpect
		2	wellBeing
		3	happlylife
		4	HPI
	Number of Units[a]		4
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1[a]		4
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	GDP
	Number of Units		1
	Rescaling Method for Scale Dependents		Standardized
	Activation Function		Identity
	Error Function		Sum of Squares

a. Excluding the bias unit

Table 6 gives information about the network. It describes the process of working. It works into three-layer: an input layer, hidden layer, and output layer. It shows there are 4 units working under the input layer, 4 units are under the hidden layer.



Fg-1 Input, hidden and output layer

Figure 1 gives the network information. It describes the process of working. It works into three-layer: input layer, hidden layer, and output layer. It is a complete connected graph of input, hidden layer and output respectively. It also synaptic weight which is categorized as less than 0 and more than0. The layers which are grey in colour have impacted more than 0. These layer describing out of the entire factor which components have more weight or more important.

Table 7 Independent Variable Importance

	Importance	Normalized Importance
lifeExpect	.232	62.4%
wellBeing	.164	44.2%
happlylife	.372	100.0%
HPI	.232	62.5%

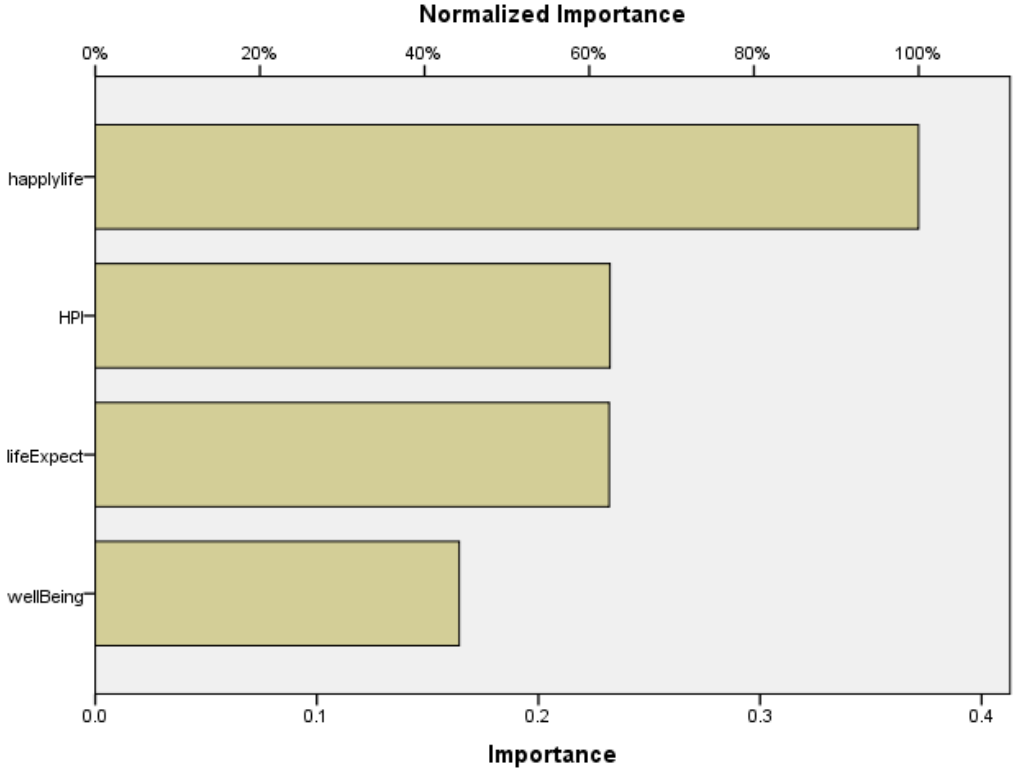


Fig 2 Normalized Importance

Table 7 and figure 2 show importance on how the network classifies the prospective applicants. So, statistical models will help in this situation. The highest importance is due to happy life (100%), 62.5 % and 62.4% of the national growth is found affected by a happy planet index and life expectancy respectively. Rest of the weighed is due to the remaining factor means well-being.

5. CONCLUSION

Positive emotions are the main source of happiness that drives economic development. Therefore, it can be said on the behalf of findings that there is a strong relationship between various variables: life expectancy, well-being. These indicators are tools for measuring the extent to which countries contribute to the social economic and environmental progress of their citizens. A country should achieve happiness as an input not just an output. As happiness is now an accepted and interpreted a major tool for implementing and executing the objectives of the growth, development and better performance.

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Happy Planet Index Report02016

AN ANALYTICAL EVALUATION OF TREND IN EMERGENCE OF COLLECTION FROM DIRECT TAXES

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ABSTRACT

Union government has an exclusive right to levy taxes under article 246(1) of seventh scheduled of constitution of India. Direct taxes are levied on income and wealth of person which includes personal income tax, corporate tax and securities transaction tax etc. Direct taxes having significant contribution in fiscal management and economic integration of nation. By adoption of technical reform and systematic up gradation of technology by department of income tax there is significant increases registered in numbers of various variables of direct collection during tenure of study, it is also found that bouncy factor in respect of collection from direct taxes with respect to consistency is more than indirect taxes. It is also reveal in study there are large numbers growth in various variables such as trends of filling E- return, collection of advance taxes, tax ducted at sources and numbers of tax payers over the period of study.

Key words: Direct tax, Indirect tax, Bouncy factor, E- Return, Gross domestic product

Introduction

Introduction: In this world, nothing can to be certain except death and taxes taxes are one of the most significant instrument for fiscal management and reconsolidation of revenue for government as well as sustainable development of nation. Taxes are levied by government under specific authority provided by the constitution, Article 265 provides —no taxes shall be levied or collected except by the authority of law. Further sub clause one and three of article 246 also provides levy of taxes by union and state government on items mentioned in seventh schedule of constitution known as central and state list items. Taxes should be based on four R`s such as revenue, redistribution, re-pricing and representation. With effect from passing of almost three decade of new economic reform since 1991 Indian tax system is witnessing of significant tax reform in the area of direct and indirect taxes. Direct taxes are obligation levied by union government on person's income and wealth by specific provisions and tax structure applicable for relevant finance act. Indian direct tax system is witnessing of integration of technology with compliance and collection management of CBDT from last fifteen years of time period such as Effective compliances of tax deducted at sources, advance tax, self and regular assessment, regulated appeal and revision system, tax facilitation opportunities with time bounded provisions and paper less compliance management etc. CBDT has recorded significant growth in collection of direct taxes over last one decade of time period. Study has shown that revenue from direct tax collection and numbers of tax payers has recorded 36% and 44% compound annual growth in study period. In recent era of economic development direct tax has emerged as one of the major sources of revenue receipt for Indian economic development it is also shown that there is significant relationship between growth in direct tax collection and growth in gross domestic product known as bouncy factor. Study is based on collection of direct taxes and their various modes with different parameters of tax receipts and indicator of fiscal consolidation by Indian economy. Study has shown that there are high correlation among increase in numbers of tax payers, numbers of return filled by different categories' of PAN holders, direct tax revenue and GDP growth.

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Terminologies in research study:

CBDT: Central board for direct taxes a statuary body of union government under ministry of finance.

GDP: Gross domestic product at market value of all factors in relevant time period.

Direct taxes: Taxes levied by CBDT on income and wealth of person under provision of finance act which includes income tax, corporate tax and wealth tax

Tax payers: Person who has submitted return to income tax department and proceedings under income tax act and their provisions has been initiated upon him.

Tax deducted at sources: As per provision of finance act tax deducted from origin of income of person.

Advance tax: Tax paid and payable by person as per finance act on income earned in relevant financial year instant of assessment year.

Regular assessment: Assessment order passed by component assessing authorities on return and TDS submitted by tax payers.

Self assessment: Assessment made by person on the basis of provision of relevant finance act with appropriate authority of income tax.

Permanent account number: An identity number allotted by income tax department according to status of entities.

Bouncy factor: Relationship between changes in rate of taxes with changes in gross domestic product.

Return of tax: Detailed income summary with tax calculated on it as per provision of finance act submitted with component tax authorities as per head of income of tax payers.

Finance act: An act passed with constitutional due proceedings in every year in relation to applicability of fiscal measurements in every financial year.

Assessment year: Period of 1st April to 31st March in relevant previous years upon which tax is payable to appropriate authority.

Person: An individual, association of persons, body of individuals, company, firm, government, Hindu un divided family, local authority trust, artificial judicial persons.

Other direct taxes: It includes all direct taxes levied by union government except personal income tax, corporate tax, securities transaction tax.

Object of study:

1. To study about pattern of growth in direct taxes collection and their relationship with total tax revenue of union government.

2. To comparative study and analysis of bouncy factor of direct and indirect taxes collection.

3. To study about impact of technical integration adopted by income tax department on numbers of tax

return filled and pattern of increase in numbers of tax payers.

4. To study about pattern of allocated cost of direct tax collection with net revenue of direct taxes.

Statement of problem: Direct tax is one of the significant instruments of fiscal management data has shown there is significant growth registered in collection of direct taxes in tenure of one decade and it is positively co- related with numbers of return filled and tax payers registered with department of income tax in various categories of PAN holders. But there are differences between numbers of tax return filled with taxing authorities and numbers of tax payers registered with taxing authorities. Data has also shown that there are very high percentages of advance tax collection and tax deducted at sources with collection of direct taxes as compared to other modes of direct taxes collection like self and regular assessment.

Limitations of study: Research study is based secondary data of direct tax collection published by department of income tax and office of comptroller and auditor general of India data of financial year 2018-19 is based on provisional estimations. Other factors effected to area of research such as penalty, interest, concessional tax schemes, appeal, review, revision, tax dispute settlement schemes ,changes in international tax law , tax treaty, changes in business cycle, demand, notice , compliances' of effective tax system, decision of tax appellate authorities, tax tribunal, constitutional appellate and review mechanism, changes in estimation and deviations from budgeted figures of tax revenue, charges in growth rate of GDP in various segment of economy , impact of changes in monetary and fiscal policies to the extent of tax collection, technical boundaries, pandemic effect on tax collection, changes in FDI norms, , and cost of tax compliance to various level of PAN holders have not been considered in area of research work.

Importance of study: Research has shown there are significant increases in compound growth rate by 34.85% for direct collection over tenure of study, 46.74% in numbers of return filled 43.46% compound growth rate in number of tax payers from five financial years, direct taxes GDP ratio is about 5.68% and bouncy factor of direct taxes in most of years are more one than one. These all data coincide that there are significant increases in different variables of collection from direct taxes and it has great impact on fiscal management and sustainable growth of Indian economy.

Research methodology: For systematic conclusion of research work there are following methodologies have been adopted such as

1. Source of data collection: Data care collected from secondary sources which include report of data collection on direct taxes by income tax department, office of comptroller and auditor general of India, department of revenue ministry of finance, and other government and tax sites.

2. Pattern of data collection: Data have been collected for total nine years according to object of study which include GDP, indirect taxes , bouncy factors growth in various area of direct taxes and five years data on numbers of return filled and tax payers etc.

3. Tenure of study: Total nine years study of direct tax collection with different aspect as per object of and total five years of tax return submission and numbers of tax payers have been incorporated for study.

4. Area of study: within ambit of direct tax collection area that is directly co- related with object of study such as indirect tax collection , bouncy factor , advance tax collection, collection from TDS ,self and regular assessment, total tax revenue, numbers of return filled and tax payers have been considered as area of study.

5. Selection of data for verification in return: Data have been selected from e -verified return filled with income tax department and information from income tax return form V

6. Rounding off tax collection: collection from direct taxes is rounding up by 100 rupees in crores.

7. Selection of return: In case persons have filled more than one return than figure of latest return have v

8. Revised return: Data of filling revised return is also considered for collection from revenue of direct taxes.

9. Statistical tools: For effective analysis of research work percentage analysis , ratio analysis compound average growth rate on various co area of object , average , mean ,median, mode, standard deviation , co-efficient of standard deviation ,skewness analysis and standard error from standard deviation have been used for study as statistical tools.

10. GDP at market price: VO – IC (fc) VO refers for value of output for particular year, IC refers for intermediate consumption at factor cost.

11. Compound average growth rate: $(V \text{ final} / V \text{ being})^n - 1$ v final is value of investment at end and v being is value of investment at beginning.

12. Simple average: Total data of variables / numbers of year

Review of literature:

1. Raja. J.Chellaiah committee (1991): Report of committee has recommended that need of simplification of personal income tax, wealth tax, and corporate tax in India towards adoption of new economic reform of globalization, privatization and liberalization.

2. Standing committee on direct tax code (2009): committee has recommended that need of rational tax structure in speciation to new pension fund tax treatment, adoption of Morden tax code instant of existing income tax act 1961, wealth tax act 1957 and modernization of direct tax laws with more tax modernization measurement.

3. Report of income tax department on direct tax collection (2019): Report has analysis that there are significant increases in revenue from direct taxes collection of personal income tax, corporate tax and wealth tax in last twenty years.

Hypothesis of study: Null hypothesis have been consider for study it means there is no differences between actual and resulted variables of study the hypothesis are followings

1. H (0): There is no significant difference between trends in variables of revenue from direct taxes receipts and revenue from indirect tax receipts.

2. H (0): There is no significant difference between consistency in bouncy factor of direct and indirect tax collection.

3. H (0): There is no significant difference between compound average growth rates in numbers of returned filled and numbers of tax payers.

Table 01

Collection of direct taxes from financial year 2010-11
Figures in (crore)

Financial year	Corporate tax	Personal income tax	Other direct tax	Total of direct taxes	% of growth in direct taxes
2010-11	298688	146258	1049	445995	NA
2011-12	322816	170181	990	493987	10.76
2012-13	356326	201840	823	558989	13.18
2013-14	394678	242888	1030	638596	14.33
2014-15	428925	265772	1095	695792	8.96
2015-16	453228	287637	1079	741945	6.63
2016-17	484924	349503	15286	849713	14.24
2017-18	571202	419884	10951	1002037	17.93
2018-19	663571	473121	993	1137685	13.54
Total	3974358	2557084	33296	6564739	NA
CAGR in %	33.35	37.45	46.84	34.85	NA

Sources: www. Income tax gov. in.

Table 02
Percentage of direct and indirect taxes with total tax receipts
Figures in (crore)

Financial year	Direct taxes collection	Indirect taxes collection	Total taxes collection	Direct taxes as % of TT	Indirect taxes as % of TT
2010-11	445995	343716	789711	56.48	43.52
2011-12	493987	390953	884940	55.82	44.18
2012-13	558989	472915	1031904	54.17	45.83
2013-14	638596	495347	1133943	56.32	43.68
2014-15	695792	543215	1239007	56.16	43.84
2015-16	741945	711885	1453830	51.03	48.97
2016-17	849713	861515	1711228	49.65	50.35
2017-18	1002037	915256	1918210	52.24	47.76
2018-19	1137685	936018	2076703	54.78	45.22
Total	6564739	5670820	12235559	53.63	46.37
CAGR in %	34.85	34.76	35.59	NA	NA

Sources: www. Income tax gov. in.

Table 03

Ratio of direct tax collection with GDP figures in (crore)

Financial year	Direct taxes collection	Gross domestic product	GDP direct tax ratio
2010-11	445995	7674148	5.81%
2011-12	493987	9009722	5.48%
2012-13	558989	10113281	5.53%
2013-14	638596	11355073	5.62%
2014-15	695792	12541208	5.55%
2015-16	741945	13567192	5.47%
2016-17	849713	15362386	5.53%
2017-18	1002037	17095005	5.86%
2018-19	1137685	19010164	5.98%
Total	6564739	115728179	5.68
CAGR in %	34.85	35.18	NA

Sources: Data compiled by author

Table 04
Bouncy factor of direct and indirect tax collection
Figures in (crore)

Financial year	Direct taxes collection	Indirect taxes collection	percentages growth in direct taxes	percentages growth in indirect taxes	Growth rate in GDP in %	Bouncy factor of direct taxes	Bouncy factor of indirect taxes
2010-11	445995	343716	17.97	40.90	18.84	0.95	2.17
2011-12	493987	390953	10.76	13.74	17.4	0.62	0.79
2012-13	558989	472915	13.18	20.96	12.25	1.07	1.71
2013-14	638596	495347	14.33	4.88	12.28	1.16	0.40
2014-15	695792	543215	8.96	9.70	10.45	0.86	0.93
2015-16	741945	711885	6.63	31.00	8.25	0.80	3.75
2016-17	849713	861515	14.24	21.10	13.23	1.10	1.60
2017-18	1002037	915256	17.93	6.28	11.28	1.59	0.56
2018-19	1137685	936018	13.54	1.64	11.20	1.21	0.15
Total	6564739	5030820	NA	NA	NA	NA	NA
CAGR in %	34.85	34.76	NA	NA	NA	NA	NA

Sources: Data compiled by author

Table 05
Ratio of advance tax, Tax deducted at sources and other direct tax receipts with direct taxes rupees (in crore)

Financial year	Tax deducted at sources	Advance tax receipts	Other direct tax receipts	Total taxes receipts	Gross direct tax collection	Percentages of direct tax with total tax
2010-11	168669	212538	43966	425173	513898	82.73
2011-12	198679	251526	50134	500339	579499	86.33
2012-13	210654	275794	48596	535044	636932	84.00
2013-14	248547	292522	63884	604953	721604	83.83
2014-15	259106	326525	81589	667220	799459	83.45
2015-16	287412	352899	105384	745695	864369	86.27
2016-17	343134	406769	120200	870103	1012401	85.94
2017-18	412768	461967	79043	953778	1154436	82.61
2018-19	487669	530285	77317	1095271	1298764	84.33
Total	2616638	2580540	592796	6397576	7581362	NA
CAGR in %	35.61	31.96	33.51	35.15	34.86	NA

Sources: Data compiled by author

Table 06
Percentage of gross direct tax Collection with self and regular assessment tax collection
Figures in (crore)

Financial year	Self assessment tax collection	Regular assessment tax collection	Total tax collection	Gross tax collection	Percentage of total tax with gross tax collection
2010-11	36887	51838	88725	513898	17.26
2011-12	27648	55512	83160	579499	14.35
2012-13	39470	62418	101888	636932	16.00
2013-14	44123	72528	116651	721604	16.16
2014-15	52050	80189	132239	799459	16.54
2015-16	54860	63814	118674	864369	13.72
2016-17	68160	74318	142478	1012401	14.07
2017-18	101873	98785	200658	1154436	17.38
2018-19	99717	103776	203493	1298764	15.66
Total	524788	663178	1187966	7581362	15.66
CAGR in %	34.31	32.73	33.41	34.86	

Sources: Data compiled by author

Table 07
Receipts and cost of allocation figures in (crore)

Financial year	Total of direct taxes	Total expenditure	Net tax collection	Cost of collection	Growth in net tax collection
2010-11	445995	2698	443297	0.60	Base
2011-12	493987	2976	491011	0.60	10.84
2012-13	558989	3283	555706	0.59	13.04
2013-14	638596	3641	634955	0.57	14.24
2014-15	695792	4101	691691	0.59	9.00
2015-16	741945	4593	737352	0.61	6.67
2016-17	849713	5578	844135	0.66	14.52
2017-18	1002037	6087	995950	0.61	17.89
2018-19	1137685	7074	1130611	0.62	11.85
Total	6564739	40031	6524708	NA	NA
CAGR in %	34.85	34.94	34.83	NA	NA

Sources: Data compiled by author

Table 08
Number of persons filled e return from financial year 2014-15 to 2018-19

PAN category	Financial year ended of 31st march					
	2014-15	2015-16	2016-17	2017-18	2018-19	CAGR %
Association of persons	88432	106573	122466	155129	177499	49.08
Body of individual	3586	4206	4257	5327	5771	45.20
Company	670900	692696	715200	799687	847860	30.86
Firm	902948	983984	1060323	1208349	1318828	43.20
Government	26	41	68	157	273	85.10
Hindu undivided family	891801	940830	1007753	1114038	1166432	41.86
Artificial judicial person	7132	7784	8479	9135	9430	42.58
Local authority	2221	2465	2578	2954	3102	43.08
Individual	32372285	36138618	41593816	50989970	59544767	46.85
Trust	162854	179586	191969	223251	244624	43.96
Total	35102185	39056782	44706909	54507997	63318586	46.47
Average	3510218.5	3905678.3	4470690.9	5450799.7	6331858.6	3510218.5

Sources : Data compiled by author

Table 09
Number of tax payers from financial year 2014-15 to 2018-19

PAN category	Financial year ended of 31st march					
	2014-15	2015-16	2016-17	2017-18	2018-19	CAGR %
Association of persons	159640	180321	205725	225599	259689	45.30
Body of individual	6985	7433	8650	9246	10418	43.65
Company	746800	768206	810617	837597	886889	40.22
Firm	1083515	1156136	1250519	1312488	1425375	41.88
Government	334	485	747	1308	2566	74.30
Hindu undivided family	999401	1055205	1119899	1135677	1187180	40.67
Artificial judicial person	10556	11098	11702	11506	12106	40.90
Local authority	7118	7533	8358	9096	10185	42.91
Individual	53805146	57970144	65555192	70445510	80445511	43.62
Trust	217092	231781	253070	261531	284578	41.75
Total	57036587	61388342	69224479	74249558	84524497	43.46
Average	5703658.7	6138834.2	6922447.9	7424955.8	8452449.7	5703658.7

Sources: Data compiled by author

Table 10
Descriptive statistics of major findings figure (in crores)

Statistical values	Direct tax collection	Indirect tax collection	Bouncy factor		Total tax receipts	E- Return filled	Numbers of tax payers
			Direct tax	Indirect tax			
Mean	729415	558890	1.04	1.34	1359981	47338492	69284693
Median	695792	543215	11.46	13.97	1239007	44706909	69224479
Standard deviation	218533	217246	0.263	1.058	432271	10315080	9687865
Co efficient factor in %	29.60	38.70	25.28	126.65	31.78	21.79	13.98
Skewness	0.629	0.278	0.58	1.29	0.4088	0.551	0.4367
Compound average growth rate in %	34.85	34.76			35.59	46.47	43.46

Sources: Data compiled by author

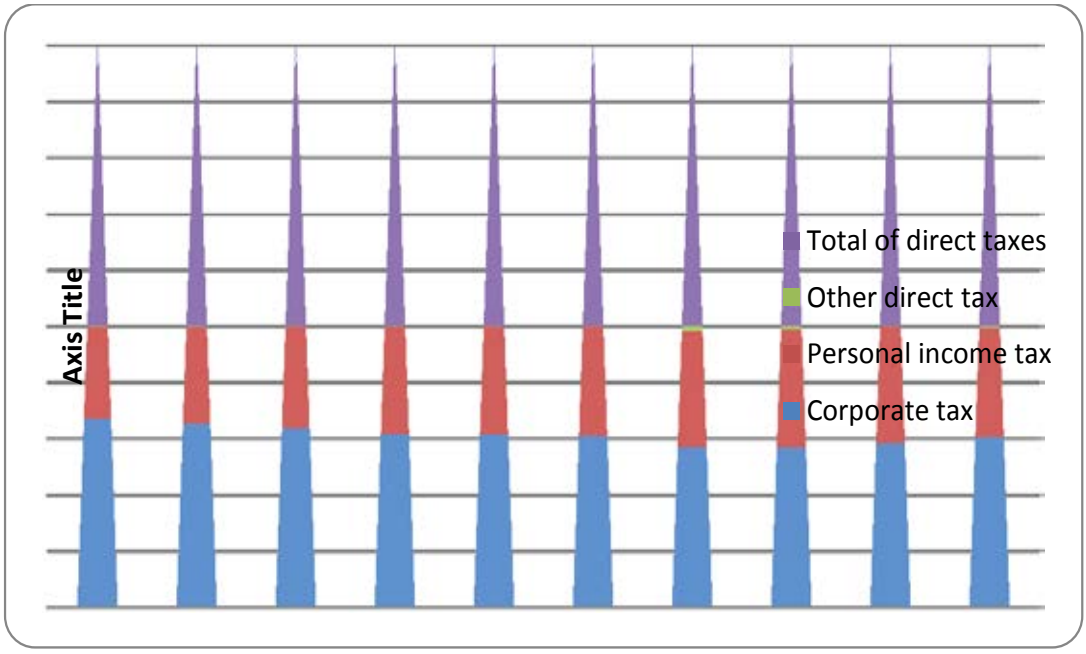

Figure 01 collection from various direct taxes

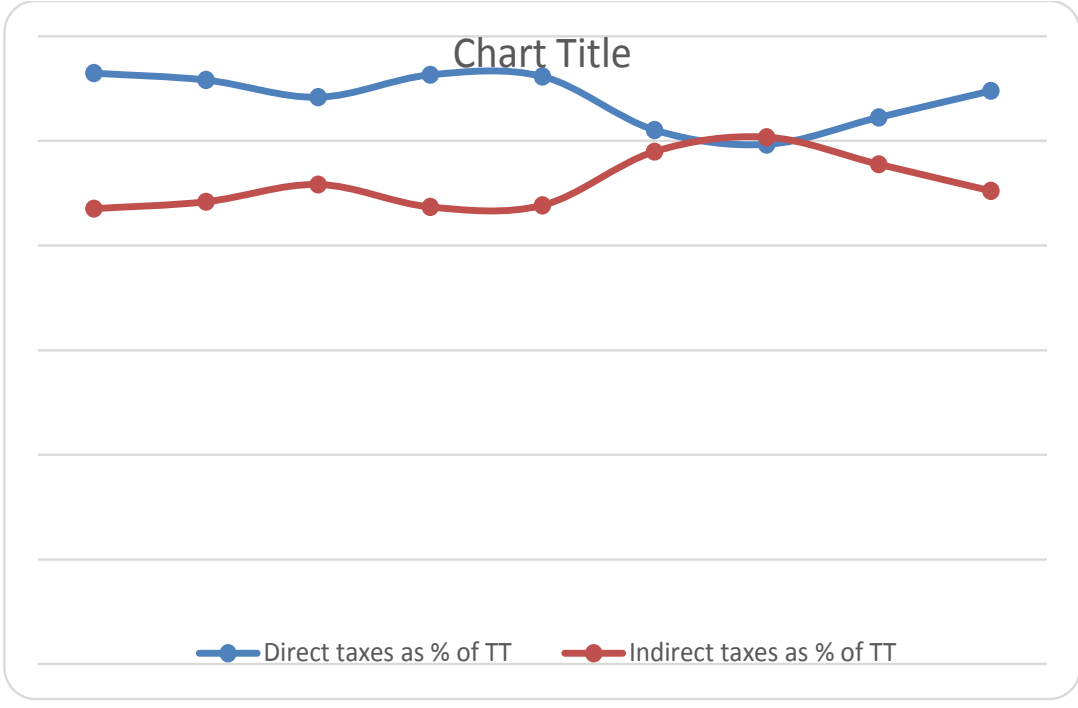

Figure 02 collection from direct and indirect taxes as % of total tax

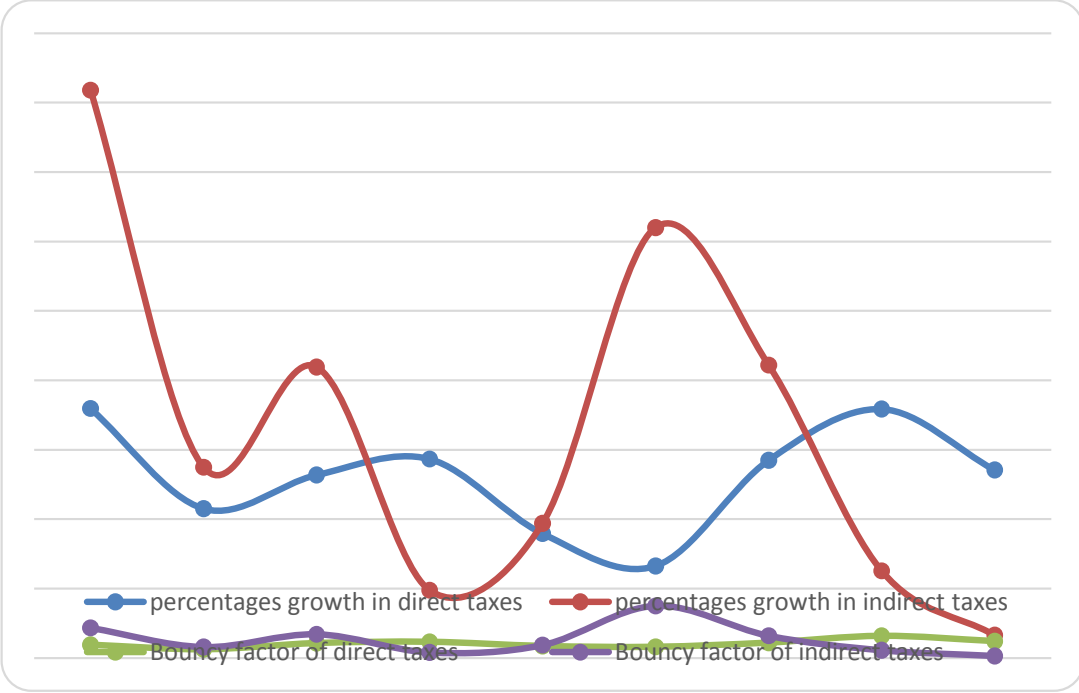

Figure 03 bouncy factor and growth rate in collection of direct and indirect taxes

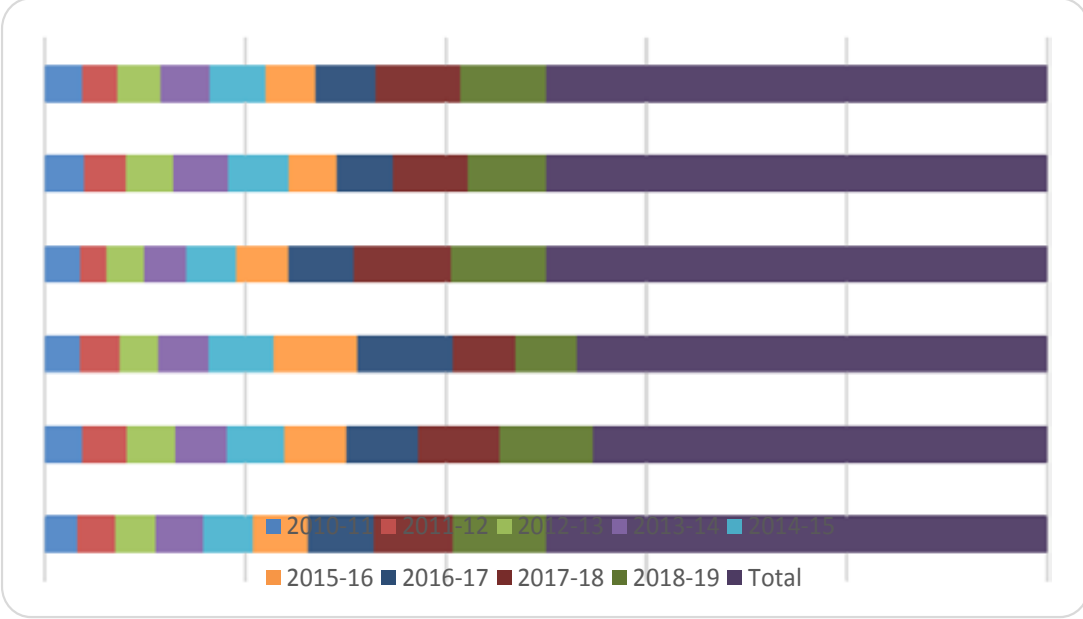

Figure 04 collection from direct taxes in various assessment modes

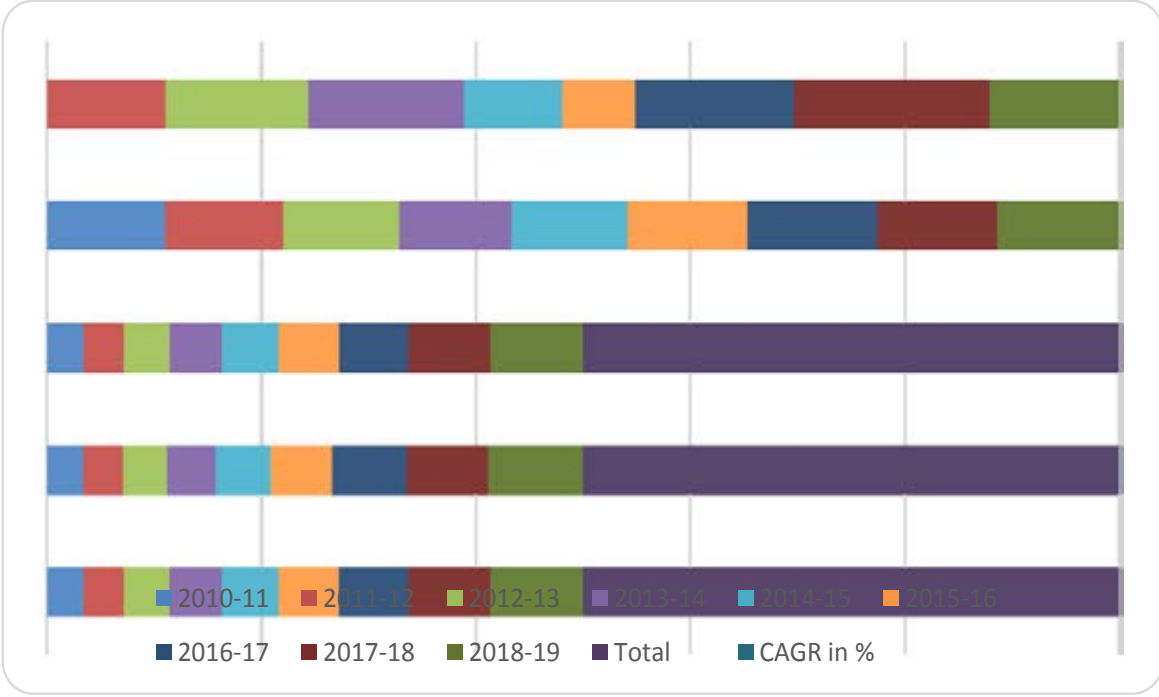

Figure 05 cost and net collection effect of direct taxes

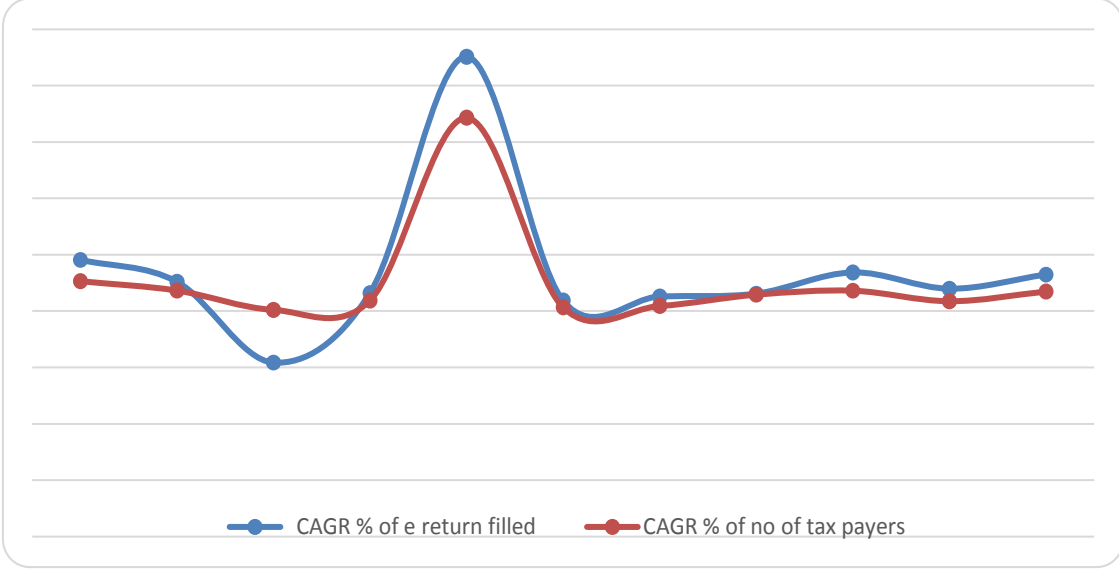

Figure 06 compound average growth rate of return numbers of filled and tax payers

Recent developments in area of direct taxation:

1. Rationalization of tax deducted at sources, tax collected at sources and advance taxes with large coverage of different group of assesses with effective rate of taxes.

2. Introduction of simple return form for various categories of PAN holders and different types of income group for submission of electronically verified return.

3. Technical integration of central record processing units with server and electronic based information based technologies that have almost removed the paper work.

4. Introduction of attractive lower tax rates for new start up manufacturing units, reduction in minimum alternative tax (MAT) over a period of time with systematic utilization of credit and increase in exempted there hold income limit and rebate and tax slab for various group of persons as per progressive rate of taxation structure.

5. Introduction of better tax compliances and governess effective tax system such as authority of advance ruling, general anti avoidance rules (GAAR), faceless appeal system, vivid se visvas scheme, waiver of penalty and interest on taxes if tax paid within stipulated time, electronically notice and assessment order , increase in limit of appeal with appellate authorities, establishment of upper tax board in tier II and tier iii cities with efficient manner.

6. Increases in numbers of refunds by department in time bound manner to tax payers without heavy paper work and administrative burdens.

Problems and difficulties in direct tax collection:

1. There are low rates of capital formation and savings in India it is near about 30% GDP and 18% GNP over a decade of time period which directly affected to collection of taxes.

2. There is very little coverage of unorganised sector in India for collection of direct taxes and increasing in rate of unemployment over a decade of time period it is near about 6.50% now.

3. Double tax avoidance treaty of India with other nations presently total 88 countries having DTTA out of which 85 countries has an active agreement with India. Specifically misleading of international treaty by institutional foreign investors from specific origin of investment with deliberately tax avoidance and invest from country specific origin without having temporary establishment of business invested in India are effects collection from direct taxes.

4. Loopholes in income tax act 1961with respect to specific provision of tax and their misapplication at large by various entities for claiming of deductions, exemptions and rebate etc.

5. More skewed of income tax act1961 with respect to particular head of income and particular categories of persons rather than other head and categories for collection of taxes.

Findings of study:

1. There is a significant increase in compound average growth rate in collection of direct taxes over a period of time it is increased by 34.85% in study period. It is also reveal that corporate tax and personal income tax has an overall contribution of 95% in total direct tax revenue.

2. There is significant relationship between changes in growth rate of direct taxes and gross domestic product and bouncy factor of direct taxes is highly constant than indirect taxes and it more than an average of par over period of study.

3. Adoption of technical integration by department of income tax resulted in quick compliance of direct taxes law. It is reveal in study that there is increases in pattern of compound average growth rate in relation to each category of PAN holders and overall CAGR is 46.47% and 43.46% for return filling and number of tax payers over study period.

4. There are significant increases in share of TDS and advance tax collection over study period it is about an average of 85% of total direct tax collection over period of study.

5. There is difference between average numbers of E- return filled and numbers of tax payers over period of study, which reveal that due to tax deducted at source, tax collected at sources, advance tax payment and due compliance procedure of applicable direct tax laws all categories of PAN holders are filling return in adequate manner as per provision of law.

Testing of hypothesis

Hypothesis of study and result	Variables of hypothesis	Statistical value				
		mean	median	S.D co-efficient	Skewness	CAGR
$H1_{(0)}$ Rejected	Direct tax	729415	695792	29.60%	0.629	34.85%
	Indirect tax	558890	543215	38.70%	0.2708	34.76%
$H2_{(0)}$ Rejected	Bouncy factor of direct tax	1.04	11.46	25.28%	0.58	NA
	Bouncy factor of indirect tax	1.34	13.97	126.65%	1.29	NA
$H3_{(0)}$ Rejected	No. of E-return	47338492	44706909	21.79%	0.551	46.47%
	No. of tax payers	69224479	69224479	13.98%	0.4367	43.46%

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