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Hansraj College
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ABOUT THE COLLEGE

Hansraj College is one of the largest constituent colleges of the University of Delhi. The college was founded by the D.A.V. College Managing Committee on 26th July, 1948 in the sacred memories of Maharshi Dayanand Saraswati and Mahatma Hansraj who spent their magnificent lives emphasizing the importance of knowledge. It is one of the leading lights in the D.A.V. family of over 700 institutions.

Hansraj College is a premier institution dedicated to teaching and research. It has highly qualified academicians who impart education in Science, Commerce, and Arts at undergraduate and graduate levels to more than 5000 students. The college has consistently demonstrated outstanding performance in academics, sports, and extracurricular activities.

The college has completed 76 years in the realm of imparting higher education. It has made significant and unparalleled contributions in terms of producing scholars, bureaucrats, intellectuals, and sportsperson serving in different domains not only in our own country but even at international levels.

Hansraj College stands at the cusp between the past and the future today. While it retains inspiring facets of its proud history, with an equally sharp gaze it looks ahead, assimilating the exciting world of new knowledge as it unfolds in front of it, holding the promise of an experience seeped with exhilarating learning and holistic growth for all those who enter its portals.

About the Journal

The ***HRC Journal of Economics and Finance*** is a **double-blind peer–reviewed academic journal** for students, researchers, and faculty to showcase their research pertaining to the discipline of economics and business. It is an international journal. Our mission is to provide a platform through which scholars can publish their scholarly findings to showcase them with the research community at large. We invite research papers and articles on topics related to the field of economics, business and management for its quarterly journal publication.

Message from the Principal

The launch of the *HRC Journal of Economics and Finance* is a milestone that marks our dedication towards providing a platform to young researchers in the field of economics and finance. It is even more fortuitous that the launch has been manifested in the Platinum jubilee year of the college, the Centenary year of the University of Delhi and the 75th year of India's independence.

The New Education Policy, 2020 has launched a paradigm shift that encourages research both at the faculty and student level. Accordingly there is a growing need to provide credible platforms to present research outputs at all levels. This journal fills a significant gap and will contribute to fostering a research ecosystem thereby advancing the objectives of the NEP 2020. This journal will provide an opportunity to students, teachers and scholars, around the world to come together and showcase the links between classroom teaching and their practical training.

I congratulate the authors whose papers/articles have been published in the journal and encourage others to contribute to future issues. Appreciation is due to the Editor In-Chief of this journal, Dr. Apoorva Gupta who has worked tirelessly for the successful launch of this issue of the journal. My best wishes for the success of this venture.

Prof. (Dr.) Rama
Principal
Hansraj College

From the Editor's Desk

Dear Readers,

It is my great pleasure and privilege to present the first issue of the third volume of the Journal of Hansraj College, the *HRC Journal of Economics and Finance*. The journal provides a platform to young researchers in the field of economics, business, social sciences, finance and management to publish their scholarly articles. Our inclusive nature ensures that we cover the wide range of issues in the field. This issue features a diverse range of articles that provide insightful analyses and innovative perspectives on various contemporary economic topics.

We have received around thirty papers relevant to the field of development economics, political economy, macroeconomic policy, financial markets, international trade, and behavioral economics. All the papers went through three rounds of review process, first by the editors and then by the review board. All the papers have gone through double blind peer review process. The authors were communicated with the revisions. The papers were accepted only after the satisfactory revisions were being made. We strictly follow the research ethics and do not tolerate plagiarism. All the selected papers were tested for plagiarism before publication. We have worked tirelessly to bring out the fourth issue of the journal with high quality research work.

Writing quality research papers takes a lot of time and effort, and the authors must be congratulated for writing their research papers for the journal, which is launched in the Platinum Jubilee year of the college, the Centenary year of the University of Delhi and the 75th year of India's independence. We also take this opportunity to congratulate the review board of this issue for their constant academic support for the timely release of the journal. We also thank the support received from the Principal of the college, Prof. (Dr.) Rama, the Advisory Board and the Editorial Board.

We hope that readers find the articles interesting, informative and engaging, and enjoy reading it. We believe that this effort of ours will stimulate further research and discussion in the field of economics and finance, and encourage readers to write for further issues of the journal. We look forward to receiving your feedback and suggestions for future issues.

Disclaimer: The opinions expressed in this journal belong to the contributors and do not necessarily reflect the viewpoints of the college, the editors, the Advisory Board, the Editorial Board, and the Review Board of the *HRC Journal of Economics and Finance*.

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Exploring the Sustainability Reporting Quality and Financial Performance Nexus - An empirical study in Indian Context

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Abstract

The study explores the nexus between sustainability reporting quality and financial performance of Indian firms in the short run and long run. We make use of sample of National Stock Exchange (NSE) listed firms (289 firm year observations) between the years 2014-2020, which have published at-least four externally assured Global Reporting Initiative (GRI) based sustainability reports during this period. The study makes use panel data regression with random effect. Our findings suggest that sustainability reporting quality has a negative impact on financial performance (ROA and Tobin Q) in the short term and positive impact in the long term. These findings have theoretical implications for academia and policy makers at the local, national and international levels. Further, the findings have practice implications for firm management, investors as well as regulatory authorities. The paper demonstrates the importance of inculcating sustainability initiatives in the firm at the grass root level.

Keywords: Sustainability reporting quality, financial performance, India, panel data regression

JEL Codes: M14, M10, M0

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1. Introduction

Recently sustainability has emerged as a major phenomenon changing as well as directing how firms function and communicate with their stakeholders. The community expects firms to responsibly handle environmental and social issues in a meaningful manner adding value to the community (Luning, 2012). Corporate sustainability disclosures are increasingly being adopted by firms (De Villiers and Sharma, 2017; De Villiers, Venter and Hsiao, 2017). In many countries they have been mandated by the regulatory authorities.[2] Legislation leads to normative pressure for conformance. This further highlights the sustainability disclosure as it signals conformance to the standard as well as conformance to the norm of transparency. Sustainability disclosure has its roots in the Triple Bottom Line (TBL) framework for corporate performance measurement (Wheeler and Elkington, 2001).The TBL framework basically provides a method to measure or track the business performance environmentally, socially as well as economically (Sala, 2020; Onyali, 2014).

Sustainability practices have emerged as a critical component ensuring the existence and perseverance of an organization in addition to ensuring adequate quality products (Simone et al., 2022). However, it is neither possible to monitor a firm continuously nor is it possible to evaluate a firm's sustainability performance objectively (King and Toffel, 2007; Touboul, 2013).Various stakeholders have no other option but to rely on various signals to assess a firm's performance (Spence, 1973). The sustainability disclosure or report is considered as one such signal providing an idea about the sustainability standing of the organization. The firm communicates its sustainability measures to various stakeholders through the sustainability disclosure report which is published in different formats by different firms. This study considers sustainability reports published as a part of the annual report or a standalone report or an integrated report. For the purposes of this paper, we only include reports adhering to the GRI standards. The GRI sustainability reporting framework is one of the most frequently used international sustainability accounting standards (Ballou et al., 2006; Gray, 2006). The standard provides precise

[2] In 2014, legislation (Directive 2014/95/EU) was enacted in the European parliament and the European Council of the European Parliament and the European Council. Similarly, in 1921, the Indian government amended Section 135 of the Companies Act 2013 mandating CSR. Also, the 2021 directive was bought in by SEBI (Securities & Exchange Board of India) making the Business Report and Sustainability Report (BRSR) format mandatory from FY2022-23).

guidelines on how to report each parameter. Sustainability reporting enhances value (Caraiani et al., 2012), supports communication among organizations (Vitolla and Raimo, 2018) and enables firm to achieve long-term goals. Firms often communicate their marketing plans using sustainability reports (Sweeney and Coughlan, 2008). In addition, it communicates firm's transparency to all stakeholders (Clarkson et al., 2011). This leads to an increase in stakeholders' belief in the firm. Additionally, the report is also a key investor decision point (Brooks and Oikonomou, 2018).

However, firms also release a sustainability report either to report incidents to the public or to distract stakeholder attention to other issues i.e., basically to change the narrative/stakeholder viewpoint (Lindbloom, 1994). Additionally, different stakeholder groups may have different preferences. For example, workers working at an industrial unit may prefer staff accommodation near the work premises but this may be opposed by other stakeholder groups. Similarly, a firm runs the risk of alienating certain stakeholder groups by disclosing their performance across the environmental, social or governance indicators. Therefore, a firm may choose to release a comprehensive sustainability report or selectively report only certain parameters pertaining to sustainability. Firms usually report in varying degrees of transparency. The disclosure lies in a range. Firms may extensively provide information for certain parameters where their performance is above par or they may curtail disclosure for select indicators where their performance is below par. Essentially, the sustainability disclosure provides the firm the flexibility to choose what it wants to disclose (Ullman, 1985; Gray et al., 1995).

Various theories have provided arguments for and against sustainability reporting. On one hand, the 'Friedman approach' states that primary responsibility of the firm management is to maximize shareholder wealth (Friedman, 1970). Sustainability reporting entails a certain cost. There is always an opportunity cost attached to sustainability reporting. Funds spent on sustainability reporting could have been used on research & development or marketing and so on (Woodroof et al., 2019). On the other hand, there is a perception that sustainability reporting brings about a gradual move towards more environment friendly business practices (Chabowski et al., 2011). This concept is further supported by the 'stakeholder approach' which posits that the organization should aim to develop value for all the parties associated with the firm and not restrict the benefits to shareholders only (Freeman and Reed, 1983). Therefore, needs of all the stakeholders should be

considered before taking any decision or action (Nguyen, 2020). Another theory of prime importance when considering the sustainability reporting for firms is the 'legitimacy theory'. It states that the firm makes use of sustainability reporting to gain acceptance of stakeholders and fulfil the societal expectations from the firm (Deegan, 2007). In addition, stakeholders attach a lot of importance to the compliance of a norm as well as the transparency norm (Michelon, 2011). Various stakeholders i.e., consumers, regulators, institutional investors are quite vocal in their demand for transparency regarding the firms' sustainability initiatives (Cui et al. 2018). This leads to normative pressure on the firm indicating stakeholder preference for compliance to various norms and practices of the industry/domain/region (Touboul, 2013; Fernandez-Feijoo et al., 2014). Various other factors play an important role with regards to sustainability reporting i.e., size (Patten, 2002; Holder-Webb et al., 2008), industry as well as ownership (Ntim and Soobaroyen, 2013). Therefore, sustainability reporting has benefits as well as costs. It is fairly important for stakeholder support and approval. This makes it all the more impertinent for the firms to analyse and decide on the quality of sustainability report to be published.

Given this background, this paper studies how sustainability reporting impacts financial performance. Further, this paper also analyzes how the impact of sustainability reporting on financial performance varies with time. Results indicate that sustainability reporting negatively impacts financial performance in the short run while in the long run, sustainability reporting has a positive impact on financial performance.

The remaining paper has seven major sections. The first section presents the problem statement followed by the second section which is an extensive review of the relevant literature on sustainability reporting. Section 3 discusses the theoretical framework and develops hypotheses based on the same. Section 4 details the research methodology which includes sample specification, data description, methodology adopted, and variable measurement as well as specific model details. Section 5 outlines the results and its discussion and Section 6 discusses the implications of the study for policy makers, managers and academia. Further, Section 7 concludes the paper and gives plausible scope for future research.

2. Literature review

There have been a number of studies pertaining to the link between sustainability reporting and financial performance. If we were to consider studies specific to India, Rajput et al (2012) were able to examine a positive relationship between corporate social responsibility activities and profit before tax. Similar results were also obtained by Ghosh (2013) on proxying corporate social responsibility by presence or absence in the S&P ESG index. In 2016, Laskar & Maji stated that sustainability reporting based on GRI parameters had a significant positive relationship with the market to book ratio of the firm. Similar results were also reported by various other researchers (Goel and Mishra, 2017; Chelawat and Trivedi, 2016; Shafat and Zameer, 2018). However, Kohli and Saxena (2012) posited that a weak correlation exists between CSR and financial performance of a firm.

This is further strengthened as Balasubramaniam (2019) reported a negative relationship between Tobin Q and ESG score. Additionally, Garg (2015) found a negative relationship between sustainability reporting and financial performance in the short term and a positive relationship between the variables in the long term. Further, Aggarwal (2013) reported mixed and inconclusive results between sustainability reporting and financial performance.

For detailed and more comprehensive review, studies from different countries are summarized in the Table 1. It is evident from the below mentioned table that sustainability reporting has been increasingly adopted by various firms across geographies over the past decade. However, the studies have yielded a mixed bag of results. More rigorous analysis is the need of the hour. The study makes important contributions to sustainability reporting and financial performance literature. This study considers the time period between the years 2014-2020. SEBI introduced Business Responsibility and Sustainability Reporting (BRSR) in 2021. These were voluntary for FY 2021-2022 and were made mandatory for FY 2022-2023 for top 1000 market capitalisation. Various firms were able to foresee possible regulation and bought about changes in their environmental and social parameters. This paper studies if this first mover advantage translated into better financial performance. This study further examines the impact in the short run as well as the long run.

Table 1: Relationship between Sustainability Reporting and Financial Performance

Study	Country	Measure of Corporate Sustainability	Measure of Financial Performance	Relationship
Lorraine et al. (2004)	UK	Media articles exposing environmental accidents/commendations	Share Prices	Negative
Freedman and Patten. (2004)	US	Environmental parameters of high pollutant industries	Share Prices	Negative
Cormier et al. (2008)	Multiple Countries	Content Analysis	Analyst earnings forecasts	Positive
Clarkson et al. (2011)	US	Environmental Performance	ROA, Cash Flows, Total Debts/Total Assets	• Negative relationship with Leverage • Positive and significant relationship with ROA and Cash Flows.
Swinkels (2012)	US, Canada	GRI	Tobin's Q, Dividend per share, ROA, ROE	No relation
Ong et al. (2014)	Malaysia	Environmental Performance parameters	ROA, ROE	Positive
Backstrom et al. (2015)	Sweden	Sustainability performance index based on disclosures DJSI, JEITA, COMPUSTAT	ROA	Positive only for board with education board diversity
Hussain (2015)	Multiple Countries	GRI (G3)	Tobin Q, ROA, ROE, D/E	Environment and social initiatives impact market and accounting performance but not capital structure
Qiu et al. (2016)	Multiple Countries	Bloomberg ES parameters	Forecast of earnings and dividends from IBES	• No relationship between environmental disclosure and financial performance. • Significant positive relationship between social disclosure and financial performance
Chen et al. (2018)	China	Environment parameters	ROA, ROE	Negative relationship associated with mandatory CSR disclosure
Buallay, (2019)	European Banks	Bloomberg ESG parameters	Tobin Q, ROA, ROE	Significant Positive Impact on performance
Dinçer and Altınay (2020)	Turkey	Four Indicators of environment, human resources, product liability, and community involvement.	Interest Margin, Return on Equity, Return on Assets	Negative

Source: Authors' Compilation

3. Theoretical Framework and Hypotheses

Sustainability reporting is supported by the stakeholder approach which gives importance to all relationship networks present in a firm's task environment including customers, employers, suppliers, regulators, investors and others who will be impacted by any organizational action (Freedman and Reed, 1983). Further, sustainability reporting is also in line with the legitimacy theory. The theory basically posits an understanding or contract between the firm and the society such that the firm supports and performs actions to gain social approval (Guthrie and Parker, 1989). Therefore, a firm basically issues a sustainability report to seek legitimacy from the stakeholders (Connelly et al., 2011). The report acts as a signal (Spence, 1973) and boosts sustainability related legitimacy (Hahn and Kuhnen, 2013).This basically explains how affected parties resolve issues related to unavailability of information. In this case, as the affected parties are not able to ascertain the sustainability performance of the firm continuously, they are forced to rely on other parameters to proxy the performance. Consequently, the firm which has access to insider information may choose to restrict the sustainability reporting if the firm sustainability performance is not up to the mark. It may do so to ensure stakeholder support and

approval. For example: Investors may study the sustainability report for information regarding regulatory risk before making any investment decision (Krueger et al., 2020). The GRI parameter 303-4 explicitly asks for "priority substances of concern for which discharges are treated" (Global Sustainability Standards Board (GSSB) et al., 2018).The firm may issue a statement stating that all waste water released fully complies with the waste water release norms. This is an example of a low-quality disclosure. However, the firm may also choose to disclose the priority substances and the treatments done if the firm has actually worked on the same and the firm sustainability practice is better than the competitors. The investor is more inclined to invest in the firm in the latter case.

In this study, we empirically study how the quality of sustainability reporting affects the firm's financial performance. The specific research questions are: one, does sustainable reporting impact firm financial performance?; and two, does this effect change over time?. For answering our research questions, we have developed hypotheses based on signalling, legitimacy and stakeholder theories. We split our hypotheses into long term and short term. Therefore, we put forward our hypotheses as mentioned below:

Hypothesis 1: H_1- Sustainability reporting quality does not impact a firm's financial performance in the short run

Hypothesis 2: H_2- Sustainability reporting quality does not impact a firm's financial performance in the long run.

4. Research Methodology

This section outlines the research design as well as the variables used in the analysis with their respective sources.

4.1. Sampling

The study is based in India. The study uses the data from the firms which have published at least 4 GRI based externally assured sustainability reports between the years 2014-2020. All sustainability reporting parameters have been obtained from the Refinitiv Eikon Database. Eikon provides ESG data on more than 400 parameters for more than 7000

firms globally. The firm-year wise breakup is mentioned below in Table 2. The sample is unbalanced.

Table 2: Firms' Year-wise break up

Year	Number of firms
2014	30
2015	33
2016	38
2017	41
2018	43
2019	49
2020	55
Total	**288**

Source Author's own elaboration

The industry group categories include Basic materials, Industrials, Consumer Cyclicals, Consumer Non-Cyclicals, Commodity Chemicals, Oil & Gas Refinery/Marketing, Technology, Independent power producer and Oil & Gas Exploration firms.[3]

Financial variables (ROA, Tobin Q, Sales, and Leverage) have been obtained from the Center of Monitoring of Indian Economy (CMIE) Prowess database. It is an exhaustive database on publicly traded Indian companies maintained by the CMIE.

4.2. Variables

4.2.1. Dependent Variable

Both accounting ratios as well as market valuation ratios can be used to proxy the financial performance of a firm. In this study we make use of the accounting ratio Return on Assets (ROA). This is in line with past literature (Auperle et al., 1985; Ghosh, 2013; Klapper and Love, 2004). We also make use of market valuation ratio Tobin Q as markers of financial performance. Tobin Q stresses on long term performance (Lenz et al., 2017). Further, as it is a market-based measure; it includes the external stakeholder valuation dynamics (Nekhili et al., 2017). It is not as sensitive as accounting ratios and thus, can be compared across different industries (Nekhili et al., 2017).

[3] The categorization is based on Eikon Industry Classification.

In this paper, we analyze the impact of the comprehensive and selective sustainability performance on Financial Performance. We also look how the relationship varies with different time durations. For the shorter time duration, we consider year end firm ROA and Tobin Q. For the longer time duration, we make use of the average Financial Performance (ROA and Tobin Q) over a 3-year period. All independent variables had the same value as the base year where base year is the first year. For example, to compute ROA_{LT} for the year 2020; average ROA values for 2020, 2021 and 2022 were taken. We basically considered the average ROA over a 3-year period including base year.

4.2.2. Independent Variable

Sustainability reporting quality is an independent parameter. For the purpose of this study, we consider the GRI sustainability reporting guidelines. These are among the most frequently used sustainability reporting norms. (Marimon et al., 2012)The GRI framework outlines exact details which must be made public by the firm. We make use of a disclosure index constructed based on the GRI sustainability reporting framework. The index concentrates on fundamental sustainability reporting items and is adapted from past literature (Hummel and Schlick, 2016).

Various studies make use of the binary system for content analysis (Encoding 0 for absence and 1 for fulfilling a particular criterion) (Hussain, 2015; Laskar et al., 2018). We go a step further and attempt to account for the quality of the disclosure through the encoding. We allocate 4 points for high quality reporting where adequate detail including numeric data meeting the GRI guideline criteria is provided. We allocate 2 points for low quality reporting where appropriate information is not provided and 0 for non-reporting.

The minimum GRI guidelines are outlined in the index. In case the conditions outlined in the guidelines are not met or some other non-relevant information is provided, we allocate 2 points for low quality data. In case no information is provided the disclosure is cited as absent and 0 points are allocated. Corporate sustainability has environmental, social and governance dimensions (Elkington, 1997). Therefore, environmental and social dimension strengthen the validity of the index.

Based on past literature, we control for the major factors that contribute to Financial Performance such as size, leverage, industry sector, and time (Choi and Wang, 2009; Surroca et al., 2010; Touboul, 2013; Hummel and Schlick, 2016). Large firms enjoy a higher market share enabling them greater possibilities to raise capital and diversify their offerings. We control size using the natural log of total sales (Patten, 2002). We controlled for leverage using the debt-to- equity ratio (Hussain, 2015; Lo and Sheu, 2007). The capital structure of the firm definitely impacts the firm's value (Hussain, 2015; Lo and Sheu, 2007). High leverage can lead to situations where returning debt may be difficult. This may also hamper future returns.

Industry specific factors like competitive intensity, growth rate, and availability of suppliers can explain differences in firm performance. Further, year specific factors can also impact financial performance. Therefore, we use industry specific and firm specific dummies.

4.3. Empirical Model

Panel data regression is used to study the association between sustainability reporting and firm performance (Kim and Oh, 2019; Ghosh, 2013). The suitable panel data model is computed to evaluate the impact of sustainability reporting quality and additional explanatory variables on the ROA and Tobin Q of selected Indian firms. The study makes use the Hausman test to select the appropriate panel data model between fixed and random effects (Hausman, 1978). The major difference being, fixed effect models capture certain features which are constant throughout the observations while random effects measure variability between entities as part of a larger group.

For dependent variable ROA, the Hausman test-Chi-square value is 5.73 with a p – value of 0.2199. As the p value is >0.05, we estimate the model with panel data random effects. For dependent variable Tobin Q, the Hausman test-Chi-square value is 10.63 with a p value of 0.0610. As the p value is >0.05, we estimate the model with random effects. The random effects model is generally represented as

$$Y_{it} = \beta_k X_{it} + \beta_0 + \omega_{it} \quad (1)$$

where X is the number of covariates and ω_{it} is the composite error term. We estimate the following panel data models:

Model 1: $ROA_{STit} = \beta_0 + \beta_1 SRQ_{it} + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \beta_4 Age_{it} + \omega_{it}$ (2)

Model 2: $TQ_{STit} = \beta_0 + \beta_1 SRQ_{it} + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \beta_4 Age_{it} + \omega_{it}$ (3)

Model 3: $ROA_{LTit} = \beta_0 + \beta_1 SRQ_{it} + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \beta_4 Age_{it} + \omega_{it}$ (4)

Model 4: $TQ_{LTit} = \beta_0 + \beta_1 SRQ_{it} + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \beta_4 Age_{it} + \omega_{it}$ (5)

where,

ROA_{ST} – Short Term ROA
TQ_{ST} – Short Term Tobin Q
ROA_{LT} – Long Term ROA
TQ_{LT} – Long Term Tobin Q
SRQ – Sustainability Reporting Quality
Age – Organization Age
Size – Organization Size
Leverage – Organization Leverage

5. Results & Discussion

Table 3 outlines the summary characteristics for the models relating to short term financial performance. The table outlines the mean, standard deviation, minimum and maximum variable values. Table 5 and 6define the correlations between the various models analysed in the short-term financial performance study parameters. Correlation coefficients between the various independent and control factors are quite low. On similar lines Table 4 details the summary characteristics for the models relating to the long-term financial performance. Table 7 and 8 define the correlations between the various models analysed with regards to long term financial performance.

Table 3: Summary statistics with short term ROA and short-term Tobin Q

Variable	Mean	Std. dev	Min	Max
ROA_{ST}	9.282	10.82281	-16.19	73.79
Tobin Q_{ST}	2.570821	3.013648	0.0351217	20.40716
SRD	0.523	0.5001822	0	1
SRQ	21.37	2.55	12.5	29
Age	51.93	24.50047	12	115
Size	13.12	1.15	9.521	16.089
Leverage	0.44197	0.17692	0.041	0.964

Source: Authors' calculations

Table 4: Summary statistics with long term ROA and long-term Tobin Q

Variable	Mean	Std. dev	Min	Max
ROA_{LT}	9.197	10.82029	-5.3	55.12
Tobin QL_T	2.51	2.77	0.187	10.72
SRQ	22.28	3.54	12.5	28
Age	52.1	25.24	14	115
Size	13.01	1.14	10.2	15.38
Leverage	0.43122	0.174	0.165	0.746

Source: Authors' calculations

Table 5: Pearson correlations with short term - ROA as dependent variable

Variable	ROA_{ST}	SRQ	Age	Size	Leverage
ROA_{ST}	1				
SRQ	-0.1283* (0.017)	1			
Age	-0.1142* (0.0352)	0.26*** (0.000)	1		
Size	-0.306*** (0.000)	0.1307* (0.0159)	0.156** (0.0038)	1	
Leverage	-0.538*** (0.000)	0.0843 (0.1206)	0.109* (0.0438)	0.41*** (0.000)	1

Source: Authors' calculations. ***p<.001, **p<.01, *p<0.05, +p<.10

Table 6: Pearson correlations with short term Tobin Q as dependent variable

Variable	ROA_{ST}	SRQ	Age	Size	Leverage
ROA_{ST}	1				
SRQ	-0.244*** (0.000)	1			
Age	-0.181*** (0.0008)	0.26*** (0.000)	1		
Size	-0.584*** (0.000)	.1307* (0.0159)	0.156** (0.0038)	1	
Leverage	-0.444*** (0.000)	0.0843 (0.1206)	0.109* (0.0438)	0.41*** (0.000)	1

Source: Authors' calculations. ***p<.001, **p<.01, *p<0.05, +p<.10

Table 7: Pearson correlations with long term - ROA as dependent variable

Variable	ROA_{LT}	SRQ	Age	Size	Leverage
ROA_{LT}	1				
SRQ	0.0023+ (0.062)	1			
Age	-0.1042* (0.5334)	0.3121+	1		
Size	-0.3772* (0.0196)	-0.1005 (0.5482)	0.071 (0.672)	1	
Leverage	-0.654*** (0.000)	-0.0698 (0.6769)	0.1844 (0.2677)	0.438** (0.0059)	1

Source: Authors' calculations. ***p<.001, **p<.01, *p<0.05, +p<.10

Table 8: Pearson correlations with long term Tobin Q as dependent variable

Variable	Tobin Q_{ST}	SRQ	Age	Size	Leverage
Tobin Q_{ST}	1				
SRQ	0.0587+ (0.0726)	1			
Age	-0.1789 (0.2824)	0.3121 (0.0564)	1		
Size	-0.676*** (0.000)	-0.1005 (0.5482)	0.071 (0.672)	1	
Leverage	-0.636*** (0.000)	-0.0698 (0.6769)	0.1844 (0.2677)	0.438** (0.0059)	1

Source: Authors' calculations. ***p<.001, **p<.01, *p<0.05, +p<.10

Table 9: Impact of sustainability reporting on short term financial performance

Variables	Model 1	Model 2	Model 3	Model 4
DV	ROA_{ST}	Tobin Q_{ST}	ROA_{LT}	Tobin Q_{LT}
SRQ	-.434*	-.0900*	2.02+	1.07+
	(0.012)	(0.013)	(0.067)	(0.08)
Age	-0.0018	-0.013	0.027	0.003
	(0.942)	(0.127)	(0.617)	(0.788)
Size	-1.83*	-.837***	-1.24**	-1.24**
	(0.019)	(0.000)	(0.001)	(0.005)
Leverage	-11.92*	-.642+	-40.93***	-7.09**
	(0.01)	(0.058)	(0.000)	(0.001)
Yr dummy	Yes	Yes	Yes	Yes
Ind. dummy	Yes	Yes	Yes	Yes
Constant	47.06***	15.38***	22.42***	44.35***
	(0.000)	(0.000)	(0.000)	(0.000)
R-square	0.2491	0.3798	0.49	0.64
Chi-square	21.15***	30.89***	18.45***	25.63***
	(0.000)	(0.000)	(0.000)	(0.000)

Source: Authors' calculations. Yr-Year, Ind.-Industry, Robust p values in parenthesis, ***p<.001, **p<.01, *p<0.05, +p<.10

Table 9 details the impact of sustainability reporting quality on short/long term financial performance proxied by ROA and Tobin Q. Model 1 implies that sustainability reporting quality negatively impacts return on assets (coefficient -.434 is significant) at 5% significance level. Model 2 confirms that sustainability reporting negatively impacts the Tobin Q (coefficient -.009 is significant) at 10%significancelevel.Therefore, we reject the null hypothesis H_{10} and accept the alternative hypothesis H_{11}

Both Model 3 and Model 4 imply that sustainability reporting quality positively impacts long term financial performance (ROA coefficient 2.02 and Tobin Q coefficient 1.07 significant at 10 % level). Hence, we reject the null hypothesis H_{20} and accept the alternative hypothesis H_{21}. As the Chi-square is significant, all four models denote the goodness of fit. The results demonstrate that sustainability reporting quality has a negative influence over financial performance in the short term. However, in the long-term sustainability reporting quality has a positive impact on financial performance.

The results are consistent with results of Lopez et al. (2007); Lin et al. (2009) and Yang et al. (2010) positing that sustainability reporting impacts financial performance negatively

in the short run and impacts financial performance positively in the long run. Results are also consistent with Garg (2015), major differences being inclusion of sustainability reporting quality, larger sample size, and use of international sustainability standards, longer time period and different methodology used.

The negative impact results of sustainability reporting quality (SRQ) on the firm's short term financial performance is in congruence with results obtained by Aggarwal (2013) and Cormier et al. (2007). The basic premise remains that the sustainability disclosure has risks as well as benefits. Disclosure is associated with potential cost escalation and risk. The firm task environment constituents i.e., competitors, regulatory authorities may use the information in a manner harmful to the firm's interests and cause financial loss. It may also cause withdrawal of support from specific stakeholder groups and lead to financial implications.

In the long run, sustainability reporting quality has a definite positive impact on the financial performance. The results are in line with Goel and Mishra (2017); Chelawat and Trivedi (2016) and Shafat and Zameer (2018). The stakeholders are able to genuinely assess the firm's environment, social intentions in the long run over a longer period of time. Further, over a period of time the firm is able to recover initial costs spent on sustainability initiatives and subsequent reporting.

The size and leverage coefficient of the control variables are negative and statistically significant for both short and long-term financial performance. For size, this is in contradiction to the traditional positive firm size and profit relationship posited by (Baumol, 1959). However, there is ample support in past literature for a negative relationship between size and financial performance (ROA) (Becker et al., 2010; Kartikasari and Merianti, 2016). Larger firms may also attract higher bureaucracy, higher government interference as well as less flexibility. The negative relationship between leverage and financial performance is also in line with previous research (Dogan, 2013). High debt can have financial ramifications and impact financial performance negatively.

6. Implications

The paper discusses the linkage between sustainability reporting quality and financial performance of the firm both in short term and long term. It provides a number of insights for policy makers and academia. Firstly, the long run impact of sustainability disclosure quality on financial performance highlights the significance of including sustainability initiatives from the grass root level itself. This will definitely enhance the financial performance of the firm in the long run. Secondly, there is a need to develop cost friendly sustainability practices as well as to set aside funds for sustainability initiatives so as to ensure stakeholder approval. This has achieved support at the topmost level with around 59% of the India's CEO's willing to invest at-least 6% of revenues in programs to raise sustainability performance (KPMG India CEO outlook 2022).

Thirdly, this study augments the literature between financial performance and sustainability reporting for further scope in research. The results obtained from the study regarding the short term and long-term effect of reporting on financial performance will help researchers in better understanding of the varied impact of sustainability reporting. Fourthly, the time period of the study is very crucial as Securities & Exchange Board of India (SEBI) mandated the Business Responsibility Reporting (BRR) for the top 100 NSE/BSE firms in the year 2012. The GRI framework can be considered as the superset of BRR. Therefore, it is interesting to study firm's going ahead and adopting international sustainability standards demonstrating the understanding that sustainability initiatives will become mandatory in the near future. It also shows the firm's willingness to invest in sustainability related initiatives to prevent regulatory issues as well as be assured of long-term stakeholder support. It will be interesting to contrast this study with studies post 2022-2023 where the government has mandated the new Business Responsibility and Sustainability Reporting (BRSR) guidelines

7. Conclusion

The study observes that application of suitable panel data regression models reveal negative relationship between sustainability reporting quality and financial performance in the short term and positive relationship in the long term. The negative short-term

results may be attributed to cost escalations due to sustainability initiatives, increased risk perceptions or confusion about the actual sustainability reporting quality by stakeholders leading to stakeholder withdrawal. This may have financial implications as well. However, in the long run, the stakeholders may be able to finally discern the true sustainability reporting quality of the firm and sustainability reporting has a positive impact on the firm performance.

Another limitation can be the paucity of externally assured sustainability reports. Very few Indian firms published externally assured sustainability reports on a continuous basis. This was one reason for the low number of firms in the initial years of analysis. Further, SEBI has mandated the new BRSR format from 2022-2023 for the top 1000 firms by market capitalization. So, we hope this will change in the near future and sustainability reporting will be more widely adopted across India.

It is important to study the impact of individual dimensions of sustainability reporting i.e., environmental or social or governance reporting on financial performance. The interplay between sustainability performance, sustainability reporting and financial performance would also be an interesting research topic. In addition, the study can be extended to include multiple countries or multiple cultures.

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Appendix

Table A1: Sustainability Disclosure Quality Parameters

Environmental dimensions			
Code	**Disclosure Item**	**Minimum requirements**	**GRI Linkage**
E1/301	Materials Used	All substantial input materials by weight or volume, Percentage of recyclable material used	EN1/301
E2/302	Energy Consumption & Renewables	direct and indirect energy consumption, share of renewable energy sources. (Includes energy consumption within and outside organization) [a]	EN3/4/302
E3/303a	Water Withdrawal	Water Withdrawal by source.[b]	EN8/303a
E4/305a	GHG Emissions	GHG Scope 1, Scope 2 and Scope 3 Emissions,	EN16/17/305a
E5/305b	Ozone-depleting and other emissions.	total emissions of ozone-depleting substances; other significant air emissions by type and weight for at least one substance; alternatively, an explicit statement of irrelevance for both.[c]	EN19/20/305b
E6/306a	Water Discharge	total discharge by quality (emissions to water by type and weight for at least one substance; alternatively, an explicit statement of irrelevance) and destination.d	EN22/306a
E7/306b	Waste	Total waste by type and disposal method	EN23/306b
E8/308	New Supplier Assessment	Percentage of new suppliers screened using environmental criteria	308-1/EN-32
Social dimensions			
S1	Employment	Total workforce based on at least three criteria (division, region, employment type, employment contract, qualification, age or gender)	LA1/102-7/102-8
S2	Turnover	Total Number of Employees leaving by any reason.	LA2/401
S3	Labour Management	Minimum number of weeks' notice typically provided to employees and their representatives prior to the implementation of significant operational changes	402
S4	Collective Bargaining.	Percentage of total workforce covered by collective bargaining agreements	LA4/407
S5	Safety & Health	work safety and health based on following criteria (rates of injury, occupational diseases, lost days, absenteeism, fatalities)	LA7/403
S6	Training	total training time	LA10/404
S7	Discrimination	total number of incidents or explicit statement that no incidents occurred	HR4/406
S8	Child, Forced and compulsory Labour	scope and numerical results of audits (within company or supply chain) regarding at least one aspect	HR6/7/408/409

Source: Hummel and Schlick (2016), [a] - For industry groups 8: share of renewable energy produced, [b] – For industry groups 7: by source is excluded, [c] – For industry groups 7: ozone-depleting substances or other significant air emissions, [d]- For industry groups 7: by quality & destination is excluded

Can Orphanhood Explain Nutritional and Educational Disparities?: Empirical Evidence from India

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Abstract

Absence of biological parents is expected to negatively impact their orphaned children's health outcomes through channels of depressed household incomes and lack of parental care and support. Our research study explores this hypothesis by engaging in a comparative analysis of health outcomes of Paternal orphans, Maternal orphans and Double orphans (as classified by UNICEF) relative to non-orphans in India. Using data from Round 5 of the National Family Health Survey, we explore whether there are differences in indicators of stunting, wasting, malnutrition and years of schooling across these three types of orphans. Our paper engages a causal framework by restricting our sample to "blended" households, those with both orphans and non-orphans, and controlling for household-fixed effects. We observe that at large, orphans are at a disadvantage relative to non-orphans, the effects being confounded by poverty and other household characteristics. Their living arrangements are also significant and we observe that Double orphans fare better than Maternal, Paternal and non-orphans in certain settings, pointing towards compensating factors like robust extended familial ties.

Keywords: Orphanhood, intra-household analysis, nutrition, education, caregivers, Hamilton's rule.

1. Introduction

According to a UNICEF report in 2020, almost 10,000 children become orphans every day. The likelihood of individuals becoming orphaned is often exacerbated with poverty,

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especially in regions facing healthcare limitations, high disease burdens or conflicts. Conversely, the absence of parental support can hinder orphans from accessing stable housing, healthcare, and jobs, potentially perpetuating economic hardship. The high correlation between socioeconomic poverty and orphanhood makes it challenging to discern the effects of each on children growing up in these circumstances.

The loss of a parent can profoundly affect multiple aspects of a child's life. Health vulnerabilities arise as access to healthcare and proper nutrition diminishes, potentially impacting overall well-being. Education becomes challenging due to disruptions caused by the loss of parental guidance and financial stability, leading to irregular attendance, early dropout, and limited access to higher education. Transitioning into adulthood and the workforce becomes more arduous, with orphaned children often lacking support networks and struggling to acquire necessary skills for stable employment. Consequently, they may face lower income levels, housing difficulties, and an overall reduced standard of living compared to their peers with intact familial support systems (Beegle et al., 2006).

For all statistical purposes, the UNICEF Data on orphans defines orphans to be those children under 18 who have lost one or both of their parents, further sub-categorising them into:

- **Single orphan**: A child who has lost one of his/her parents.
    - **Maternal orphan**: The child who has lost his/her mother but the father is still alive.
    - **Paternal orphan**: The child who has lost his/her father but the mother is still alive.
- **Double orphan**: A child who has lost both of his/her parents.

In this paper, we have explored how the shock of orphanhood impacts child health and education outcomes. While seminal work has previously been conducted in this regard, especially in the African context, our paper adds to the literature by studying these outcomes across the categories of Paternal, Maternal and Double orphans. We have used the nutritional indicators for stunting, malnutrition and wasting, and mean years of

schooling as the indicator for education. In the first part of our analysis, we compare these outcomes across orphans and non-orphans in the entire sample after controlling for demographic characteristics and other relevant individual-level variables. Our paper's novelty lies in extending this comparative analysis to Maternal, Paternal and Double orphans where outcomes are relative to the base category of non-orphans. In the second half of the paper, we explore our hypothesis that orphans are worse off than non-orphans even within the same households. This causal estimation is done by restricting our sample to households with at least one orphan and one non-orphan and accounting for household-level fixed effects. We repeat the same analysis for the three orphan categories.

To understand how demographic characteristics and poverty confound orphanhood in impacting children's outcomes, we have included extensive descriptive tables. To study their living arrangements and the role of familial structures, we document the relationship of orphans to the head of their household. The role of caregivers is understood through Hamilton's rule, and other channels that support our results. These are explained in the second section. The third section describes the demographic characteristics, and living arrangements of orphans. We then elaborate on our methodology and estimating equations. The fifth section deals with the results. We interpret the same in the next section. Finally, we discuss the limitations and scope for further research, along with the policy implications of our study.

2. Background

Out of the 140 million orphans in the world, 52 million belong to Africa. Humanitarian crises resulting from natural disasters, wars and diseases are the most pressing reason for children losing their parents (Gail et al. 2014, 437). The significance of the AIDS pandemic's rapid spread during the late 1990s and early 2000s, and the devastating repercussions it inflicted specifically within the Sub-Saharan region, cannot be overstated in this context. Home to 10% of the world's population but 70% of HIV infections, 13 million children younger than 15 years of age had lost one or both parents to AIDS by 2005. As of now, around 20% of the population in this region under the age of 18 is orphaned.

This highly skewed distribution of orphans in Africa is reflected in the vast majority of literature on orphanhood coming from the continent. As these studies on orphans focuses on the AIDS related orphan crises in Sub-Saharan regions, the findings are often tough to apply to other contexts. By looking at rates of orphanhood, their demographic characteristics, living arrangements and outcomes in India, where large scale orphanhood neither exists nor attributed to a single factor like AIDS, our findings can be more generalizable to other settings. Additionally, our analysis looks at Maternal, Paternal, and Double orphan categories, a dimension largely unexplored in large-scale surveys of mapping orphans and their outcomes in India. Another distinct aspect of our research is examining potential discrimination within households against orphans. Our research fills critical gaps in the existing literature by examining these aspects within the Indian context, shedding light on the complexities of orphanhood and its impact on health, education, and household dynamics in India.

2.1. Review of Literature

Our study builds upon previous work such as the one by Panpanich et al. (1999) in Malawi where health outcomes of orphans in the village, orphans in orphanages and non-orphans were compared. Malnutrition, wasting, and stunting were identified by utilising set thresholds for Weight-for-Age, Weight-for-Height, and Height-for-Age, respectively. Findings revealed higher malnutrition prevalence in younger orphanage children, with increased stunting and lower Height-for-Age scores. Notably, no significant nutritional disparity was found between village orphans and non-orphans underscoring how extended families can provide appropriate care for orphaned children.

Educational outcomes are studied in the paper by Case et al. (2004) on the impact of orphanhood on child schooling enrolment rates in 10 Sub-Saharan African countries. The results showed that although poorer children in Africa are less likely to attend school, the lower enrolment of orphans is not accounted for solely by their poverty. It is, in fact, the conditions of the household in which they live which determine their poor enrolment rates when compared to non-orphaned children of the same age. Theoretically, this is supported by the Hamilton's rule (Case et al. 2004, 484) which states that closeness of biological

ties governs altruistic behaviour, and thereby, outcomes for orphans depend on the relatedness of orphans to their household heads.

Another study by Chuong and Operario (2012) in South Africa looked at educational delay – operationalized as being behind proper grade level in school – and found that orphaned children have a 35% greater chance of being behind at school. The interesting insight is that this educational delay correlated directly with one's connection to the head of the household. 30% of those without a direct linear relationship (son or daughter) to the head were below the expected grade level, while only 19% of children with a direct linear relationship faced the same issue.

3. Data and Descriptive Statistics

Our study uses the data source of the fifth round of the National Family Health Survey, India, 2019–21 (NFHS-5) as provided by the Demographic and Health Surveys Program. This survey was conducted by the International Institute for Population Sciences, Mumbai. Our research focuses on data for children below 18 years (0–17) of age. Since the data is from a household survey, institutionalized orphans or children not living in households cannot be included in the analysis.

To construct the *Orphan*, *Maternal orphan* and *Paternal orphan* variables for children aged 0-17 years, the following questions from the NFHS-5 questionnaire were used for the analysis:

- Is (Name)'s natural mother alive?
- Is (Name)'s natural father alive?

We use data available from NFHS-5 to generate various summarized statistics. Table 1 shows the total number of children (aged 0-17) that we have considered for our study, sub-categorised across Double orphans, Maternal orphans, Paternal orphans and Non-orphans. Out of the total sample size (N) of 919575, the majority are non-orphans (=875137) representing 95.16% of the total sample size. Within the orphan population, the majority are paternal orphans (=28444), followed by maternal orphans (=12184) and double orphans (=3810). Their percent distribution is illustrated in Figure 1 with Paternal,

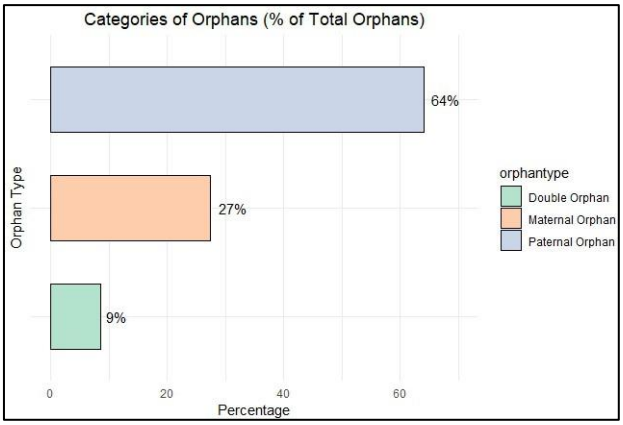
Maternal and Double orphans forming 64%, 27% and only 9% of the orphan category respectively. The large discrepancy between paternal and maternal orphans is consistently seen in all other countries and can be explained by the higher age-specific mortality among men and the tendency for women to typically marry older men as also discussed in the World Bank report *Poverty, AIDS, and Children's Schooling* (Ainsworth and Filmer 2002).

Table 1: Children (aged 0-17) by Orphanhood

Orphan type	**Count(N)**
Double Orphan	3810
Maternal Orphan	12184
Paternal Orphan	28444
Non-Orphan	875137
Total	919575

Source: Authors' Calculations from NFHS-5 Data

Figure 1: Distribution of Orphan Types



Source: Authors' Calculations from NFHS-5 Data

3.1. Demographic Characteristics

To understand the background characteristics of orphaned children versus non-orphaned children, they were stratified into different groups based on wealth index, caste group, the place where they reside, sex, and the highest level of education attained (see Table 2).

It is important to note that there is a higher proportion of orphaned children among low-income households, with 35.34% of all orphans belonging to the poorest households and 25.15% of all orphans belonging to the poorer household income class. For non-orphans,

their distribution was more evenly spread out among the different economic strata. Another interesting point to be explored is that there were more orphaned children belonging to the SC, ST, and OBC categories than from the General category. Only around 14.59% of all orphaned children belonged to the general category. This was also observed for non-orphaned children; however, the proportion of non-orphaned children belonging to the general category was significantly higher, standing at 18.14% as compared to 14.59% for orphaned children.

With regards to the highest level of education attained, we note that more orphans have attained a higher level of education than non-orphaned children. It was observed that there was a higher proportion of orphaned children who had attained education up to the secondary level (46.18%) when compared to their non-orphaned counterparts (28.44%). This pattern is also seen in Table 3, which shows that on average, all categories of orphans have higher years of education than non-orphans.

Table 2: Percent distribution of Orphans and Non-Orphans by Background Characteristics

	Orphans (% of total = 100)	**Non-Orphans** (% of total = 100)
Wealth Index		
Poorest	35.34	26.91
Poorer	25.15	23.51
Middle	18.28	19.52
Richer	13.5	16.51
Richest	7.74	13.54
Caste		
General	14.59	18.14
Scheduled Caste	22.84	21.66
Scheduled Tribe	27.26	20.66
OBC	35.32	39.55
Place of Residence		
Rural	82.36	80.53
Urban	17.64	19.47
Sex		
Male	51.34	51.56
Female	48.66	48.44
Highest Level of Education attained		
No Education	14.97	31.15
Primary	38.74	40.36
Secondary	46.18	28.44
Higher	0.11	0.05

Source: Authors' Calculations from NFHS-5 Data

While these figures might appear surprising, they can be corroborated by evidence finding positive correlation of the age of child with both probability of being orphaned (increased risk of parental death with their age) and years of schooling in all the country-years studied by Case et al. (2004). Thus, the tables indicate that orphans are older and thus have completed higher levels of education.

Table 3: Years of Education, Summary Statistics by Orphan Type Groups

	Mean	SD	Min	Max	N
Double Orphan	4.26	3.57	0	13	3805
Maternal Orphan	4.54	3.56	0	14	12179
Paternal Orphan	5.15	3.62	0	14	28430
Non-Orphan	3.25	3.57	0	14	874908

Source: Authors' Calculations from NFHS-5 Data

3.2. Living Arrangements

Since our paper delves deep into how familial structures interact with orphan status in determining outcomes for children, we have involved living arrangements to be one of the main descriptive points of our study. To understand with whom the orphans were living after the death of one or both of their parents, we considered the orphan's relationship with the head of the household. Orphan's relationships with the head of the household have been assigned the following 5 divisions – either parent (includes the subdivisions of father and mother, whosoever is alive), grandparents (includes grandmother or grandfather, whosoever is alive), other relatives (includes uncle, aunt, brother, sister, cousin, other extended family members, et al.), adopted/foster home, other households (where there was no blood relation). The percent distribution of these categories is given in Table 4.

The importance of blood relations has been highlighted, as discussed later in the section on Hamilton's rule. The high proportion of double orphans living with grandparents could have significant implications, as previous studies have shown that children living with grandparents who receive pensions benefit not only from the financial and social support provided but also from the care they receive (Ardington & Leibbrandt, 2010; Mthembu et al., 2016).

Table 4: Percent distribution of Indian Orphans (aged 0–17) and their Living Arrangement

Type of Orphan	Living with (%)					
	Either Parent		Grandparent(s)	Other Relatives	Adopted / Foster Home	Other Households
	Father	Mother				
Maternal Orphan	60.33	-	27.23	10.51	1.63	0.3
Paternal Orphan	-	65.13	24.12	9.79	0.62	0.34
Double Orphan	-	-	46.9	41.98	8.01	3.12

Source: Authors' Calculations from NFHS-5 Data. [N=43963]

3.3. Nutritional Outcomes

Table 5 depicts summarised statistics for our dependent variables – Height-for-Age z-score (zHFA), Weight-for-Age z-score (zWFA), and Weight-for-Height z-score (zWFH) – for non-orphans and for each orphan type and shows their means, standard deviations, minimum and maximum values and the number of observations in each. Since these variables are recorded in the children's Recode in NFHS, we have limited nutritional outcomes only for children aged 0-5 years.

Table 5: Nutritional Outcomes Summary Statistics by Orphan Type Groups

	Mean	SD	Min	Max	N
Double Orphan					
Height-for-Age z-score	-1.29	1.97	-5.82	5.88	952
Weight-for-Age z-score	-1.39	1.37	-5.8	4.58	974
Weight-for-Height z-score	-0.75	1.52	-4.97	4.76	927
Maternal Orphan					
Height-for-Age z-score	-1.41	1.83	-5.96	5.93	2653
Weight-for-Age z-score	-1.49	1.35	-5.9	4.58	2722
Weight-for-Height z-score	-0.84	1.5	-4.98	4.75	2597
Paternal Orphan					
Height-for-Age z-score	-1.45	1.84	-5.99	6	5950
Weight-for-Age z-score	-1.49	1.35	-5.93	4.85	6084
Weight-for-Height z-score	-0.84	1.5	-4.98	4.89	5832
Non-Orphan					
Height-for-Age z-score	-1.36	1.83	-6	6	358300
Weight-for-Age z-score	-1.43	1.34	-6	5	365503
Weight-for-Height z-score	-0.8	1.52	-5	5	350587

Note: Nutritional outcomes analysis is restricted to sample of 0-5 year old children.
Source: Authors' Calculations from NFHS-5 Data.

The numbers from Table 5 indicate that malnutrition is widespread, with all groups showing negative z-scores for all indicators. While non-orphans have better z-scores than maternal and paternal orphans, the interesting finding is that double orphans perform slightly better on all indicators compared to non-orphans. These counterintuitive figures are corroborated by our results (Section 5) and can be explained by selection effects, wherein double orphans are placed into the care of their extended family (see Table 4), which might improve the nutritional support they receive.

4. Methodology

We test the hypothesis that orphans are worse off than non-orphans in terms of nutrition and education. Our analysis has two parts. The first part examines the entire sample of households (Tables 6-7) to identify overall differences. To explore discrimination within households, we focus on a subset of 'blended' households where both orphans and non-orphans live together (Tables 7-8). We also compare maternal orphans, paternal orphans, and double orphans with non-orphans to account for differences among orphan categories. Our outcomes of interest include stunting (height-for-age Z score), malnutrition (weight-for-age Z score), wasting (weight-for-height Z score), and years of education.

Our main causal framework of orphanhood affecting nutritional and educational outcomes works through an intra-household level analysis of the outcome variables across orphans, non-orphans and different categories of orphans. It could be argued that households with orphans are inherently different from households with only non-orphans. This difference could be present both before and after the shock. Children in households afflicted with high poverty or illnesses could be more likely to experience the death of a parent, or conversely, the orphanhood shock might make these households worse off. This would mean that orphans might simply fare worse than non-orphans due to being characteristically different. We account for this by restricting our sample to households that have at least one orphan and one non-orphan. The rationale behind this is that post this sample restriction; we are only looking at orphans and non-orphans for whom all within-household characteristics are the same. By including household-fixed effects in

our estimation equation, we are controlling away the variations across the different households in this restricted sample. These controls ensure that we can make a causal inference regarding the impact of orphanhood on a child's nutritional and educational indicators.

4.1. Estimation Strategy

Equations 1 and 2 are used for the entire sample of orphans, while 3 and 4 study the outcomes for a restricted sample of households where orphans and non-orphans cohabit. Our initial comparative analysis of orphans and various orphan categories with non-orphans for our entire sample is achieved through the empirical specification in the following two equations:

$$Y_{ij} = \beta_0 + \beta_1 * Orphan_i + \beta_2 * X'_{ij} + \varepsilon_{ij} \quad (1)$$

$$Y_{ij} = \beta_0 + \beta_1 * MaternalOrphan_i + \beta_2 * PaternalOrphan_i + \beta_3 * PaternalOrphan_i * MaternalOrphan_i + \beta_4 * X'_{ij} + \varepsilon_{ij} \quad (2)$$

Here our outcome variable Y_{ij} is nutritional indicators of Height-for-Age, Weight-for-Age and Weight-for-Height Z scores (for 0-5 years age group) and years of education (for 0-17 years age group) for a child i in household j. In equation (1), our main explanatory variable *Orphan* is a dummy which will give us the impact of being an orphan relative to non-orphan on our outcome indicators. In equation (2), our explanatory variables are *Paternal orphan*, *Maternal orphan* and its interaction term in order to give us the effects on outcome indicators for each category of orphans (Maternal, Paternal and Double orphans) relative to non-orphans. In both equations, we control for X'_{ij} individual and household-level factors like wealth index, caste, number of household members, age and sex of the child, and relationship to the household head.

As discussed above in Methodology, our causal framework works through a restriction of sample to "blended" households, where at least one orphan and one non-orphan cohabit, and by controlling for household-fixed effects. This specification is described below:

$$Y_{ij} = \beta_0 + \beta_1 * Orphan_i + \beta_2 * X_j' + \beta_3 * Z_i' + \varepsilon_{ij} \quad (3)$$

$$Y_{ij} = \beta_0 + \beta_1 * MaternalOrphan_i + \beta_2 * PaternalOrphan_i + \beta_3 * PaternalOrphan_i * MaternalOrphan_i + \beta_4 * X_j' + \beta_5 * Z_i' + \varepsilon_{ij} \quad (4)$$

Here our outcome variable Y_{ij} is the same nutritional and educational indicators for a child *i* in "blended" household *j*. In Equation (3), our main explanatory variable *Orphan* is a dummy which will give us the impact on outcome indicators of being an orphan relative to non-orphan in households that have both types of children. In Equation (4), our explanatory variables are *Paternal orphan*, *Maternal orphan* and its interaction term in order to give us the effects on outcome indicators for each category of orphans (Maternal, Paternal and Double orphans) relative to non-orphans with a similar intra-household interpretation. In both equations we control for X_j' household-level fixed effects, thereby controlling for all household characteristics, and adding some individual-level controls Z_i' like age of the child, sex of the child, and their relationship to the household head.

5. Empirical Results

5.1. Entire Sample

In Tables 5 and 6, we have run two specifications for each of the four outcomes of interest, one with wealth index control and one without. Other household characteristics like number of members and belonging to Backward Caste (SC, ST and OBC) are kept in all specifications. Child-level characteristics are mapped by variables such as child sex (taking the value 1 for male) and the relationship to the head of household indicated by the dummy *distantrel*. This variable takes the value 1 if the child resides with a relative other than a parent or a grandparent and is intended to capture the effect of living with distant relatives on children's outcomes. In column 8 in each table, we have kept age of child and its square in the regression to capture the differential effect of age on years of education. As discussed in Tables 2 and 3, age is positively correlated with both orphanhood and schooling, so not including it in the regression will bias the coefficients upward.

Table 6: Regression results from Equation (1)

	(1) zhfa	(2) zhfa	(3) zwfa	(4) zwfa	(5) zwfh	(6) zwfh	(7) yearsofeduc	(8) yearsofeduc
orphan	-0.05**	0.00	-0.04***	0.00	-0.03*	-0.01	-0.30***	-0.25***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
sex of child	0.03***	0.04***	0.02***	0.03***	0.01**	0.02***	0.07***	0.08***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
distantrel	0.07***	0.01	0.10***	0.04***	0.07***	0.04**	0.02*	-0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
No. of HH Members	-0.01***	-0.02***	-0.01***	-0.01***	-0.00	-0.00***	-0.04***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
backward caste	-0.33***	-0.15***	-0.31***	-0.15***	-0.17***	-0.10***	-0.16***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
wealth index		0.20***		0.18***		0.08***		0.17***
		(0.00)		(0.00)		(0.00)		(0.00)
age of child							-0.01***	-0.01***
							(0.00)	(0.00)
ageofchildsq							0.04***	0.04***
							(0.00)	(0.00)
Observations	338925	338925	345602	345602	331766	331766	848014	848014

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

In Table 6, columns (1), (3) and (5) indicate that being an orphan reduces the standardized Height-for-Age, Weight-for-Age and Weight-for-Height scores by 0.05, 0.04 and 0.03 respectively. These effects are significant at the 5%, 1% and 10% levels respectively. However, when we account for Wealth Index in columns (2), (4), and (6), the impact of orphanhood becomes negligible in magnitude and insignificant. For education, the orphan status reduces years of schooling by 0.30 and 0.25 years in columns (7) and (8) respectively, both highly significant at the 1% level.

In Table 7, we extend our framework to the three categories of orphans to understand to see if their outcomes are different from each other or non-orphans. The results here are more complex, with the effect on Weight-for Height losing significance in its entirety. Maternal orphans are faring worse than non-orphans in all nutritional indicators (columns (1)-(6)). However, the correlation is significant at the 10% level only in column (3) for weight-for age where wealth index is not included in the model. On the other hand, in columns (1), (2) and (3), we observe that being a Paternal orphan reduces the standardized scores for HFA, WFA and WFH by 0.06, 0.05 and 0.04 respectively, the relationship being significant only for the first two at 5% and 1% respectively. These effects become insignificant when wealth index is controlled for.

For Double orphans, the positive correlation is consistent across columns (1)-(6). In columns (1) and (3), we see that being a Double orphan increases the standardized scores

for HFA and WFA by 0.26 and 0.24 respectively, each of which is significant at the 1% level. What is perhaps more interesting is that although these coefficients drop to 0.18 and 0.17 in columns (2) and (4), they continue to remain significant at 5%.

Table 7: Regression results from Equation (2)

	(1) zhfa	(2) zhfa	(3) zwfa	(4) zwfa	(5) zwfh	(6) zwfh	(7) yearsofeduc	(8) yearsofeduc
Maternal	-0.06	-0.01	-0.05*	-0.01	-0.04	-0.01	-0.42***	-0.35***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Paternal	-0.06**	-0.01	-0.05***	-0.00	-0.04	-0.01	-0.25***	-0.20***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Maternal*Paternal	0.26***	0.18*	0.24***	0.17**	0.14	0.10	0.33***	0.25***
	(0.10)	(0.10)	(0.07)	(0.07)	(0.08)	(0.08)	(0.04)	(0.04)
distantrel	0.07***	0.01	0.10***	0.04**	0.06***	0.04**	0.03**	-0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
sex of child	0.03***	0.04***	0.02***	0.03***	0.01**	0.02***	0.07***	0.08***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
No. of HH members	-0.01***	-0.02***	-0.01***	-0.01***	-0.00	-0.00***	-0.04***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
backward caste	-0.33***	-0.15***	-0.31***	-0.15***	-0.17***	-0.10***	-0.16***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
wealth index		0.20***		0.18***		0.08***		0.17***
		(0.00)		(0.00)		(0.00)		(0.00)
age of child							-0.01***	-0.01***
							(0.00)	(0.00)
ageofchildsq							0.04***	0.04***
							(0.00)	(0.00)
Observations	338925	338925	345602	345602	331766	331766	848014	848014

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

For education in column (7), being a Maternal orphan reduces years of schooling by 0.42 years and being a Paternal orphan reduces the same by 0.25 years, both significant at 1%. The coefficients drop but remain highly significant when wealth is included in column (8). Again, the interaction term is positively correlated with education. However, given the specification of our estimating equation, the differential impact on double orphans is the sum of the Double, Maternal and Paternal coefficients, with the result implying that Double orphans are better off than only Maternal and only Paternal orphans but not non-orphans. The controls have similar coefficients as in Table 6.

5.2. Restricted 'Blended' Sample

In Table 8 and 9, we have regressed each of the four outcomes of interest on their orphanhood and type of orphan status respectively while controlling for household-fixed

effects. We thereby do not need to control for other household characteristics like number of members, belonging to Backward Caste (SC, ST and OBC) and Wealth Index since these variations across households get washed away after controlling for the household-fixed effect. All other child-level (individual) controls like sex of the child, relationship to household head (*distantrel*) and age of child (at the time of survey) and its square (for education indicator only) remain the same as specified for Tables 6 and 7.

Table 8: Regression results from Equation (3)

	(1) zhfa	(2) zwfa	(3) zwfh	(4) yearsofeduc
orphan	-0.0157	-0.0130*	-0.0042	-0.0079
	(0.01)	(0.01)	(0.01)	(0.02)
sex of child	0.0152	0.0079	-0.0027	0.0672***
	(0.01)	(0.01)	(0.01)	(0.02)
distantrel	0.0121	0.0154	0.0135	-0.3089***
	(0.02)	(0.01)	(0.01)	(0.04)
age of child				-0.0124
				(0.01)
ageofchildsq				0.0327***
				(0.00)
Observations	16867	17325	16496	29837

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 9: Regression Results from Equation (4)

	(1) zhfa	(2) zwfa	(3) zwfh	(4) yearsofeduc
Maternal	-0.0091	-0.0067	-0.0030	-0.0340
	(0.02)	(0.01)	(0.01)	(0.03)
Paternal	-0.0281**	-0.0211**	-0.0039	0.0398
	(0.01)	(0.01)	(0.01)	(0.03)
Maternal × Paternal	0.0593*	0.0314	-0.0042	-0.1267*
	(0.04)	(0.02)	(0.03)	(0.07)
distantrel	0.0085	0.0142	0.0145	-0.2964***
	(0.02)	(0.01)	(0.01)	(0.04)
sex of child	0.0151	0.0080	-0.0026	0.0675***
	(0.01)	(0.01)	(0.01)	(0.02)
age of child				-0.0118
				(0.01)
ageofchildsq				0.0326***
				(0.00)
Observations	16867	17325	16496	29837

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

In Table 8, columns (1), (2) and (3) indicate that being an orphan reduces the standardized Height-for-Age, Weight-for-Age and Weight-for-Height scores by 0.02, 0.01 and 0.004 respectively; however these effects are significant only for zHFA at 10%. Although insignificant, the negative coefficient of 0.01 in column (4) indicates that being an orphan reduces a child's years of education by 0.01 years on average.

Similar to Table 6, in Table 8 we compare outcomes across the three categories of orphans with respect to non-orphans but with our restricted sample and including household-fixed effects. There is no statistically significant difference in any nutritional outcome for maternal orphans. For Paternal orphans, the Height-for-age and Weight-for-Age z-scores are on average 0.03 and 0.02 units worse off than that of Non-orphans, both statistically significant at the 5% level. There is no statistically significant difference for any other nutritional indicator for Paternal orphans. Interestingly, Double orphans show a 10% statistically significant better faring on Height-for-Age z-scores than not only Maternal and Paternal orphans but also Non-orphans. With regards to the measure of years of education in column (4), we see that Maternal and Paternal orphans are worse than Non-orphans, the effects being insignificant. On the other hand, double orphans have 0.13 lesser years of education on an average than non-orphans, the effect being significant at 10%.

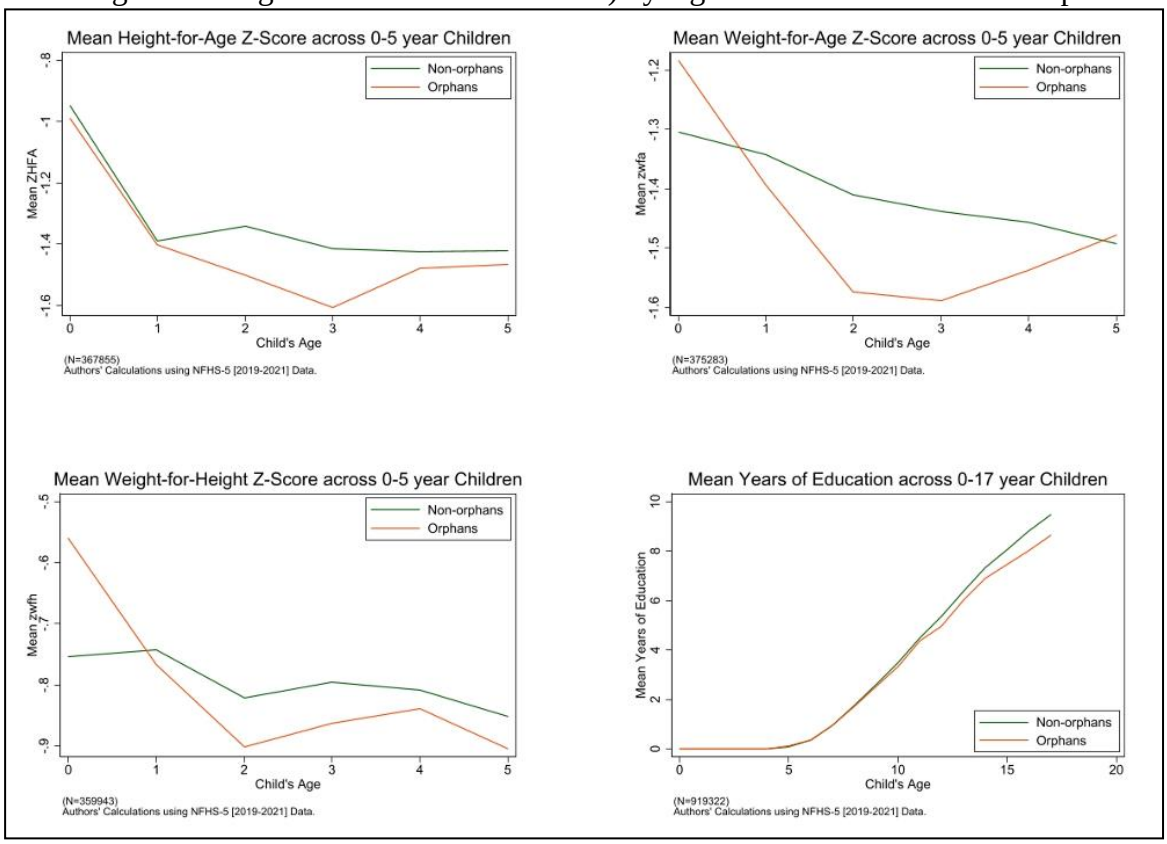
5.3. Nutritional and Educational Outcomes across Age

Figure 3 depicts nutritional status and educational attainment among orphaned and non-orphaned children across age. As 35.5% of Indian children in NFHS-5 suffer from malnourishment (stunting, underweight, wasting), we have obtained negative standardised z-score values for both non-orphans and orphans (Radhakrishna and Ravi 2004, 671).

The top left table depicts instances of stunting among children aged 0-5 by looking at their mean Height-for-Age z-scores. As the figure depicts, from the ages of 0-1, both orphans and non-orphans depict similar negative zHFA scores. From the ages of 0-1, non-orphans and orphans follow the same trend, with stark divergence between 1-3 years of age as orphans have consistently lower scores. However from the ages 3 till 5, the gap

reduces indicating that they might be catching up to non-orphans. The top-right table depicts instances of children aged 0-5 being underweight by looking at their mean weight-for-age Z scores (zWFA). The orphans start falling behind non-orphans at age 1 and the gap between them widens till the age of 5. The bottom left table depicts instances of wasting among children aged 0-5 by looking at their mean weight-for-height Z scores (zWFH). Again, the orphan disadvantage starts at age 1 with the gap between them remaining the same till age 5. In the bottom-right table, we observe mean years of education among orphaned and non-orphaned children aged 0-17 across age. Till the age of 10, both groups of children receive the same educational attainment. However, from the ages of 10 to 17, the curve for non-orphans deviates upward, indicating that orphanhood might hinder educational attainment at a later stage when cost of education increases.

Figure 3: Mapping our Outcome variables of interest (Height-for-Age, Weight-for-Age, Weight-for-Height and Years of Education) by Age of Children for entire sample



6. Discussion

In Tables 6 and 7, when Wealth Index is accounted for, we observe that the negative effect of orphanhood status on nutritional indicators becomes insignificant. This indicates that the main channel through which loss of either parent or both affects children's outcomes is the negative income or wealth shock. These could be due to the loss of running income from the late parent or placing of the child in households poorer than their original homes (Case Et Al. 2004, 484).

The negative coefficients for number of household members are also theoretically supported by Chuong and Operario (2012) who discuss how increasing number of household members increases a child's likelihood of education delay. Similarly, the negative relationship between being lower caste and nutritional and educational outcomes of children in general are also well documented (Dommaraju et al. 2008, 477).

In Table 7, the coefficient for maternal orphan is insignificant and the statistically significant negative coefficients for paternal orphan lose their significance with wealth controls showing that there is a negative income shock which results from the loss of the income-earning father. Gertler et al. (2004) have documented the impact on parental death and school enrolment rates in Indonesia and our findings largely corroborate theirs. The high magnitudes of the interaction term vis-a-vis the individual coefficients for Maternal and Paternal orphans imply that Double orphans are not only better off than maternal and paternal orphans, they are also better off than non-orphans. While these results might be unexpected, we believe that this can be explained by familial and community ties. As discussed in Section 3.2, since many of these double orphans are cared for by their grandparents, they often receive better support overall as discussed by Karimli et al. (2012).

Tables 8 and 9 delve into our intra-household causal estimation in our restricted sample and control for household-fixed effects. The results show that orphans are worse off than non-orphans in terms of both nutritional and educational indicators. This is also observed across the different orphan categories in Table 9. This finding provides evidence against the argument that the educational disadvantage of orphans is solely due to lower levels of household resources, since here we are only considering “blended” households and

controlling for all household-fixed effects. As described by Hamilton's rule, adult caretakers are more likely to shy away from investing in children who are more distantly related. This can be a result of both greater affinity to their own children and also because they are more likely to reap the benefits from their children later in life, in terms of transfers and support in old-age (Case et al. 2004, 484). The significant results for Paternal Orphans and not for Maternal Orphans further nuances the picture, indicating that the loss of an income-earning parent lowers the position of the orphaned child in the family even further, resulting in fewer resources being invested in him.

7. Limitations and Scope for Further Research

Since our data does not contain information about either the timing of the parental death or the circumstances of the same, it is tough to set up a longitudinal framework to establish causality. Looking at cross-sectional data limits our analysis to observable current outcomes for children, undermining the long term effects that orphanhood could potentially have for children across time. Mapping the impact of orphanhood on outcomes later in adulthood is worth studying to fully capture its consequences on life outcomes. For example, Beegle et al. (2006) in a longitudinal analysis of orphanhood on education and health in Tanzania tracked 718 non-orphaned children from 1991 to 2004 and found that 19% of them experienced parental loss before age 15. They found that maternal orphanhood was linked to a permanent setback of 2cm in final height and a year of educational attainment. Expressing welfare in terms of consumption expenditure, this translated to an 8.5% deficit compared to peers whose mothers had survived.

Further, the effects of orphanhood go beyond basic indicators of health like weight and height. A study on dietary diversity, a good indicator of micronutrient adequacy, in the Brong Ahafo region of Ghana found that under-5 orphans in orphanages had both a higher mean and minimum dietary diversity score compared to non-orphans in households (Ali et al., 2018). Although the results are counterintuitive, they can be mainly attributed to well-balanced daily menus that the orphanages in the study followed and thus lack external validity. Since surveys like NFHS now gather data on food baskets and are increasingly stressing on more comprehensive health indicators, there is a need to

extend our comparative analysis to higher-order indicators of physical and mental well-being. Similarly, for education, indicators like enrolment rates, probability of dropping out or being behind the adequate grade levels are more nuanced ways of capturing outcomes.

Additionally, it is well studied how absence of parental figures in teenage years particularly exposes children to risks like substance abuse, early sex or sexual exploitation and delinquency. Thurman et al. (2006) in their paper on sexual risk among South African adolescents found that orphaned youth were significantly more likely to be exposed to sexual activity as compared to non-orphans (49% v/s 39%). Moreover, they were also more likely to have engaged in sexual intercourse at an earlier age as compared to non-orphans. In India, data on sexual risk and exploitation of children on a scale like NFHS is lacking and unreliable given the stigma associated with reporting it. These hypotheses can be studied in the Indian context by undertaking surveys, a direction we hope our paper points to further researchers.

8. Conclusion and Policy Implications

Our study extensively investigated the impact of orphanhood on educational and nutritional outcomes in India. Initially, our analysis across the entire sample of households (Tables 6-7) indicated that the negative effect of orphanhood on nutritional indicators becomes insignificant when accounting for the Wealth Index. This shift underscores that the primary conduit through which the loss of a parent impacts children's outcomes is predominantly the negative income or wealth shock resulting from the orphanhood event.

Moreover, our findings within “blended” households (Tables 8-9) revealed noteworthy disparities. Orphans, on average, exhibited inferior educational outcomes compared to non-orphans, while no statistically significant differences were observed in nutritional indicators. This discrepancy contradicts the presumption that the educational disadvantage of orphans solely stems from lower household resources, as we meticulously controlled for all household-fixed effects.

The distinctive nature of investments — where nutritional provisions are more uniformly distributed among all children, while educational investments are more substantial — could contribute to these disparities. Additionally, our surprising observation that Double orphans fare better than Maternal and Paternal orphans and non-orphans might be attributed to familial and community support networks, especially when Double orphans are cared for by pension-receiving or relatively better-off grandparents.

Overall, our study underscores the critical role of economic shocks following parental loss and the need for targeted interventions addressing the adverse effects of orphanhood on children's well-being. Recognizing the vulnerabilities of orphaned children is crucial for policy decisions: if extended families and social networks provide adequate support, then policies might not necessarily need to specifically target orphans. Instead, assistance could be directed based on indicators of socioeconomic poverty. However, if all else being equal, orphans are more disadvantaged, it might be wise for governments to create policies specifically tailored to support them.

The United States' Assistance for Orphans and Other Vulnerable Children in Developing Countries Act of 2005 is aimed at supporting orphans and other vulnerable individuals, particularly those affected by HIV/AIDS in Sub-Saharan Africa (Chigbu 2019). Mexico's National System for Integral Family Development (DIF) also provides programs for adoption, foster care, and education support to orphans and those without adequate families. In India, the government, through its Ministry of Women and Child Development, implements schemes like the Integrated Child Protection Scheme (ICPS), aims to provide comprehensive care and protection for vulnerable children, including orphans. However, most policies target institutionalized children and thus single parent orphans (comprising 91% of the total orphans in our sample) are left without adequate support. Further, there is a lack of mechanisms aimed at aiding their transition to adulthood with negligible skill-building or employment support.

We hope that our paper broadens the scope of discourse around policies targeting orphans and takes into account the multifaceted effects of orphanhood. Tailoring policies to the nuanced needs of different types of orphans – Maternal, Paternal, and Double – is crucial for addressing their distinct challenges. For Maternal orphans, policies might prioritise emotional support and alternative caregiving arrangements, while Paternal orphan-

focused initiatives could emphasize financial support and skill-building opportunities compensating for the absence of the breadwinner. Double orphans, if facing compounded challenges, would require comprehensive policies covering financial aid, education, healthcare, and long-term support.

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Climate Change Impacts and Adaptation Strategies in Rural Indian Agriculture: A Case Study of Sonarpur, West Bengal

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Abstract

This research delves into how climate change is affecting farmers' perception in the Sonarpur district of West Bengal (India), focusing on the challenges local farmers are grappling with. Previous studies have underscored the impact of urban expansion and human activities on climate change stressing the need for sustainable farming methods. Through a primary survey, this study finds that while farmers may not be fully aware of climate change, they are experiencing its effects on their farming practices. This study also aims to understand their perceptions and the effectiveness of adaptation efforts. The findings reveal farmers' perception about unpredictable weather patterns that are disrupting crop yields prompting them to adjust their methods. While farmers generally appreciate government support, there are ongoing struggles with accessing timely assistance and adopting new technologies. Many farmers are hesitant about using genetically modified crops citing concerns about biodiversity loss and economic dependencies. However, they show interest in innovative farming techniques such as hydroponics indicating a potential shift towards technological solutions to reduce credit dependency and improve resilience in farming practices.

Keywords: Climate change, Agricultural practices, Drought resistant crops, Crop failure insurance

JEL Classification Codes: Q10, Q18, Q54, Q56, Q57, R11

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1. Introduction

The renowned agricultural scientist M.S. Swaminathan once aptly remarked, "If agriculture goes wrong, nothing else will go right."[2] This succinctly captures the pivotal role that agriculture plays in the socio-economic fabric of India. From providing sustenance to millions to driving economic growth, the significance of agriculture cannot be overstated. India's cropping pattern has evolved considerably over the years. Prior to the Green Revolution, the majority of cultivated land was dedicated to foodgrains with minimal diversification in crop types.[3] During the Green Revolution, the introduction of the Minimum Support Price (MSP) and other government support measures encouraged farmers to primarily grow wheat and paddy. However, the economic reforms initiated in 1991 exposed domestic agricultural products to the global market, creating new export opportunities and leading to a greater diversification in cropping patterns towards non-food crops.[4]Yet, despite its crucial importance, rural Indian agriculture has long grappled with a multitude of challenges, ranging from structural issues like informal credit systems and poor infrastructure to inherent problems like low productivity and disguised unemployment.[5]

However, amidst these persistent challenges, a new and formidable threat has emerged in recent years — climate change. The impacts of climate change on agriculture are increasingly evident, with erratic weather patterns, shifting rainfall distribution, and rising temperatures posing significant risks to crop yields and livelihoods. Nowhere is this more apparent than in regions like West Bengal, where the effects of global warming have been accompanied by excessive rainfall, exacerbating existing vulnerabilities.[6]

In the face of this looming crisis, it has become imperative to understand the specific impacts of climate change on rural Indian agriculture and identify effective measures to mitigate its adverse effects. This paper is an attempt to address this pressing issue. Drawing upon insights from the data collected from these farmers and available literature, the study draws conclusions to explore the multifaceted dimensions of climate change-

[2](Swaminathan 2017)
[3](Economic Survey, 2019–20).
[4](National Bank for Agricultural and Rural Development 2005)
[5](National Bank for Agriculture and Rural Development 2022)
[6](Bidur Paria. Pulak Mishra 2022)

induced challenges in agriculture and assesses the potential of various adaptation strategies, by virtue of prioritizing the farmers' perception about the same.

Central to this endeavour is an examination of the role of technological innovations in bolstering the resilience of agricultural systems. From heat-resistant crop varieties to precision farming techniques, genetic modification, and hydroponics, there exists a spectrum of innovative approaches that hold promise in mitigating the impacts of climate change on agriculture.[7] However, the adoption and uptake of these technologies by farmers remain contingent upon various factors, including their awareness, access to resources, and perceived benefits.[8]

To delve deeper into these dynamics, this paper employs a door-to-door survey conducted in Sonarpur, a rural village located in close proximity to Kolkata, West Bengal. Moreover, the survey was designed not merely as a data-gathering exercise but as an opportunity for meaningful engagement and dialogue with farmers. Beyond the structured questionnaire, efforts were made to foster genuine conversations, allowing for the exploration of nuanced perspectives and insights. These qualitative inputs were subsequently synthesized and incorporated into an 'Additional Comments' section, enriching the overall analysis.

While the study acknowledges the inherent limitations stemming from its constrained sample size and scope, it aspires to contribute meaningfully to the discourse on climate change adaptation in rural Indian agriculture. By shedding light on the challenges faced by farmers and exploring avenues for innovative solutions, the research endeavours to inform policy interventions and community-led initiatives aimed at building climate-resilient agricultural systems. The study's primary aim is to bring forward the perception of the farmers on impact of climate change on agricultural practices in Sonarpur district, an otherwise less talked about and less explored subject in climate cum agricultural research.

[7](Tétédé Rodrigue Christian Konfo March 2024)
[8](Tingting Liu 2018)

2. Literature Review

The complex relationship between climate change and agricultural practices has garnered significant scholarly attention, particularly in developing economies like India where agriculture remains a crucial economic sector. Previous research has examined this relationship through various lenses, from broad impact assessments to specific adaptation strategies.

Studies focusing on the West Bengal region have highlighted certain particular vulnerabilities of agricultural systems to climate variability. For example, Bandyopadhyay's research in South 24 Parganas district revealed that only 13.08 percent of cultivated land is irrigated, indicating high rainfall dependence and climate vulnerability.[9] This limited irrigation infrastructure, combined with seasonal employment patterns, has led to significant agricultural labour migration during non-Kharif seasons, highlighting the socio-economic implications of climate-dependent agriculture. Roy's investigation into the North 24-Parganas further identified key obstacles to agricultural development, including small landholdings, natural calamities, and limited mechanization due to cheap labour availability, factors that collectively hamper farmers' ability to adapt to changing climatic conditions.[10]

The role of financial institutions and credit accessibility in climate adaptation has been extensively studied. Jana's research in the 24 Parganas district revealed that approximately one-third of farmers lack access to credit facilities, with 63.6% of available credit coming from informal sources.[11] This finding aligns with broader literature on agricultural finance in developing regions, where informal lending often dominates despite high interest rates. Recent studies have noted the emergence of self-help groups and microfinance institutions as crucial intermediaries in rural credit markets, particularly in supporting climate adaptation strategies.[12]

Technological innovations in agriculture have been proposed as potential solutions to climate-related challenges. Research by Konfo emphasizes the importance of climate-smart innovations in enhancing producer incomes through sustainable solutions. These

[9](Mausumi Bandyopadhyay 2017)
[10](Sanjoy Roy 2021)
[11](Jana n.d.)
[12](Neha Kumar 2018)

include precision farming techniques, which involve site-specific variable recognition and monitoring of soil and temperature conditions for increased flexibility and better yields.[13] However, as Liu notes, the implementation of such technologies faces significant barriers in developing regions, particularly due to small landholdings and underdeveloped agricultural infrastructure.[14]

The debate surrounding genetically modified crops as a climate adaptation strategy has also received scholarly attention. Bhattacharjee's analysis highlights the cautious approach toward genetically modified crops due to limited research on long-term effects on health and climate. This uncertainty has influenced both policy decisions and farmer attitudes, particularly in regions like West Bengal where market acceptance remains a significant concern. The regulatory environment, as discussed by Phillips[15], further complicates the adoption of genetically modified technologies as a climate adaptation strategy.

Recent scholars have increasingly focused on integrating traditional knowledge with modern adaptation strategies. Kumar and Khanna[16] emphasize the importance of understanding local farming communities' perceptions and practices in developing effective climate adaptation policies. This approach recognizes that successful adaptation strategies must consider both technological innovations and local socio-economic contexts, particularly in regions with strong traditional agricultural practices. Datta, Behera, and Rahut[17] systematically reviewed literature on farmers' perceptions and adaptations in India, finding that the majority of farmers have observed rising temperatures and erratic rainfall, aligning with meteorological data. They also identified a wide range of adaptation measures, including both incremental and transformational changes in land use, cropping systems, and labor allocation. However, the analysis shows that adoption of the measures is not determined by a farmer's perception of climate change but rather determined by factors such as access to information or credit for that matter, the level of household income, and farm size. The authors point out that there is a need for large-scale investments in the agricultural sector and capacity-building efforts to

[13](Tétédé Rodrigue Christian Konfo March 2024)
[14](Tingting Liu 2018)
[15](Phillips 2008)
[16](Surender Kumar, Madhu Khanna 2023)
[17](Pritha Datta 2022)

support effective adaptation, which they suggest an integrated approach to ensure sustainable policymaking and enhance the resilience of farmers to climate impacts. This calls for both local knowledge and systemic challenges to be addressed when developing climate adaptation strategies.

Our study adds to the existing literature by reviewing not only farmers' perception on concurrent climate change, but also their awareness about existing solutions such as heat-resistant crops and hydroponic techniques. We identify the heavy dependence of Sonarpur's farmers on government crop insurance and suggest an improvement to this policy to the Government of West Bengal.

3. Methodology and Data Sources

This study employs a survey-based research design to investigate the farmers' perception of climate change on agriculture in the Sonarpur district of West Bengal, with a special focus on improvement measures. A convenience sampling technique is employed to select participants for the study. Despite the inherent challenges of resource constraints and logistical limitations, efforts were made to ensure a representative sample across diverse demographic categories, including age, gender, and income levels.

A structured questionnaire is developed to collect data on farmers' perceptions of climate change, adaptation strategies, awareness of government policies, willingness to adopt new technologies, and other relevant variables. The questionnaire is designed to elicit both qualitative and quantitative responses, allowing for a comprehensive analysis of the research questions. A copy of the questionnaire has been attached in the appendix.

Data collection is conducted through face-to-face in-person interviews with the selected participants. The authors solely conducted these interviews ensuring consistency and clarity in data collection. Respondents were briefed about the purpose of the study and their privacy and confidentiality were protected by anonymizing response data and storing it securely. For open-ended questions included in the survey, thematic analysis has been employed to identify recurring themes and patterns in respondents' narratives regarding climate change impacts and adaptation strategies.

In particular, primary data were extracted from a cross section of 30 individuals after elimination of cases of missing data and extreme outliers. To ensure qualitative soundness of the data, only in-person in-depth interviews were conducted with efforts to understand their current situation through the survey. It was ensured that compliance with ethical guidelines for research involving human participants was present. Table 1 shows the descriptive statistics of the data at hand. Figure 1 gives the geographical map of Sonarpur district.

Table 1: Demographics of the Survey Population (by age, gender and annual income)

Age		Gender		Income	
Category	**No. of Individuals**	**Category**	**No. of Individuals**	**Category**	**No. of Individuals**
0 - 25	10	Male	14	INR 0 –INR 1,00,000	7
25 - 40	14	Female	16	INR 1,00,000 -INR 3,00,000	19
40 and above	6	Others	0	INR 3,00,000 and above	4

Source: Authors' survey data

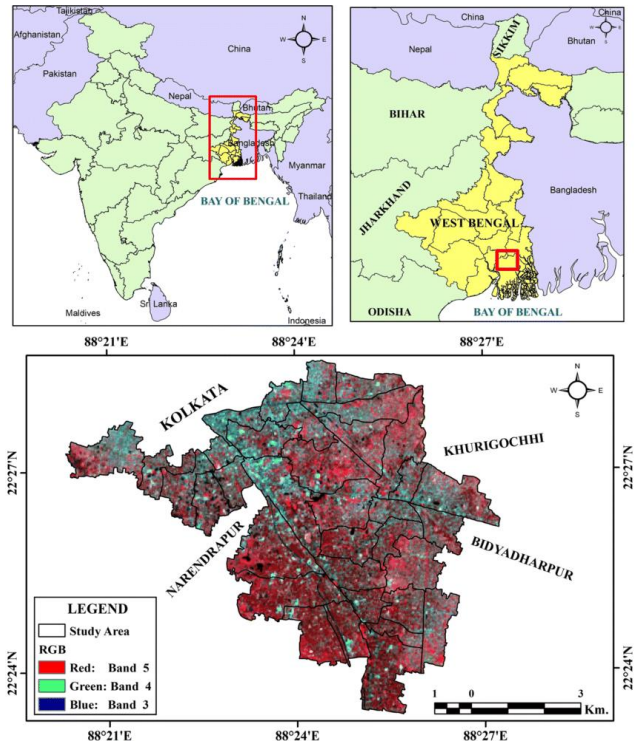
4. Results and Analysis

The study yielded mixed results on people's perception on the impact of climate change on their yield. However, remarkably all respondents agreed that there had been a noticeable impact and change on their cultivation practices, half of them believing that there had been a drastic negative impact leading to crop losses and hence a shifting in cropping patterns.[18] These observations can be attributed to events which occurred in Sonarpur around the survey period. In the early weeks of December 2023, Sonarpur observed sudden bursts of heavy rainfall which spoiled the rice harvest. Farmers never anticipated these showers.[19] Figure 1 shows the geographical location of Sonarpur district within the state of West Bengal.

Figure 2 reveals the average weather patterns in Sonarpur over the years. The sudden rainfall in December 2023 disrupted this pattern. Our study has been conducted post this event, so that farmers can refer to a recent context such as rainfall while answering open ended questions on climate change and relief measures.

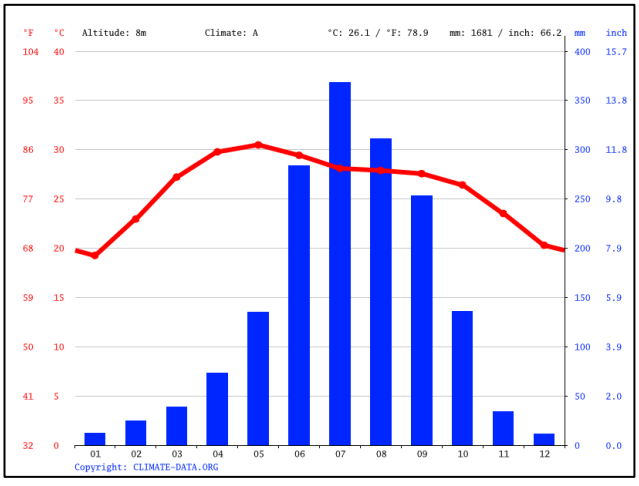
[18]Survey Result
[19](The Times of India 2023)

Figure 1: Geographical Location Map of Sonarpur, West Bengal



Source: https://www.researchgate.net/figure/Location-map-of-the-Rajpur-Sonarpur-Municipality-area_fig1_342472046 *(Accessed on 27 June 2024)*

Figure 2: Climate Graph/Weather by Month of Sonarpur on Average over the Years



Source: https://en.climate-data.org/asia/india/west-bengal/rajpur-sonarpur-59999/

Our survey also revealed that cultivators in Sonarpur have been forced to tweak their cultivation practices due to changing temperatures. An overwhelming majority of farmers observed a negative impact on the growth of rice and wheat due to changed precipitation levels (irregular and extreme patterns) fuelled by changing temperatures. Although both rice and wheat show insignificant adaptations to rising temperatures, wheat has been able to adapt to changes in precipitation.[20] About 40% of the sample has no experience with heat-resistant crop seed varieties. The rest are aware of the development of such crop and seed varieties but most only aspire to use them. A few farmers have heard of these varieties but are apprehensive of introducing them into their cultivation practices due to the high working cost. The effort of the government in developing effective crop species is commendable. However, these efforts can only bring real-world benefits when implemented in cultivation practices. Since, the effects of global warming cannot be reversed (in an outright manner) over a short period of time, drought-resistant and heat-resistant crop varieties must be encouraged in the same manner as the high yielding seed varieties in the 1960s.

Farmers also believe that the government's constant support and cash transfers have been beneficial. Ironically almost half of them have not directly benefited from government schemes; they believe that certain initiatives have been effective. Most appreciated efforts of the government's help during the time the Amphan super cyclone in 2020. Table 2 shows the average weather patterns for Sonarpur by month which reveals high precipitation from June – October. The Amphan was the fourth super cyclone that hit West Bengal and Kolkata since 2015, all of which led to major damage to life, property and agricultural yield.[21] Amphan made landfall on 20 May 2020 which drastically changed the weather averages displayed in Table 2 not just for May 2020 but for the entire year as well. In these cases, the government stepped in to provide food grains from its buffer stock to the residents, said the farmers. They also recounted incidents of financial assistance during this period. Few mentioned that the government helped them set up irrigation facilities over their land-holdings which these farmers periodically shared with other sharecroppers during times of erratic rainfall.

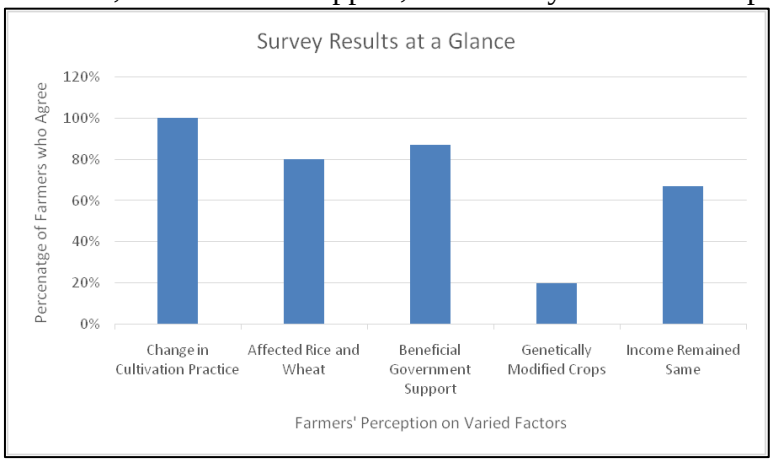
[20](Surender Kumar, Madhu Khanna 2023)
[21](PRABIR KUMAR DAS 2021)

Table 2: Data on Average Weather Patterns by Month for Sonarpur over the years

Weather Parameter / Month (on average)	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	19.3 °C (66.7 °F)	22.3 °C (72.1 °F)	27.2 °C (81 °F)	29.8 °C (85.6 °F)	30.5 °C (86.9 °F)	29.4 °C (84.9 °F)	28.1 °C (82.6 °F)	27.9 °C (82.2 °F)	26.7 °C (80.1 °F)	26.4 °C (79.6 °F)	23.5 °C (74.3 °F)	20.3 °C (68.5 °F)
Min. Temperature °C (°F)	13.3 °C (55.9 °F)	17.1 °C (62.8 °F)	21.9 °C (71.4 °F)	25.7 °C (78.3 °F)	27.1 °C (80.8 °F)	26.2 °C (79.2 °F)	25.2 °C (77.4 °F)	24.6 °C (76.3 °F)	23.1 °C (73.6 °F)	21.8 °C (71.2 °F)	18.6 °C (65.5 °F)	14.8 °C (58.6 °F)
Max. Temperature °C (°F)	25.5 °C (77.9 °F)	27.5 °C (81.5 °F)	33.2 °C (91.8 °F)	36.3 °C (97.3 °F)	35.9 °C (96.6 °F)	34.8 °C (94.6 °F)	31.0 °C (87.7 °F)	30.6 °C (87.5 °F)	30.2 °C (86.4 °F)	30.1 °C (86.2 °F)	28.4 °C (83.5 °F)	25.6 °C (78.9 °F)
Precipitation / Rainfall mm (in)	12 (0)	25 (1)	39 (2)	26 (1)	54 (2)	185 (7)	284 (11)	368 (14)	311 (12)	253 (10)	36 (1)	34 (1)
Humidity(%)	64%	61%	64%	69%	74%	76%	86%	88%	81%	69%	64%	64%
Rainy days (d)	1	2	4	2	4	9	16	21	16	2	1	1
Avg. Sun hours (hours)	9.1	9.3	9.7	9.4	8.6	8.5	8.1	7.8	7.8	8.3	8.9	8.7

Link to excel: Corrected_Exact_Styled_Climate_Data.xlsx
Source:https://en.climate-data.org/asia/india/west-bengal/rajpur-sonarpur-59999/

Figure 3: Survey Results at a Glance: Farmers' Perception on Varied Factors such as Temperature, Cultivation, Government Support, Genetically Modified Crops and Income



Source: Authors' survey data

Another mentioned the effectiveness of the 'Bangla Shasya Bima' Insurance scheme. Bangla Shasya Bima aims at supporting sustainable production in agriculture sector byway of -

- providing financial support to farmers suffering crop loss/damage arising out of unforeseen events; and,
- stabilizing the income of farmers to ensure their continuance in farming.[22]

Figure 3 presents the survey results at a glance. It is important to note that most farmers are apprehensive about the idea of sowing Genetically Modified crops on their land. Primarily due to the lack of conclusive judgement on the use of Genetically Modified

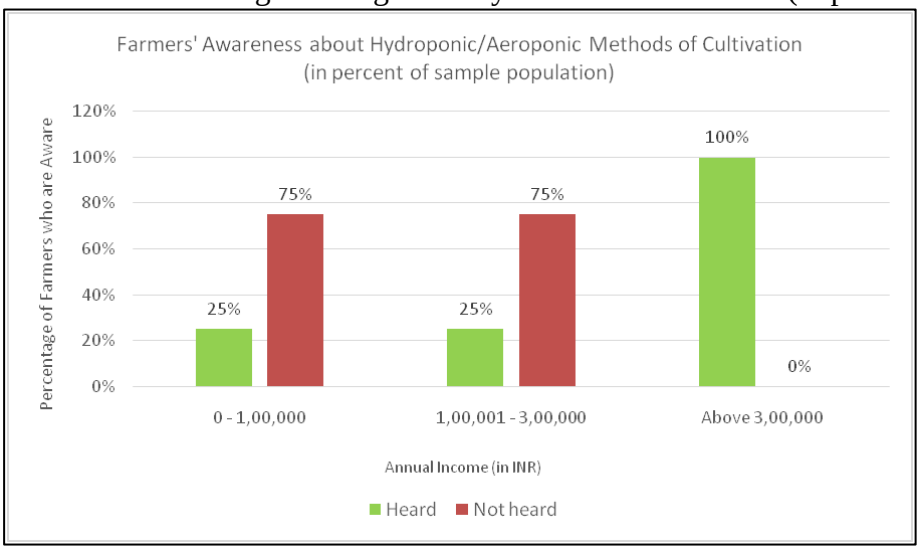
[22](Government of West Bengal 2024)

crops by the Supreme Court, the farmers retained a negative outlook. The Supreme Court had appointed a Technical committee to provide their report. The committee expressed the need for realignment of Genetically Modified crops regulations and suggested a complete ban on herbicide tolerant crops. On January 9, 2024, the Supreme Court resumed hearing petitioner's arguments which challenged the government's approval (in October 2022) of indigenously developed HT Mustard DMH-11.[23] Experts believe that Genetically Modified seeds threaten crop biodiversity, especially indigenous crop varieties which are crucial to fight climate change. They believe that the loss of these varieties would constitute a huge risk in the face of worsening effects of climate change.[24] Furthermore, the development of Genetically Modified seeds is concentrated in the hands of a few private firms. This must be considered when assessing Genetically Modified crops in the context of implementing it in agricultural practices in villages like Sonarpur. An approval on Genetically Modified seeds would make working capital more expensive for farmers. This is because these few private firms could monopolise the Genetically Modified seed market and become price-setters for the period until competitors attempt to rise.[25] Two-thirds of the survey sample size has never heard of hydroponic/aeroponic systems. Figure 4 below sorts the awareness of farmers about such systems based on their income. Our study reveals that farmers have become used to traditional subsistence methods of farming. Although these methods have clearly reached the end of their usefulness, there have been negligible changes in overturning such systems. The lack of initiative on the part of these farmers is distressing. Once given factual explanations by us who were taking interviews on field, an overwhelming majority of people were willing to set up hydroponic/aeroponic systems. Clearly, the sweeping advent of the internet has made people living in rural regions more accepting and receptive towards innovation. The government has introduced several schemes to introduce new technology into agriculture.[26] Although, the technology might not have effectively reached Sonarpur yet, its news definitely has. Through interactions with all farmers, a common link lay in their desire to fund their own working capital instead of relying on credit. A lot of these farmers envision these technologies as a method of breaking the vicious credit cycle and taking control of the entire production process. Farmers believe that the ability to take

[23](Centre for Civil Society 2022) (Nitnaware, Down to Earth 2024)
[24](Nitnaware, Down to Earth 2022)
[25](Phillips 2008)
[26](Government of West Bengal n.d.)

control over their process of production is a cost-cutting panacea, combined with new agricultural techniques and better resource management. This can help them cut significant costs, thereby increasing productivity and allowing them to finance their own working capital, subsequently improving their financial independence and reducing the dependency on precarious lending arrangements. This phase has been identified as a crucial milestone toward sustainable agriculture because it would not only increase the resilience of farm income and thus better financial stability for farmers but also stimulate more resilience against external financial shocks.[27] It will further be pivotal in increasing self-sufficiency and reducing reliance on credit, thereby contributing to larger socio-economic payoffs through improved food security and enhanced rural development.[28]

Figure 4: Farmers' Awareness about Hydroponics, Aeroponics, Precision Agriculture or Greenhouse Technologies Categorised by their Annual Income (in percent).



Source: Authors' survey data

Government schemes have focused on bringing farmers into the institutional credit sector.[29] The respondents reported that they had created bank accounts in the past five years. They mentioned that it was easier and more affordable to secure bank loans now. However, a majority of the farmers still prefer the informal sector: a field in which Self-Help Groups have proved outstanding. Farmers have actively welcomed the foundation of

[27](Kirsten 2009)
[28](Chatterjee 2016)
[29](National Bank for Agricultural and Rural Development 2023-24)

self-help groups. In Sonarpur, most of these groups collect INR 50 from each farmer per month which is used to help farmers in raising credit, and in times of need like marriages and funerals. Self-help groups provide these funds at near-negligible rates of interest and the borrowers are held to account by close members of their own community.[30] Additionally, a shocking trend has been seen in Sonarpur recently. Due to the influx of banking facilities, moneylenders have faced stiff competition and decreasing demand for loans. They have adapted through two methods: (i) providing loans at lower rates of interest compared to banks and (ii) providing loans in kind to eliminate a step (securing working capital) in the agricultural process, said the respondents.

However, these positive developments may not sound enough when it comes to the impact of climate change on credit needs of farmers. Due to unpredictable yields, farmers in our study reveal that they often lose existing savings or are unable to repay previously withdrawn loans. This plunges them in a vicious debt cycle which is difficult to escape since farming, as a field, has a considerable maturation period between the investment and its return. Taking the example of the recent rice crop failure in 2022, several farmers said that they plan on funding the next year's cultivation on credit facilities.

Our study finally reveals that a majority of farmers believe that their income levels have remained the same relatively, while a few believe that it has declined. Most farmers believe that their standard of living has declined over the years. These results raise concerns for the future as bad yields due to changing climates are only expected to push incomes lower.

5. Conclusion and Policy Recommendations

The survey revealed mixed perceptions among farmers regarding the impact of climate change on their yield, with all respondents agreeing on noticeable changes in cultivation practices. Farmers in Sonarpur have been compelled to adjust their cultivation practices in response to changing temperatures and precipitation patterns. Notably, rice and wheat cultivation exhibit varying levels of adaptation to rising temperatures and altered precipitation. While a significant portion of farmers lack experience with heat-resistant

[30](Neha Kumar 2018)

crop and seed varieties, there is some awareness of these coming up. However, apprehensions regarding implementation, potentially due to high costs, hinder widespread adoption of these varieties.

Farmers generally perceive government policies positively, particularly initiatives such as the 'Bangla Shasya Bima' Insurance scheme. However, there are concerns regarding the timeliness and effectiveness of government assistance, with a preference for proactive support rather than reactive measures during crises. Farmers overwhelmingly reject the idea of sowing Genetically Modified crops on their land, partly influenced by legal uncertainties and concerns about biodiversity loss. The debate around Genetically Modified crops underscores the need for comprehensive regulations and considerations of socio-economic impacts. Despite limited awareness initially, farmers exhibit receptiveness towards innovative farming technologies like hydroponic/aeroponic systems, especially after receiving factual explanations. There is a growing recognition of technology as a means to enhance self-sufficiency and break free from reliance on credit.

While there have been improvements in access to institutional credit, many farmers still rely on informal sources due to perceived benefits such as lower interest rates and community support. Climate change-induced yield fluctuations exacerbate existing challenges, leading to increased reliance on credit and concerns about income stability.

With a vision to solve this, the following is a policy recommendation to improve the already existing ‘Bangla Shasya Bima’ Insurance scheme. The ‘Bangla Shasya Bima’ Insurance scheme, aimed at providing insurance coverage to farmers in West Bengal, represents a significant step towards safeguarding the agricultural sector against risks and uncertainties. However, upon critical analysis, one area for improvement emerges as crucial for enhancing the effectiveness and utility of the policy: the incorporation of comprehensive weather index-based insurance. Currently, the scheme primarily relies on traditional yield-based insurance, which indemnifies farmers based on actual yield losses. While yield-based insurance has its merits, it often faces challenges related to accurate yield assessment, especially in regions with diverse cropping patterns and varying agronomic practices. By integrating weather index-based insurance into the ‘Bangla

Shasya Bima' scheme, the government can address these challenges and provide more timely and reliable compensation to farmers in the event of adverse weather events.[31]

In refining the 'Bangla Shasya Bima' Insurance scheme, it's essential to explore a hybrid approach that integrates both crop yield-based and weather index-based measurements. Such a comprehensive strategy would harness the strengths of each method while mitigating their respective limitations, thereby offering farmers more robust protection against diverse agricultural risks.

Firstly, the existing crop yield-based insurance component could be retained but with improvements in data collection and assessment methodologies. This could involve leveraging advancements in remote sensing technologies, such as satellite imagery and drones, to accurately monitor crop health, growth stages, and yield potential. By incorporating these high-resolution data sources, insurers can enhance the precision of yield assessments, reducing the potential for disputes and delays in claims processing. Additionally, investing in training programs for local agronomists to better interpret and validate field-level data would further bolster the accuracy of yield estimates.[32]

Simultaneously, integrating weather index-based insurance into the scheme would provide an additional layer of protection against weather-related risks. Weather index insurance operates by establishing predetermined thresholds for key meteorological variables, such as rainfall, temperature, and humidity. When these thresholds are exceeded, payouts are triggered automatically, without the need for individual farm assessments. This streamlined approach significantly reduces administrative burdens and accelerates claims processing, ensuring timely assistance to affected farmers.[33] Furthermore, weather index insurance can cover a broader spectrum of perils beyond yield losses, including droughts, floods, and heat waves, thereby offering more comprehensive risk coverage.

To implement this hybrid approach effectively, the government of West Bengal already has a robust infrastructure for weather monitoring and data dissemination for the Bay of

[31](Government of West Bengal 2024)
[32](Afshar, M. H., Foster, T., Higginbottom, T. P., Parkes, B., Hufkens, K., Mansabdar, S., Ceballos, F., & Kramer, B. 2021)
[33](Sun 2022)

Bengal observatory. There is a network of weather stations equipped with sensors for real-time data collection and transmission.

Furthermore, policy to policy partnerships could play a pivotal role in scaling up the adoption of weather index-based insurance among farmers. By integrating the insurance dissemination with other agricultural policy schemes and conditional cash transfers like Krishak Bondhu, Duare Sarkar, Matir Katha, etc. would reduce the apprehension of farmers from availing the scheme. Having banked and paperwork done only once while registering for the policy may enhance the accessibility of all such policies combined.

In conclusion, the successful integration of crop yield-based and weather index-based measurements within the 'Bangla Shasya Bima' Insurance scheme requires a multifaceted approach encompassing technological innovation, data analytics, stakeholder engagement, and capacity-building initiatives. By embracing complexity and embracing a holistic perspective, policymakers can develop insurance products that are not only robust and effective but also inclusive and empowering for the farming communities they serve. This comprehensive strategy reflects a commitment to harnessing the transformative potential of insurance as a catalyst for sustainable agricultural development and poverty alleviation in West Bengal.

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Appendix: **Questionnaire**

1. Do you believe climate change has a direct impact on your lives and cultivation practices?
   a. Significantly
   b. Not significantly, but noticeable
   c. No noticeable observation
   d. None of these options describe my condition
2. Have there been instances when you have had to change cropping patterns or your original plans were not followed because of climate change?
   a. Yes, I had to adapt them considerably.
   b. Yes, I had to make some adjustments.
   c. No changes had to be made.
   d. None of these options describe my condition
3. Have you observed a difference in the impact of changing temperatures on rice and wheat?
   a. Yes, they respond differently.
   b. No, I have not observed a characteristic difference
   c. I don’t cultivate both of these
   d. None of these options describe my condition

4. Are you aware that the government has launched several drought- and heat wave-resistant varieties of crops? (DBW187, DBW222)
   a. Yes, I am using them.
   b. Yes, I wish to use them.
   c. No, I have not heard of them.
   d. None of these options describe my condition
5. How effective do you think the government's policies have been in taking measures to mitigate the impact of climate change on the agricultural sector?
   a. Highly Effective: I have benefited from them.
   b. Effective: I have not directly benefited, but it has improved the situation.
   c. Ineffective: They have not improved the situation.
   d. None of these options describe my condition
6. Would you be willing to grow Genetically Modified crops that ensure good yields but are not yet popular and preferred among people (trials are underway)?
   a. Yes, I would be open to trying.
   b. No, I will stick to non-modified crops.
   c. Too early to say
   d. None of these options describe my condition
7. Have you ever heard of hydroponic or aeroponic systems, precision agriculture, or greenhouse technologies?
   a. Yes
   b. No
   c. Maybe
   d. None of these options describe my condition
8. Would you be willing to set up such systems?
   a. Yes
   b. No
   c. Maybe
   d. None of these options describe my condition
9. What has been the state of credit facilities for agriculture?
   a. I only borrow from the formal sector.
   b. I borrow partly from the formal and the informal sector.

c. I only borrow from the informal sector.

d. None of these options describe my condition

10. How would you judge the trajectory of your income from agriculture over 10 years?

a. It has jumped considerably.

b. It has only improved to keep track with rising prices.

c. It has remained relatively the same.

d. It has declined.

Policy Design Precepts for a Better Tomorrow: A Look at Some Ideological Visions

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Abstract

Ideological visions of a better future for economy and society from plutocrats, conservatives and progressives are briefly reviewed. The plutocrats and the conservatives do reputational laundering by stakeholder capitalism and compassionate capitalism respectively. The progressives are diverse, and despite having some good ideas of changing capitalism, they are not yet a viable political alternative. Also, more importantly, there are dilemmas and tragic contradictions in their policy proposals and praxis.

Keywords: Plutocrats, Great reset, Conservatives, Progressives

1. Introduction

Highlighting "the scope and significance of critical policy problems" and analysing "efforts to address them, ending with suggestions for improvement targeted to policy practitioners" is a topical concern. In fact, the journal *Policy Design and Practice* is dedicated to doing so. In this regard, this paper sketches out the visionary perspectives of the conservatives (Liberal Right) and the progressives (Liberal Left) which are pitted against the plutocratic perspective.

Corruption of capitalism, socio-economic inequalities, ecological collapse and democratic recession over the last five decades of neoliberalism constitute the empirical backdrop for the review here (Standing, 2016; Keane, 2002; Razin and Sadka, 2023; Guriev and Treisman, 2022; O'Donnell, 2018).A better tomorrow will have to come out of

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neoliberalism as the late-20th-century political reappearance of the 19th-century ideas associated with free-market capitalism. Neoliberalism is summarily criticised as "forthrightly aimed to dismantle the social state…it is not only social regulation and redistribution that are rejected as inappropriate interferences in markets or as assaults on freedom. Also jettisoned is democracy's dependence on political equality" (Brown, 2017).

In this milieu, the plutocrats have monopolistically thrived out of rent-seeking. The conservatives attack rent-seeking, and defend competitive capitalism at all costs. The progressives, driven by equality and ecological concerns, want to reform capitalism so as to promote the welfare of all--general welfare (Stiglitz, 2019).

Actually, it is not easy to define a 'progressive'. Following Rowson (2015), a progressive may be taken as "not being a neoliberal, who valorises the market and deeply distrusts government, caring only for aggregate wealth in abstraction and not the imbalances of power and inequalities in welfare that result. Progressives believe governments have an important role to play in redressing the unfairness and negative externalities of markets, but the state is only part of the story. More generally they tend to be animated by all the other freedoms of association and expression that democracy affords."

2. Plutocrats

Goodman (2022), as an exemplary representative of the progressives, has attacked the plutocrats as "Davos Men" and meticulously dissected how they influence and manipulate the business world and economic life. The Davos man is defined as "A member of the global billionaire class that controls the majority of the world's wealth. A rare and dangerous predator who attack without restraint—expanding his territory and seizing the nourishment of others—while he deftly assumes the guise of empathy and generosity, lulling his prey into submission". These men gather annually under the auspices of the World Economic Forum in Davos, Switzerland in order to do reputational laundering, i.e. "cleanse their reputation". They are unusual predators whose power comes partly from their keen "ability to adopt the guise of an ally".

Goodman elaborates on how the World Economic Forum (WEF) has become a smokescreen prop in the service of Davos Man as he pursues greater wealth and power at the cost of ordinary people even in crisis situations such as the recent Covid-19 pandemic.

They are predominantly a white and male gluttonous cabal. They, and their hired guns — lobbyists, think tanks, battalions of public relations people, and obsequious journalists — resolutely perpetuate the idea, even in the face of overwhelming evidence to the contrary, that everyone is a winner when the rules are organized around greater prosperity for them who already enjoy most of it. They promote the Cosmic Lie: the alluring yet demonstrably bogus idea that cutting taxes and deregulating markets will not only produce extra riches for the most affluent, but trickle the benefits down to the lucky masses — something that has, in real life, happened zero times. Austerity complements this Cosmic Lie as a value system promoted by the affluent people who benefit from it. Less public spending spells less need for taxes, that means more for Davos Man. And whatever public spending is required to pacify a restive populace can be paid for by the sacrifices of ordinary wage-earners.

They champion "stakeholder theory" as "one of the greatest intellectual contributions to the world of business" as a means of pre-empting government regulation and as a substitute for the public making use of democracy to fairly distribute the gains of capitalism. Their logic is that the wealthy are magnanimous and so unions are an unnecessary intrusion on business, and taxes represent money seized by the government, money that could otherwise be showered on the fortunate people who would benefit from their philanthropic undertakings. But the truth is that they leave notorious imprints everywhere by way of tax evasion, financial shenanigans and the looting of the system by the powerful. They insinuate into public discourse the notion that anyone who opposes their monopolization of wealth is anti-business. They use their money to purchase influence over the political sphere, crafting rules that allow them to keep more of their earnings. Politicians pursue the goals of deregulation, tax cutting, and the dismantling of government while packaging this as a spur to growth. They speak empathetically to the working class while serving the needs of the plutocrats. They indulge in the language of compassion, while solidifying the prerogatives of the privileged people who finance their campaigns.

All this they do even as, aided by governments and international organisations, they derive income from possession of assets that are scarce or artificially made scarce – rental income from land, property, minerals or financial investments; income lenders gain from debt interest; income from ownership of 'intellectual property'; capital gains on investments; 'above normal' company profits (when a firm has a dominant position); income from subsidies; and income of financial intermediaries derived from third-party transactions. They seek to maximise their money and wealth telling lies to the public that global capitalism is based on free markets; intellectual property rights encourage risk-takers; the institutional structure of capitalism built in the globalisation era is 'good for growth'; their profits reflect managerial efficiency and returns from risk-taking; and wages of work done by precariat and platform economy workers is the best route out of poverty (Standing, 2016).

Such plutocrats as the social basis of WEF have unabashedly put forward 'the great reset' agenda about shaping the better future of the world. According to the WEF, the state of the world can be improved in three ways--by the creation of stakeholder capitalism, which will replace shareholder capitalism. The idea of this system is that companies will work for the common good rather than immediate profits and benefits alone; by the construction of a more resilient, equitable and sustainable system based on environmental, social and governance metrics; and by harnessing innovations innate to the Fourth Industrial Revolution for the public good, nourishing greener, smarter and fairer growth.

For promoting social sustainability, for example, WEF (2022) has highlighted five key issues that need to be addressed to ensure better work for workers and employers alike: volatility in wages and the cost of living; divergence in the demand for flexibility; silent pandemic in well-being; erosion of diversity, equity and inclusion gains; and the need for a re-skilling revolution. Accordingly, the WEF has called for the following policies: promote fairness in wages and technology; provide flexibility and protection; deliver on health and wellbeing; drive diversity, equity and inclusion; and foster employability and learning culture. For achieving all this, the WEF says, we need to ensure at least a living wage for all; enable all workers to benefit from flexibility, where possible and appropriate; safeguard total well-being at work; ensure that the workforce profile reflects the operating market; provide accessible up-skilling and re-skilling for the entire

workforce; support worker representation and processes for dispute resolution; take a responsible approach to deploying technology; use Artificial Intelligence (AI) and data responsibly; support national public social protection systems; support access to benefits; promote solutions that provide security for independent workers; protect physical and psychological safety in the workplace; provide for predictability of hours and boundaries on working time; ensure that workers feel valued and find purpose in their work; drive equal pay and equitable conditions; enable inclusive participation and build an inclusive culture; ensure that global leadership reflects workforce composition; enable a culture of continuous learning, ensure talent processes recognize and reward skilling achievements; and cultivate systems and alliances for redeployment.

All this is bunkum or amounts to shedding crocodile tears, according to progressive critics. The lip-service that the plutocrats pay to the liberal ideology of markets is ethically deficient, and cannot overcome the present situation of hypocrisy and hide and seek on their part and on the part of the politicians working at their behest (Nooteboom, 2019): "Firms…increase profits in the widespread obstruction of competition and pressure on governments to grant financial and regulatory advantages under threat of moving their activities abroad when not accommodated. Politicians play hide and seek in holding market ideology high while often markets are not in fact realized. Examples are a CO_2 tax that would yield a market mechanism against pollution, fair tax practices, tax on car use according to volume and time of usage, which would yield a market mechanism against congestion. At the same time, markets are introduced where they are undesirable (education, science, culture) or are problematic in their functioning (care)…The most pressing demand now is to save the environment, but most firms circumvent that." By contrast, interdisciplinary understanding, factoring in philosophy, sociology, and psychology, can lead to ethically strong progressive policy for "reasonability towards populist complaints; the courage not to tag along in system tragedies; moderation of greed and remuneration; and justice in the distribution of income and access to knowledge, legal process and political voice, and in the conditions and continuity of work (ibid.).

3. Conservatives

On the right-of-the-centre, there are libertarian conservatives (Liberal Right)who attack the WEF's agenda to reset the world for a good global economy and society. For them, the 'great reset' is nothing but the 'great regression' towards the totalitarianism or socialism of the "half-educated corporate billionaires" or "money Oscars" (Walsh ed., 2022). On this side is, for example, the George J. Stigler Centre for the Study of the Economy and the State, which has become an intellectual destination for research on regulatory capture, crony capitalism, and the various forms of subversion of competition by special interest groups. It promotes 'radical enlightenment' of the Right, professing that capitalism can be made to serve growth as well as fairness by making the economy more competitive and its politics more and more deliberative so as to act as a countervailing power against the corporate rent-seekers' politics of capturing government policymaking in their favour through bribery and corruption (see Zingales, 2017; Lindsey and Teles, 2017).

While this viewpoint has gained currency now, even among progressives, it is terribly confusing in light of Stigler's don't-do-anything-against-monopoly-power directive. Stigler had opposed measures against monopoly like increasing competition with antitrust laws, regulation, and public ownership, as futile (Mankiw, 2012). The re-imagined libertarian political solution of establishing 'rent-proofing democracy' at multiple levels and across different institutions to generate more egalitarian and pro-innovation outcomes is a celebration of the 20th century political philosophy of liberal democracy marking the 'end of history'(a la Fukuyama, 2006) along with eternally nostalgic wishful thinking about competitive capitalism against the inexorable laws of concentration and centralization of capital that have been at work since long.

Some centre-right conservatives also do reputational laundering like the plutocrats (Bartlett and Meltzer, 2016).They profess 'compassionate capitalism' as a different nomenclature for stakeholder capitalism — "Business is the most pervasive and influential force on the planet today. The true purpose of business is to uplift the experience of existing. It is not to make owners wealthy. It is not to produce ever-cheaper goods and services. Compassionate capitalism is an economic system meant to make a lot of money, help a lot of people, and have a lot of fun. It is not to keep an avaricious and

toxic economic model afloat. And it is certainly not (with no apology to Milton Friedman) to make a profit"! To put it differently, there are conservatives pretending to be "progressive lefty liberal snowflakes" making the case for blending together in the "right measure" generosity, kindness and community good on the one hand, and yield, ownership and return on investment, on the other. With no blueprint to this effect, this amounts to a quintessential vagueness unlike the clarity about a better tomorrow by progressives (Hodgson, 2021) in terms of 'liberal solidarity' based on eight points: (a) freedom from arbitrary power with opportunities for personal development; (b) equality of opportunity which implies reduction of inequalities in power, wealth and income, and the end of discrimination based on gender, race, caste, religion or sexual orientation; (c)defence of human rights and dignity; (d) private property and markets are necessary but not sufficient conditions for freedom, autonomy, democracy and the protection of human rights; (e) individuals are not always self-interested, or exclusively devoted to their own personal satisfaction; (f) the state plays a vital role in governing society, sustaining education and welfare, maintaining law and order, defending its population from harm, constituting the legal frameworks for markets and firms, and enabling economic development; (g) representative democracy is indispensable; and (h) international cooperation is essential to deal with pandemics and the climate crisis, to end the destruction of biodiversity on our planet, to help prevent war, to sustain a stable and progressive global politico-economic order.

The progressives attack conservatives as a confused lot and, therefore, useless to go beyond neoliberalism. Whatever brilliantly the conservatives say against the plutocratic machinations ends up being status-quoist for capitalism as it is now in terms of monopoly-rentier capitalism. The conservatives, according to the progressives, fantasise about their El Dorado through the perfectly competitive model in mainstream economic education. But as Komlos (2023) has aptly commented, "It might apply to Mom-and-Pop operations, but such models are anachronistic in a world in which supranational mega-corporations dominate. Oligopolies and monopolies take advantage of their market power and do not produce the socially efficient amount of goods at the socially efficient price. They differ from the profitless firms insofar as they charge super-high prices, have power to manipulate consumers, take advantage of asymmetric information to trap consumers, practice opportunism, and, in contrast to perfectly competitive firms, make immense

profits that they use to enhance their political and economic power further by financing an array of lobbyists, political action committees, and think tanks." The plutocrats as a powerful minority in the world have, after all, come into existence and thrived due to the manipulative wielding of monopoly power in product markets and resource ownership as also monopsony power in labour markets. Their rentier and crony capitalism and kleptocracy have undermined small businesses; harmed working people; fuelled racial injustice; failed consumers; killed innovation; made the economy fragile; destabilised communities; blocked climate progress, and corrupted democracy (Mitchell and Holmberg, 2020).

4. Progressives

The progressives debunk the great reset agenda of the plutocrats saying that it is high time the WEF and its Centre for New Economy and Society stopped fooling themselves and woke up to the stark truth that they are part of the problem!

Social unsustainability problems of majority of people in the world cannot be resolved by the WEF simply because in its agenda designing, there are no representatives of trade unions, public sector organisations, human rights groups, peasant or indigenous (tribal) organisations, students and youth (Buxton, 2016).For example, the plutocrats are not bothered about the workplace safety and health issues, which are on the rise with lean or agile manufacturing under neoliberal globalization. Workers are getting maimed in the supply chains of the automobile industry in India (Srivastava, 2024). This is not surprising because the employers in capitalist system go to the extremes to evade the costs of safe and healthy workplaces. The working class is hit with the choice: "unsafe job, or poverty, or slave labour with both" (Wolff, 2020).

Furthermore, on behalf of the progressive Transnational Institute, Buxton (2016) has pinpointed the essential problem with the plutocrats thus: "The real concern about the WEF, however, is not the personal hypocrisy of its privileged delegates. It is rather that this unaccountable invitation-only gathering is increasingly where global decisions are being taken and moreover is becoming the default form of global governance." There is definitive transition from intergovernmental decision making towards a system of multi-

stakeholder governance. In the latter, governments and intergovernmental forums such as the UN are considered "no longer efficient places for tackling increasingly complex global crises." Only corporate elites can offer agile governance drawing on private sector's experience of "adapting to a new fast-changing environment". Governments are told to tackle any issue by aligning with private sector in public-private partnerships. And a few carefully selected civil society representatives are roped in to legitimise this undemocratic process. "It is therefore no surprise that multi-stakeholder governance does not lead to any binding regulations that would damage corporate profits. Corporations are free to pick and choose what they act on and not bound by any enforceable legislation that could control their social and environmental impact."

So, the essential proposition of the Transnational Institute and the like many progressive think tanks is that the transnational corporations are capturing global governance to serve their interests of business and profits rather than the wellbeing of humanity: "The 'Great Reset' is just the latest iteration of the gradual corporate takeover of global institutions, such as the UN and other international bodies, that take critical decisions over the governance of global common goods like food, water, health, internet and others" (TNI, 2021; Marshall, 2015).

The environmental concerns of WEF are a hoax given that the plutocrats are hypocritical as they use private jets and needless short haul flights; there is collusion between them and those who should be making policy in the public interest which serves their wealth and power amassed through environmental destruction, human exploitation, tax dodging and avoidance and political gaming; and there is no genuine moral concern for "a new development paradigm redirecting the global trajectory toward a socially equitable, culturally enriched, and ecologically resilient planetary civilization" (Raskin et al., 2002; Stanton, 2023).

Among the progressives, there are some who seriously have misgivings about Artificial Intelligence (AI) based technologies solving the social and environmental sustainability problems of humankind about which the WEF is hopeful. There is surely a three-fold risk with generative AI (Skidelsky, 2023): "First, AI renders a growing share of human workers redundant. Rising inequality and proliferating mental-health problems are the natural consequence of growing uselessness. Second, AI poses a threat to human

freedom. Governments and businesses have always spied on their subjects, in order to control them better or make more money out of them. Digital surveillance has made such spying easier and more comprehensive than ever. This carries risks beyond loss of freedom and privacy, as demonstrated by the recent Post Office scandal in the UK: hundreds of sub-postmasters were wrongfully accused of stealing money after faulty accounting software showed discrepancies in the Post Office's finances. Third, the uncontrolled advance of AI could lead to our extinction as a species. Just as massive earthquakes, volcanic eruptions, and other natural disasters threaten our survival, so do anthropogenic, largely technology-driven forces like nuclear proliferation and global warming. AI can compound the threat these forces represent."

Therefore, according to Skidelsky (2023), "we must stop all investment in AI development, except for specially sanctioned purposes (such as to alleviate suffering)". There is a very difficult political challenge as well: "In an economy where the means of production are largely privately owned, policymakers must ensure that the gains of productivity-enhancing technologies like generative AI are shared sufficiently widely." This can be done by taxing "the wealthy sufficiently to provide a universal basic income, which is not tied to labour… The efficiency gains brought about by machinery make this possible; it is for politics to find a way to spread the bread evenly on the butter" (ibid.). There is also a danger of human atrophy like this: "…the smarter the machine, the dumber its users will need to be, so as not to throw human spanners into the mechanical works. Only moral idiots will accept the infallibility of algorithmic judgments" (ibid.).

The above viewpoints are corroborated by other progressive researchers on this theme. According to Acemoglu (2022), AI may produce various social, economic and political harms in terms of damaging competition, consumer privacy and consumer choice; excessively automating work, fuelling inequality, inefficiently pushing down wages, and failing to improve worker productivity; and damaging democratic functioning. As a result, "efforts to limit and reverse these costs may need to rely on regulation and policies to redirect AI research. Attempts to contain them just by promoting competition may be insufficient." And researching the relationship between technological change and economic inequality, Kurz (2023) has shown that "In a free market economy with intellectual property rights, firms' control over technology enables them to expand, attain monopoly power, and earn exorbitant profits. Competition among innovators does not

eliminate market power because technological competition is different from standard competition; it results in only one or two winners… technological market power tends to rise, increasing inequality of income and wealth. Unchecked inequality threatens the foundations of democracy." In such a scenario, public policy is the only counterbalancing force that can restrain corporate power, attain more egalitarian distribution of wealth, and make democracy compatible with capitalism by "restricting corporate mergers and acquisitions, reforming patent law, improving the balance of power in the labour market, increasing taxation, promoting upward mobility, and stabilizing the middle class".

The progressives propose 'middle-out economics' to promote general welfare. It is a theory that "prosperity is built from the middle-out…middle means middle class, which means not the rich, which means me. And since everyone likes to think of themselves as being in the middle class, even people who in fact aren't, it's aspirational: it speaks to everyone below the middle class who aspires to join it." The economy grows not from the top down but 'from the middle out' — 'from the bottom up and the middle out, not the top down'. "What it means is, invest in creating a large, stable, and comfortable middle class, and the economy will not only be fairer but grow faster. It holds that we are all better off when prosperity is broadly shared, and that the public sector — government — must play a vital part in shaping that prosperity (Tomasky, 2022; Bose, 2023).

The summary ingredients of this theory are as follows. The 20th-century free-market paradigm has reached the end of its useful shelf life. There is little or no room left within it for useful solutions when it comes to the grave challenges we face today. Similarly, the 20th-century models of public management are equally unsatisfactory, not to mention politically infeasible. In light of this, we need to find new answers to the following questions. How should government and markets interact in today's economy to produce prosperity with a fair distribution of wealth and opportunities? What are the appropriate terms of a 21st-century social contract?

Answers to these questions are drawn from the currently emerging more data-based, context-specific, and so realistic understandings of both markets and government, which can be used to test and refine the overboard presumption that markets ought to be our default starting position. Good empirical analyses can also kick-start a long overdue process of rehabilitating government from exaggerated, axiomatic assumptions of

incompetence—leading to improved understanding of where public solutions work well and where they do not. It is, thereby, possible to explore the possibilities for public-private partnerships and other novel experiments with government-market interaction. It is possible to suggest and support innovative forms of government action to supplement, enhance, or modify competitive markets by promoting collaboration and cooperation. Or, it may be possible to structure markets in the first instance to yield a more equitable distribution (obviating the need to correct for wealth inequality through redistribution). It is possible to abandon the frankly bizarre idea that the sole purpose of a corporation is to maximise shareholder wealth (whether or not that's what shareholders want). It is also possible to rethink the problem of concentrated private power and re-establish a more sensible role for antitrust and anti-monopoly laws, which is also long overdue (Kramer, 2018).

The progressive economic proposals also include an assortment of arguments in favour of promoting cooperative companies to create jobs with living wages, universal basic income and/or jobs guarantee policies, campaigns to redress monopoly power, making the Davos Man pay wealth taxes and stopping how the rich people can find ways to evade taxation focussed on income, promoting deliberative democracy and adopting non-extractive development strategy in order to take care of social as also environmental sustainability concerns (Goodman, 2022; Stiglitz, 2019; Standing, 2014 and 2016; Meer, 2021).

Some post-capitalist progressives have also made minimal demands like full automation of the economy, reduction of the working week and the right to be lazy with diminishment of the work ethic so as to overturn existing ideas about the necessity and desirability of (meaningless) work, and the imposition of suffering as a basis for remuneration along with provision of a basic income (Srnicek and William, 2016).These demands have arisen out of the impossibility of capitalism to circumvent work crisis in terms of the seven trends to escalate in the years to come: "1. The precarity of the developed economies' working class will intensify due to the surplus global labour supply (resulting from both globalisation and automation); 2. Jobless recoveries will continue to deepen and lengthen, predominantly affecting those whose jobs can be automated at the time; 3. Slum populations will continue to grow due to the automation of low skilled service work, and will be exacerbated by premature deindustrialisation; 4. Urban

marginality in the developed economies will grow in size as low-skilled, low-wage jobs are automated; 5. The transformation of higher education into job training will be hastened in a desperate attempt to increase the supply of high-skilled workers; 6. Growth will remain slow and make the expansion of replacement jobs unlikely; and 7. The changes to workfare, immigration controls and mass incarceration will deepen as those without jobs are increasingly subjected to coercive controls and survival economies."

An honest confession of the progressives is that political reform for a strong democracy to offset the political power of concentrated wealth should first take place so as to support progressive economic reform on the above lines (Stiglitz, 2019). However, how this can come about in the absence of a popular struggle for representative democracy, and in the presence of illiberal democracy under the control of the plutocrats and their populist politician-friends is a mystery. And it appears now as an unresolvable dilemma. Political futurology, as a science, is, after all, very dismal (Fleming, 2022)even as there is now a definitive and daunting global trend against progressivism by way of open borders, green energy transition and gender-affirming care (Matthews, 2025).

5. Sorting Out a Conclusion

This paper has assembled the salient viewpoints of the conservatives and the progressives in relation to the reputational laundering that the plutocrats have been doing in recent times even as they relentlessly pursue their self-interest.

The conservatives do not have any coherence in "inventing the future" and they end up covertly or overtly supporting the plutocrats. Their nostalgia for competitive capitalism belies the relentless dynamics of capitalism to be monopoly capitalism of the minority of rentiers and corporates at the cost of the majority of people. The political theory of (rent-seeking) firm from conservatives is brilliant but it is also appropriated by the progressives. The conservatives surprisingly do not want to take up any measure to curtail the monopoly power of the rentiers and corporates. In this sense, it is rather difficult to neatly identify who is who in terms of coherent ideas and palpable policy possibilities in accordance with them.

The progressives do have some authentic and appealing ideas to reform or change monopoly capitalism but the worldwide upsurge in despotic populism (Hudson and Shah, 2022) does not permit the implementation of their ideas. In other words, there are no progressive political parties truly representing the interests of the ordinary people against the elite, with mass support for middle-out economics along with upholding checks and balances and protecting the rights of minorities; and not denigrating "others" based on nationality, religion, race, caste, sexual orientations or gender identity.

This is not all. Suppose, to begin with, we consider the Republicans as conservatives and the Democrats as progressives in the American context. Only a minority (led by Bernie Sanders along with the firebrand Alexandria Ocasio-Cortez) in the Democratic Party upholds the progressive ideas. The Democratic Party is by and large under the control of some plutocrats or the other, and, more disturbingly, under the control of neoconservatives (neocons) hell bent on aggressively establishing American hegemony everywhere in the world leading to unjustified wars and destruction, like the Republicans are, led by the most-wanted illiberal-democratic populist Trump on the rise now.

There are troubling issues with regard to the economic ideas of the progressives as well. Most progressives are in favour of the universal basic income while others view it as status-quoist and fundamentally a "flawed idea". Some progressives make the case for "Job Guarantee" as the alternative (Wray et al., 2023) while some others want both to be in place (Goodman, 2022). Similarly, whether progressive capitalism is possible under globalisation (Stiglitz, 2019) or deglobalisation (Bello, 2004) is a bone of contention among the progressives themselves. Yet another mindboggling matter is that just as supply-side economics of the conservatives failed to live up to its expectations, so also the progressive proposal to pay, without any federal budget constraint, for policies such as Medicare for All, a federal jobs guarantee, a universal basic income, free college, etc. as guided by the Modern Monetary Theory (MMT), is littered with contentious issues (Moller, 2019; Murphy, 2019).Avant-garde Post-Keynesian ideas on these lines need to be thoroughly examined and evaluated for decisiveness and pragmatism, which is beyond the concern of this paper.

Most importantly, the environmental concerns of the progressives are deceptive. Unlike the climate-change-denial of the Republicans, there is Green New Deal proposal

supported by the youthful Sunrise Movement, Alexandria Ocasio-Cortez and others of the Democrats, calling on the federal government to wean the US from fossil fuels and curb planet-warming greenhouse emissions across the economy (Klein, 2020). But the Democrats in general are notorious for climate-destroying actions when in office (Dansereau, 2018). Moreover, since the Democratic Party is committed to managing a traditional, private-capitalist economy, it cannot "take meaningful steps to address the apocalyptic scale of the problem.…The Dems have always played seesaw between the interests of their corporate campaign donors and those of the party's middle- and working-class base… They have more and more aligned themselves with the jealous interests of their elite backers. Party leaders have embraced a business-friendly, neoliberal approach to climate change, just as they have just about everything else" (Rugh,2018).This is not all. The progressive talk about Green Keynesianism could be futile as expansionary policies needed to deal with recession may be in conflict with goals of reducing resource and energy use and carbon emissions (Bill, 2012). Similarly, the Green Energy projects that many progressives support are handled by the short-term profit-oriented plutocrats, and are not independent of fossil fuels and the deeper extractivist mindset that they represent. This can be seen in *Planet of the Humans*, a 2019 American environmental documentary film written, directed, and produced by Jeff Gibbs. The film was executively produced by Michael Moore, who released it on YouTube for free viewing on April 21, 2020, the eve of the 50th anniversary of the first Earth Day. Incidentally, the Earth Day programmes are also increasingly hijacked by the plutocrats for their money-making. Lastly, according to the democratic eco-socialists who argue that degrowth is the solution for climate change, political parties not in favour of getting rid of capitalism cannot address the impossibility of capitalism to decouple itself from its incessant growth imperative (Bellamy Foster, 2011; Isikara, 2021).

A better tomorrow is, therefore, surely not going to come soon despite the noisy noises from the ideological spectrum as examined in this paper. The plutocrats are undoubtedly the oligarchs of the world now and they and their populist politicians orchestrate surveillance capitalism to influence the electorate in their favour. They are bad for the Earth and its people in every sense. And all mainstream politicians are controlled by the plutocratic agendas in some way or the other, and, therefore, they are incapable of truly

and effectively dealing with the social and environmental sustainability issues (Solnit, 2023; Kolbert, 2024). This conclusion is outright pessimistic.

It is in contrast to the hope that we can meet the immense challenges in struggling against emerging plutocracy and state despotism by a mixture of moral principle, pragmatism and boldness of liberal solidarity as propounded by Hodgson (2021), which can be studied and further researched to concretely prove that progressive capitalism is not an oxymoronic hallucination.

Normatively, this paper has posited sympathy towards the progressive concerns and policy proposals, fuelled by political hope and informed by a vision of democratic renewal and reduced inequality and ecological entropy. However, in doing so, it is cognisant of the limitations of being a progressive as Rowson (2015) had pointed out: "The word progressive has been doing so much rhetorical work lately that it's worth asking what it means. Like many, I feel fond of the term, and have come to identify with it, but recently I noticed that being progressive gives me no felt sense of coherence, motivation or belonging, and this realisation bothered me. When the concepts you reach for to make sense of your life start to feel meaningless, it is time to re-examine them."

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Gender and Financial Knowledge

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Abstract

Financial knowledge is amongst the list of basic knowledge a person should have in order to secure a desirable standard of living. Hence governments across the world see it as an important issue. In most developing economies, gendered differences exist in both the knowledge of and access to financial products and services. Hence this paper aims to explore the relationship between gender and financial knowledge. We did this through an online survey amongst individuals in the Delhi NCR region, assessing their financial knowledge in both objective and subjective terms. The relationship between the objective and subjective scores is tested through correlation which shows a weak correlation between the two variables. Then a two-tailed independent t-test is conducted on both objective and subjective scores respectively to determine whether a meaningful difference exists in the respective scores based on the gender of the respondent. The objective score's mean for males and females did not show any significant difference. However, on average the subjective scores of females are lower than males. The findings indicate that women's perception of their own financial knowledge level is lower as compared to men. The results show that even in an educated sample of the population, with no prominent gender gap in objective financial knowledge, the participants still have a gender based gap in their subjective perception of their knowledge. Further, it also highlights that a high level of objective knowledge may not correlate with a high subjective score. Thus increasing women's subjective financial knowledge may need interventions other than those targeting to increase objective financial knowledge.

Keywords: Financial knowledge, Subjective financial knowledge, Objective financial knowledge, Gender, Financial literacy

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JEL Codes: G53, J16, D83

1. Introduction

In a country like India with deep-rooted patriarchal attitudes, gender bias remains a real concern, making it imperative to view the issues related to finance from a gendered lens. Financial literacy levels are of concern to every economy. In India, even though financial literacy levels have been rising over the years, further efforts are needed to improve female financial literacy (Reserve Bank of India, 2020). Financial literacy is defined as "knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life" (OECD, 2014). Financial literacy is a broad concept, and one of its components is financial knowledge. Financial knowledge measures the ability to understand financial calculations, specifically the implications of interest rates, inflation, and the risk and return on financial securities (Kadoya and Khan, 2020). This paper aims to explore the relationship between gender and financial knowledge. The concept of financial knowledge is studied by further bifurcating it into two aspects: objective and subjective (Robb and Woodyard, 2011). The objective financial knowledge is the actual extent of understanding and knowledge a person has pertaining to basic financial concepts and products. Whereas subjective financial knowledge refers to how individuals personally perceive their understanding of financial matters and how they assess their own level of financial knowledge. An individual's confidence level significantly influences their financial choices. These choices, in turn, impact overall financial well-being, which is the ultimate goal of having financial knowledge. Thus, it is crucial to consider one's subjective financial knowledge. Hence, this research aims to explore the relationship between objective and subjective financial knowledge an individual has, and how the subjective financial knowledge differs with the gender of the person. By highlighting these nuances, this paper adds to the wider conversation on financial literacy and stresses the importance of specialized interventions that extend beyond standard practices to address the unique gender-related challenges faced in navigating the financial landscape.

The structure of the rest of the paper is as follows. Section 2 summarizes the existing literature on the topic. Section 3 discusses the methodology used in the paper. Section 3 covers the result of the survey and its analysis. Finally, section 4 concludes the paper.

2. Literature Review

The broader concept of gender and finance has two vital concerns, one, financial literacy and two, financial inclusion. These are two distinct but related concepts. Financial inclusion is defined as "a process of promoting, timely and adequate access to a wide range of regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches including financial awareness and education with a view to promote financial well being as well as economic and social inclusion" (OECD/INFE 2018). Gender is an important determinant of financial inclusion (Khan et al, 2022). Empirical analysis shows that formal finance is less accessible to women as compared to their male counterparts (Ghosh and Chaudhury, 2018). This gender-based gap with respect to financial inclusion is a global issue. It is reflected by the Global Findex Database 2021, which stated that most of the unbanked individuals across the globe are women. Further, the Global Findex Database also showed that in developing nations, it is more likely for women to have inactive bank accounts as compared to men. This gap is vital to address as enhancing the financial inclusion of women can greatly contribute to their economic and social empowerment (Choudhary and Jain, 2023). Further, it offers holistic approaches to address poverty, encourage inclusive development, and contribute to the attainment of Sustainable Development Goals (Choudhary and Jain, 2023).

To give a brief overview of the relationship between financial inclusion and financial literacy, the former acts on the supply side, while the latter acts on the demand side. So financial inclusion aims to make sure financial services are available to all, and financial literacy aims to empower people to make use of those services. The existing literature establishes financial literacy as an important determinant of financial inclusion (Khan et al, 2022). The review also highlights that the impact of financial literacy on financial inclusion is a proportional one, where low financial literacy levels are seen to be linked

with low financial inclusiveness (Khan et al, 2022). Khan et al (2022) also explain that an increase in financial literacy levels, leads to higher demand for formal and informal financial products, thereby enhancing financial inclusion. Moreover, studies recommend improving financial literacy in order to close the gender gap in financial inclusion (Isaac et al, 2020; Rahmawati et al, 2019).

Although the importance of financial literacy is widely acknowledged, the way it is defined and measured differs greatly among agencies and researchers. Kadoya and Khan (2020) point out that most of these definitions view financial literacy in terms of financial knowledge and the ability to understand finance-related issues. These definitions mostly did not pay attention to an individual's ability to use financial knowledge in practice, until the Organization for Economic Co-operation and Development (OECD) incorporated it into their definition of financial literacy (Kadoya and Khan, 2020). It has also been observed that financial literacy and financial knowledge are interchangeably used in some papers (Rai et al, 2019). However, despite the minor disagreements on terminology, the lower levels of women's financial literacy in comparison to their male counterparts is well documented (Zaimovic et al, 2023).

For the purpose of this paper, the following definition, which is similar to the one given by OECD, is considered- Financial literacy is a combination of financial awareness, knowledge, skills, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing (Atkinson and Messy, 2012). This definition implies that financial literacy has three key aspects: financial knowledge, financial behavior and financial attitude. These three components can be understood as follows:

- **Financial knowledge:** It is defined as understanding of financial calculations such as the implications of interest rates, inflation, and the risk and return on financial securities. This knowledge, in turn, evolves into the skills necessary for moderating individuals' financial behavior and attitudes.
- **Financial behavior:** It is a critical aspect which gauges how people engage in financial transactions and they adeptly apply financial knowledge to make informed decisions. The positive outcomes of financial literacy are intricately linked to individuals' financial behavior.

- **Financial attitude:** It measures individuals' perspectives on financial matters, stands as another integral aspect of financial literacy. The assessment of financial attitude revolves around the importance individuals place on their financial issues, ultimately contributing to securing future benefits.

These three components are interrelated to each other. The positive relationship of financial knowledge with financial behavior has been strongly established (Atkinson and Messy, 2012; Kim et al, 2019; Dewi et al, 2020). Further financial behavior is correlated with financial wellbeing (Riitsalu and Murakas, 2019). Apart from financial behavior, studies have also established a positive relationship of financial knowledge with financial decision-making and financial well-being (Dewi et al, 2020). Therefore, this paper focuses on studying financial knowledge in depth.

Financial knowledge also can be further bifurcated into two components, namely, objective financial knowledge and subjective financial knowledge. They can be understood in the following terms (Dewi et al, 2020). Subjective financial knowledge pertains to individuals' self-perceptions regarding their financial understanding and how they would evaluate their own level of financial knowledge. On the other hand, objective financial knowledge refers to the factual information stored in memory. It is evaluated by assessing individuals' comprehension of diverse elements within financial markets and products, including numeracy, assets, debts, savings and investments, the value of money, inflation, compounding interest, and risk diversification (Dewi et al, 2020).

Notably, subjective financial knowledge has a greater impact on financial behaviors and well-being than objective financial knowledge (Robb and Woodyard, 2011; Riitsalu and Murakas 2021; Lind et al, 2021). Further, it is also shown that objective and subjective financial knowledge have a low correlation between them (Robb and Woodyard, 2011).

However in a country like India where financial literacy levels are low (Klapper and Lusardi, 2020), the focus of studies naturally tends to be on the objective parts of financial literacy, which is also the key focus of government institutions. Moreover, in the global context too, subjective financial knowledge remains as an area which can be explored in greater depths. This lacuna is highlighted in the literature review on financial literacy by Zaimovic et al (2023), which identifies a research gap in the relationship

between financial self-efficacy (subjective financial knowledge) and gender differences in financial literacy. Thus, this paper adds to the existing body of literature by studying objective and subjective financial knowledge in terms of their relationship to each other and the relationship between subjective financial knowledge and gender. Further, this paper sets itself apart from other studies by surveying an educated sample of population with most participants at least having or pursuing an undergraduate degree.

The literature review also shows uniformity in the methodology of studying financial literacy, for which the survey method is the popular choice (Goyal and Kumar, 2021). This paper follows the trend and chooses the survey method. The details of which are elaborated in the following section.

3. Data and Methodology

The paper uses data collected through a primary survey using a questionnaire. The survey[2] was conducted on 104 participants who were selected through the convenience sampling method. The convenience sampling method imposes the limitation of lack of generalizability of the study to the entire population. Thus the paper does not aim to make generalized statements on the financial knowledge levels of the country or any specific region. All of the respondents resided in Delhi NCR. Out of which 57.7% were female and 42.3% were male. Most of the respondents (51%) were from the age group 18-24 years, followed by 35-44 years (16.3%), 45-54 years (14.4%), 25-34 years (9.6%), 55-64 years (4.8%) and under 18 years (3.8%). The current or pursuing education level for 52.9% of respondents was an undergraduate degree, 36.5% for a master's degree, 5.8% for high school and 4.8% for a PhD or any educational level higher than a master's degree. Through the questionnaire, objective and subjective scores of financial knowledge were obtained. The first eleven questions of the survey measured objective financial knowledge. The questions were developed on the basis of the questionnaires used by researchers in past studies (Robb and Woodyard, 2011; Lind et al, 2020). The first two questions required basic mathematical abilities, while the rest only tested conceptual

[2] Questionnaire can be accessed through: https://docs.google.com/document/d/1pPM775hRGE9SYUJWGOrH1kfK81xc4tZ24vii9wA5IPU/edit?usp=sharing

understanding of key concepts like inflation, credit, types of investments, etc. They were multiple-choice questions and had only one correct answer. To calculate the objective score, one point was given for each right answer and no points were given for a wrong answer. There was no negative marking for wrong answers and all questions were compulsory. Thus, each participant could obtain a score ranging from 0 to 11 for objective financial knowledge. The last question of the survey asked the respondent to rate their own financial knowledge on a scale of 1-7. There was no right answer for the last question and the respondent's answer was directly taken to be their subjective score. Then the variances in the samples of the two groups, for both objective and subjective scores respectively, were tested using Levene's test for equality of variances from which equal variance is assumed. The relationship between the subjective and objective scores is tested through correlation analysis. The means of each score were then compared on the basis of gender using a two-tailed t-test with the assumption of equal variance.

4. Results and Analysis

Table 1 and 2 give the summary statistics of objective and subjective scores respectively. The correlation of these scores is given in Table 3 and is explained in the following sub-section.

4.1. Analysis of Correlation between Objective and Subjective Scores

For the first part of the analysis the relationship between the objective and subjective scores of the participants is tested. The results are shown in Table 3. Given the p-value is less than 0.01; we can conclude that the observed correlation is statistically significant. The correlation coefficient is 0.36. It shows a positive relationship between the two variables. However, the coefficient's numerical value suggests that the strength of the relationship between the objective and subjective scores of the participants is weak. Thus, the linear relationship between the subjective and objective scores of participants is statistically significant but not practically important.

Table 1: Descriptive statistics of objective scores

	Gender	Number of observations	Mean	Mode	Median	Standard Deviation	Standard Error Mean
Objective Scores	Female	60	8.05	9	9	2.20496	0.28466
	Male	44	8.8636	10	10	2.30864	0.34804

Source: Authors' calculations based on survey data.

Table 2: Descriptive statistics of subjective scores

	Gender	No. of observations	Mean	Median	Mode	Standard Deviation	Standard Error Mean
Subjective score	Female	60	4.3	4.5	5	1.54371	0.19929
	Male	44	5.1136	5	4	1.54342	0.23268

Source: Authors' calculations based on survey data.

Table 3: Correlation between subjective and objective scores

Variables	Pearson Correlation	Sig. (2 tailed)	N
Objective Scores			
Subjective scores	.364**	<.001	104
Correlation is significant at the 0.01 level (2-tailed).			

Source: Authors' calculations based on survey data.

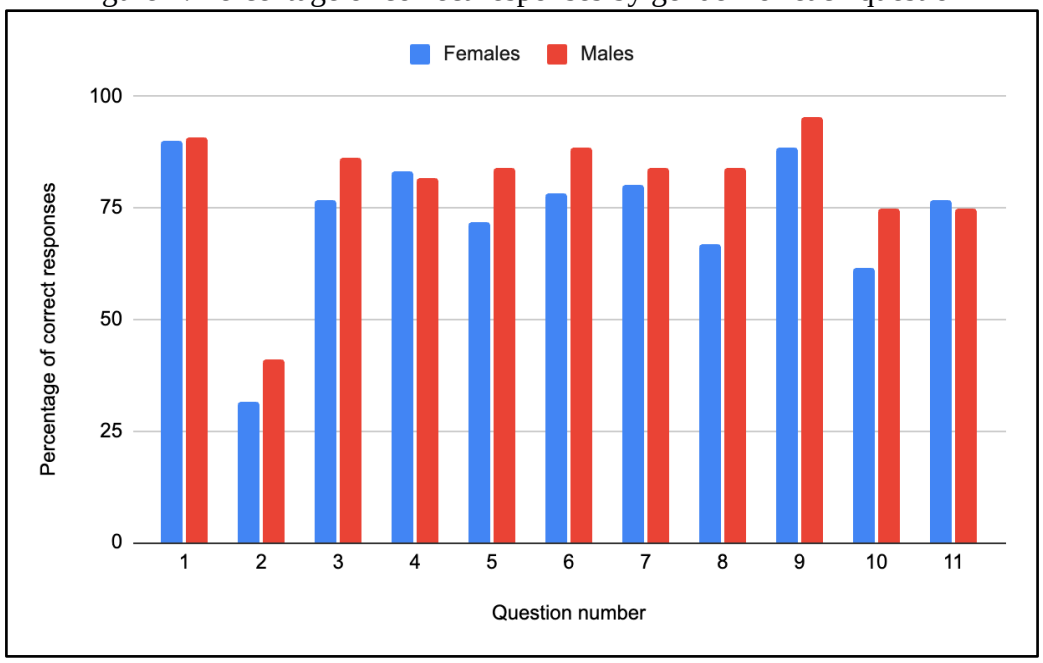
4.2. Analysis of Objective Test Results by Gender

For the next part of the analysis, the differences in the mean objective scores based on gender are considered. There is a slight difference in the means of the objective scores of females and men respectively as can be observed in Table 1. The mean, median and mode score is higher for males. However it is to be noted that the number of observations is unequal for the two groups.

All the aforementioned scores are out of 11, which is the highest possible score. The range of score for females is 1 to 11, whereas for males it is 3 to 11. Figure 1 shows the percentage of females who answered each question correctly with respect to the total number of female respondents, in comparison with the percentage of males which answered each question correctly with respect to the total number of male respondents.

To ascertain whether the observed difference in means of the objective scores of females and males is statistically significant a two-tailed t-test with equal variance is conducted. The null hypothesis being that there is no difference between the objective scores of females and males. The alternative hypothesis asserts that a significant difference exists in the scores of females and males. Table 4 shows the result of the t-test.

Figure 1: Percentage of correct responses by gender for each question



Source: Authors' calculations based on survey data.

Levene's Test for equality of variances was conducted to assess the equality of variances between the two groups. The results showed an F value of 0.001 and a significance value (p-value) of 0.979. This indicates that there is no significant difference in the variances of the two groups. Thus, the assumption of equal variances is met for the subsequent t-test analysis.

The results of the independent samples t-test conducted on males and females indicate that there is no statistically significant difference in objective scores between the two groups, as evidenced by, $p > 0.05$. This suggests that there is not a meaningful distinction between the groups in terms of objective financial knowledge.

Table 4: Result of t-test on objective scores of males and females

Levene's Test for equality of variances	F		0.001
	Sig.		0.979
t-test for equality of means	t		-1.823
	df		102
	significance (two sided p)		0.071
	Mean difference		-0.81364
	Std. Error difference		0.44643
	95% Confidence Interval of the difference	Lower	-1.69913
		Upper	0.07185

Source: Authors' calculations based on survey data.

4.3. Analysis of Subjective Score Results by Gender

The subjective scores of the respondents lie between 1 to 7; with 7 representing the highest degree of confidence one has on his/her own financial knowledge. The rating which a respondent gives to himself/herself is directly taken as their subjective score.

The mean subjective score of females was 4.3 and that of males was 5.1 (refer to Table 2). To ascertain whether this difference in means of females and males is statistically significant, a two-tailed t-test is conducted. For the purpose of the t-test, the null hypothesis is that there is no difference between the subjective scores of females and males. The alternative hypothesis is that there is a significant difference between the subjective scores of females and males. Table 5 shows the result of the t-test.

Table 5: Result of t-test on subjective scores

Levene's Test for equality of variances	F		0.278
	Sig.		0.599
t-test for equality of means	t		-2.656
	df		102
	significance (two sided p)		0.009
	Mean difference		-0.81364
	Std. Error difference		0.30637
	95% Confidence Interval of the Difference	Lower	-1.42132
		Upper	-0.20595

Source: Authors' calculations based on survey data.

Levene's test for equality of variances shows F value of 0.278 and a significance or p-value of 0.599. This proves that there is no significant variance in the two groups and assumption of equal variances holds.

The results of the independent samples t-test conducted on subjective scores of males and females indicate a statistically significant difference in subjective financial knowledge between the two groups, as $p < 0.05$. This suggests that there is a meaningful distinction in subjective scores between the groups. Thus we can conclude that on average, females had a lower subjective score than males.

5. Conclusion

The analysis shows that a linear and positive correlation exists between the objective and subjective scores of financial knowledge of the participants. However the strength of the correlation is weak and thus not practically important. The average objective financial knowledge scores of males and females who participated in the study showed no significant difference. Yet there is a significant difference in their subjective scores. The subjective scores indicate the subjective financial knowledge of a person which reflects the level of confidence they have in their own knowledge. This shows that even in an educated sample of the population with no prominent gender gap in objective knowledge on the topic of financial knowledge, there exists a gender gap in subjective perception of one's own knowledge. It has been shown that females on average, exhibit a lower confidence level or they rate their own financial knowledge lower than males. This implies that a person's actual level of financial knowledge and his or her confidence in the same are not strongly related. Thus, to achieve financial well-being in a gender-inclusive manner, the policies and educational programmes may need to do more than just increase the objective financial knowledge of women.

This conclusion falls in line with the previous studies which suggest females show a lower confidence level and lower capacity for risk. Hence studies have also noted behavioral differences like women being more open to taking financial advice than men. However, a gender gap in objective financial knowledge has been well documented across countries including both developing and developed economies (Hasler and

Lusardi, 2017), which has not been seen in this study. This may be due to the fact that almost all the participants were pursuing or had completed an undergraduate degree at the minimum.

An important implication of the findings of this paper is that the subjective financial knowledge of women needs to be given attention. Increasing an individual's subjective knowledge is way more complicated than addressing the objective part. The paper also shows that working on increasing females' objective knowledge may not be a sufficient method for increasing their financial inclusion. There is a need to enhance subjective financial knowledge of women which is an important aspect in achieving financial well-being. Hence, the paper suggests further research to narrow down the reasons behind the lower subjective knowledge of women and the ways to improve the same.

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   iii. **Book**: Smith, T.M., & Smith, R.L. (2015). *Elements of Ecology*. Virginia: Pearson Press.

   iv. **Book chapter**: Grainger, J., & Konkel, J. (2018). Flow Cytometry. In A. Hoffman and S. Clokie (Ed.), *Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology* (pp. 287-312). Cambridge: Cambridge University Press.

   v. **Online document**: Utkina, I. (2020). Traditional bamboo cultivation system in the Republic of Korea earns place on global agricultural heritage sites list. News. Food and Agriculture Organization of United Nations. http://www.fao.org/news/story/en/item/1295510/icode/ (accessed 26 June 2020).

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