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RESEARCH BULLETIN

CELEBRATING 50TH EDITION RESEARCH BULLETIN

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

Statutory Body under an Act of Parliament

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Vision Statement

The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally.

Mission Statement

The CMA professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting.

Behind Every Successful Business Decision, there is always a *CMA*

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FOREWORD

Over the years, India has showcased a robust and resilient growth story driven by diligence, inventiveness and vision. In the face of unprecedented encounters such as the COVID pandemic and geopolitical conflicts, the Indian economy has demonstrated a noteworthy ability to rebound and transform challenges into opportunities while striving to achieve strong, sustainable, balanced and inclusive growth. It was through the path of 'techno nationalism' that India developed self-reliance through its technologies numerous sectors such as space, defence, nuclear energy, and supercomputers.

The government's economic policy focus was to restore India's growth potential by getting the financial sector back on track, facilitating economic activity by easing conditions for business, and massively augmenting physical and digital infrastructure to enhance India's connectivity and competitiveness of its manufacturing sector. With this vision to guide its policies, the government has undertaken diverse economic reforms to prepare the economy to grow at its potential by improvising ease of business and strengthening the governance systems.

It gives me an immense pleasure to present esteemed Research Bulletin of the Institute, Vol.50, No. I & II, April & July 2024 issue. I hope the articles on Cryptocurrency, CBDC and ESG Principles in India, India's Financial Landscape, Fintech Landscape, Black Money and Laundering, Social Entrepreneurship, etc. provide you valuable insights to enrich your knowledge base.

Hope you all had a joyous and wonderful festive season…. wish all experience cheerfulness, warmth and bliss in the forthcoming days too!!!

CMA Bibhuti Bhusan Nayak
President
The Institute of Cost Accountants of India

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CHAIRMAN'S COMMUNIQUÉ

Technology is emerging as the biggest strategic differentiator shaping the economic prosperity of nations. In this outset, the corporate sector has a responsibility, as much to itself as it is to society, to think harder about ways AI will augment labour rather than displace workers.

For talent to be future-ready, they need to be compliant and open to exploring diverse opportunities and upskilling. As the industry faces talent gaps in niche and specialized technologies, investing time and effort into developing unique skills can make talent more attractive to potential employers.

AI would add value to the human competency. Job losses will be substituted by job displacements that require reskilling. Hence, it is imperative for the employees and job seekers to develop skills such as analytical thinking, innovation, complex problem solving strategies, technology design and programming, resilience and adaptability.

Technology has been optimised in every aspect of life these days. Either to use for automation, surveillance and control or we use it for informed decision making, problem-solving and augmentation.

I sincerely appreciate and thankfully acknowledge the efforts made for timely publication of this volume.

The readers are requested to put the valuable suggestion towards amelioration of Research Bulletin.

CMA Harshad Shamkant Deshpande
Chairman
Journal & Publications Committee
The Institute of Cost Accountants of India

EDITOR'S NOTE

Greetings!!!

The Institute started publication of the 'Research Bulletin' since 1982. It has been included in the International Serial Directories [ISSN 2230 9241]. It includes both theme based and non-theme based articles on the blazing issues. Inputs are mainly received both from academicians and the corporate stalwarts. The objective of this bulletin is to highlight the dynamism in environmental, social, economical and market-related issues so that the researcher can analyze the surroundings, adapt the changes in a better manner and can take decisions strategically. This 50th edition is a testament to the contributors for their valued contributions for about five productive decades.

This Research Bulletin, Vol.50, Nos. I & II issue includes conceptual and empirical articles and new insights on like, Cryptocurrency, CBDC and ESG Principles in India, India's Financial Landscape, Fintech Landscape, Black Money and Laundering, Social Entrepreneurship, etc. would surely improve the knowledge base of readers.

The first article states the 2007–2008 Global Financial Crisis significantly impacted the stability and trust levels of banks. As a result, various policies have been developed based on past experiences to address the aftermath of the crisis. Cryptocurrency emerged as a potential solution to address the lack of trust in financial intermediaries that contributed to the liquidity crisis. The second paper analyzes the role of CBDCs in promoting environmental sustainability, social inclusivity, and good governance, while also examining the operational challenges and implications for India's financial ecosystem. The third research study reviews the transition efforts of some mega CPSUs since they have a very significant role under the short term energy security needs of the nation but seems to be inclined to align with green energy by 2040s.

Next article, El Nino and the Indian Financial Market employs quantitative analysis to examine the performance of the Nifty Index and the USD-INR exchange rate in the Indian financial market over the 27-years period spanning from 1996 to 2022, differentiate between periods characterized by El Nino period and the period other than such phenomena. Global wars and policies of superpowers like the European Union, the United States of America, and China will have a significant impact on India's Financial Landscape. In the article on emerging Global Economic scenario, mentions Indian Economy cannot function in isolation. As a developing nation and the nation which want to become the first largest economy by 2080, has to closely monitor the international developments especially in Europe, China and USA.

The Case Study of Zoho's impact in Tenkasi explores Zoho Corporation's CSR initiatives in Tenkasi, India, using diverse secondary data sources. Through thematic analysis of qualitative data, it evaluates Zoho's impact on the local community, aligning with theoretical frameworks for CSR assessment. The paper on Fintech Landscape highlights the evolution, perspectives and challenges of Fintech, reviews current market trends of Fintech in India and examines its impact on managerial accounting. The article on Identifying significant predictors of policyholder's satisfaction investigates the factors that affect policyholder satisfaction with health insurance claim settlements in Ballari District, Karnataka. The study uses hierarchical regression analysis which deduces that health insurers should prioritize expediting claim procedures and maintaining high medical service standards in order to increase customer satisfaction.

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The study on Policy changes and behaviour of private consumption and private investment in India examines the responsiveness of private consumption and private fixed capital formation for policy change particularly focusing on monetary policy (MP) shocks. The paper on Money Laundering unravels the intricate web of diverse regulatory authorities and government agencies grappling with the complex and issue of black money and the government's efforts to combat money laundering. Black money, the root of money laundering, poses significant challenges. The last article on Structural Economic Reforms and Collective Social Entrepreneurship to Pull the Small Indian Farmers Out of Poverty presents a detailed account of the four-stage reform process along with the relevant changes in Indian agro policy framework and programs of change awareness.

We are extremely happy to convey that our next issue of *Research Bulletin, Vol.50 No. III* would be a non-theme one and the subtopics are - Finance for MSMEs in India: Sources and Challenges, Viksit Bharat@2047, Sustainable and Socially Responsible Business Practices, Innovations in Supply Chain Management, Green Entrepreneurship and Circular Economy, Startups and Sustainable Development Goals (SDGs), Insurtech and Regtech, Blockchain and Decentralized Finance (DeFi), Building Resilient Cooperatives, etc.

In looking back at 50 years of research and insight for academic researchers, practitioners, professionals and other stakeholders, we celebrate the diversity of ideas, constructs, and methodologies that characterize our field. In this very special issue, we invite all to join us in the intellectual celebration.

Moreover, we are immensely indebted to our Editorial Board for scholarly review of the articles. At this juncture, would like to express our heartfelt condolence for one of our reviewers, CMA (Dr.) Sreehari Chava, who left for heavenly abode on 21st September, 2024. He was in the Editorial Board almost for a decade. He was a professional with over five decades of exposure in Financial & Cost Management of medium scale industrial enterprises- spread over Government for 14 years, Public Sector for 2 years and Private Sector for 34 years. The exposure includes telecommunications, engineering, textiles, cable and conductors, paper, transport, steel, education, sugar and power sectors.

We look forward to constructive feedback from our readers on the articles and overall development of the Research Bulletin. Please send your mails at ***research.bulletin@icmai.in*.**

We express our sincere gratitude to all the contributors and reviewers of this important issue and wish our readers get requisite insight from the articles.

CMA (Dr.) Debaprosanna Nandy
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Editorial Board

In the Memory of

The Institute and its Members deeply mourn the demise of CMA (Dr.) Sreehari Chava, Member of the Institute, who left for heavenly abode on 21st September, 2024.

He was one of the rare CMAs holding Ph.d for his thesis on "Analysis of Cost Behaviour of Indian Industry" & D.Litt.in management for the treatise "Financial Performance index". He was in the Editorial Board of Research Bulletin since 2011. He was also a member of Agriculture Cost Management Board of the Institute and a prime mover of the DACM Course with IGNOU. He was a professional with over five decades of exposure in Financial & Cost Management of medium scale industrial enterprises- spread over Government for 14 years, Public Sector for 2 years and Private Sector for 34 years. The exposure includes telecommunications, engineering, textiles, cable and conductors, paper, transport, steel, education, sugar and power sectors.

We are highly indebted for his scholarly review of few articles concerning 50th volume of Research Bulletin.

Our heartfelt condolences & respected homage to the departed soul. This is a great loss to the Profession and CMA fraternity at Large. May his family have the courage and strength to overcome the loss.

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Contents

ANALYSIS OF SHOCK TRANSMISSION AND VOLATILITY SPILLOVER: AN EMPIRICAL STUDY BETWEEN CRYPTOCURRENCY AND BANK NIFTY DURING AND POST COVID-19 PERIOD *1*

Dipanwita Majumder, Sonali Sardar, Rajashik Sen

CBDC AND ESG PRINCIPLES IN INDIA - A SYNERGETIC FRAMEWORK FOR SUSTAINABLE FINANCE *24*

Jyothi G.H.

CRITICAL REVIEW OF SELECT ENERGY CPSUs UNDER INDIA'S ENERGY TRANSITION *36*
Padmanabhan Satyes Kumar

EL NINO AND THE INDIAN FINANCIAL MARKET - AN ANALYSIS OF NIFTY AND USD-INR *49*

Gangadhara B, Bheemanagouda

EMERGING GLOBAL ECONOMIC SCENARIO: IMPACT ON INDIA'S FINANCIAL LANDSCAPE *63*

Sivakumar.A, Haritha Ravi

EMPOWERING APPROACH TO SOCIO-ECONOMIC TRANSFORMATION: A CASE STUDY OF ZOHO'S IMPACT IN TENKASI *83*

Sunil Shivaji Khandbahale, Sachin Raghunath Pachorkar

FINTECH LANDSCAPE: INCLUSIVITY, INNOVATIONS AND IMPACT ON MANAGERIAL ACCOUNTING *92*

Talsaniya Gauravkumar Kanaiyalal, Kunal Sinha

IDENTIFYING SIGNIFICANT PREDICTORS OF POLICYHOLDER'S SATISFACTION: A HIERARCHICAL REGRESSION MODEL *101*

Jyothilinga V Gautam B M

POLICY CHANGES AND BEHAVIOR OF PRIVATE CONSUMPTION AND PRIVATE INVESTMENT IN INDIA *116*

Niranjan R

REGULATORY AUTHORITIES OR AGENCIES TO PREVENT BLACK MONEY AND LAUNDERING *126*

Pramod Kumar Narula, Kuldeep Kumar

STRUCTURAL ECONOMIC REFORMS AND COLLECTIVE SOCIAL ENTREPRENEURSHIP TO PULL THE SMALL INDIAN FARMERS OUT OF POVERTY - POLICIES, PROCESSES AND PROGRAMS *134*

Girish Jakhotiya

ANALYSIS OF SHOCK TRANSMISSION AND VOLATILITY SPILLOVER: AN EMPIRICAL STUDY BETWEEN CRYPTOCURRENCY AND BANK NIFTY DURING AND POST COVID-19 PERIOD

Dipanwita Majumder
Sonali Sardar
Rajashik Sen

Abstract

The increase in the trend of investment in Cryptocurrency has made us study its basics and growth. We have tried to capture its behaviour during COVID-19(14.01.2020) and then till recent times (13.05.2024). We have compared it with the Bank Nifty Index of India. For our study, we have taken Bitcoin and Ripple as representatives of the cryptocurrency market. In our study, we have applied the ARMA model, ARCH and GARCH (1,1) to all the univariate time series data to forecast the returns from them.

We also studied the spillover effect between the two markets in the short run through Granger Causality and found the existence of the same in the case of both markets.

Lastly, we have seen through the Impulse Response Function how one market reacts in response to the negative shock in another market.

Keywords:

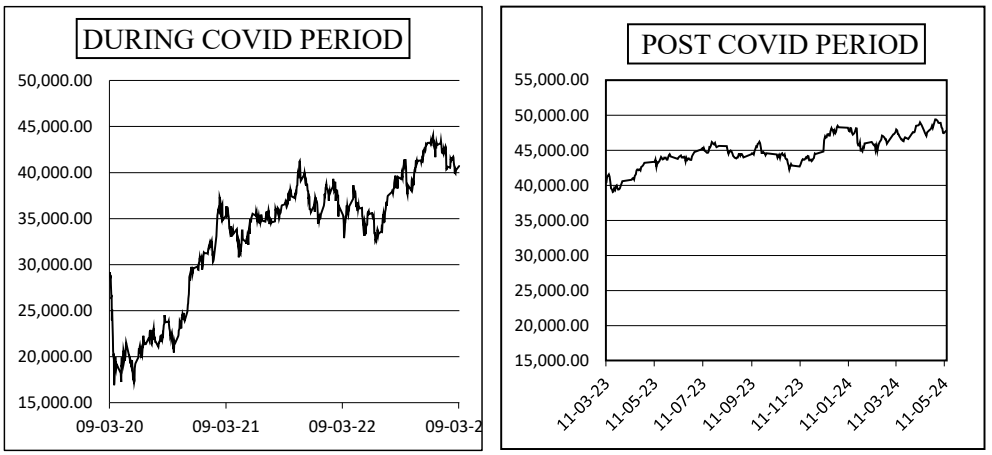
Bank Nifty, Cryptocurrency, ARMA Model, GACH (1,1), Granger Causality, Shock Transmission, Forecasting

1. Introduction

The 2007–2008 Global Financial Crisis significantly impacted the stability and trust levels of banks. As a result, various policies have been developed based on past experiences to address the aftermath of the crisis. Cryptocurrency emerged as a potential solution to address the lack of trust in financial intermediaries that contributed to the liquidity crisis.

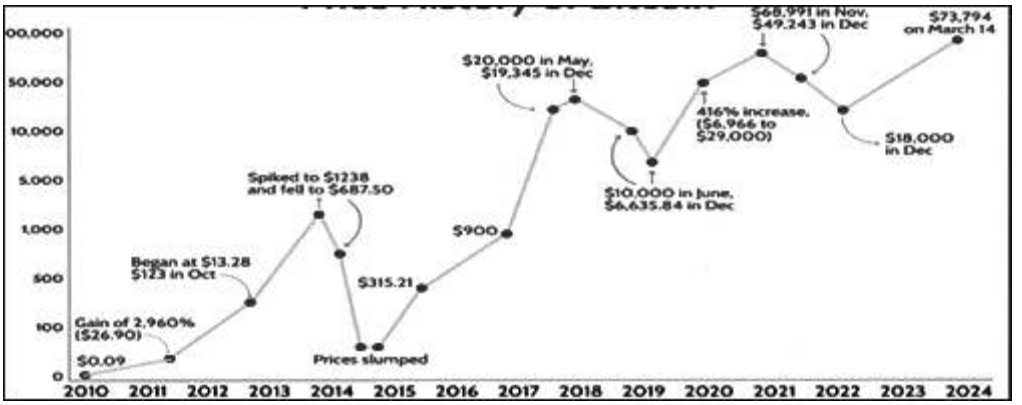
Again, on January 30, 2020, the World Health Organization declared COVID-19 as a public health emergency of international concern. By March 11, 2020, it was classified as a pandemic. The PHEIC designation remained in effect until May 5, 2023(Wikipedia). This swift global spread led to lockdowns and travel restrictions. This unprecedented situation posed significant challenges for investors and policymakers alike. Governments worldwide responded by introducing diverse economic stimulus packages to avert the transformation of the health crisis into an economic one. In India, the first COVID-19 cases emerged in March 2020, leading the government to impose one of the most stringent lockdowns on March 23, 2020. During the same period, Bank Nifty also underperformed heavily. Figure 1.1 shows a comparative analysis of the price fluctuation of Bank Nifty during the COVID-19 pandemic period from March 2020 to April 2023 and the post-COVID-19 pandemic until the end of our study period, March 13, 2024.

Figure 1.1: PRICE MOVEMENT OF BANK-NIFTY



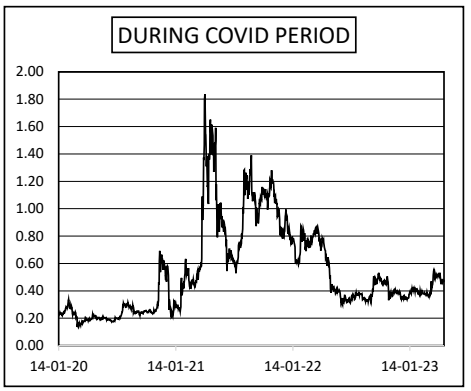
This supports studies that show that major events can influence asset risks and returns (He et al., 2020; Chowdhury et al.,2022). As studied, the unparalleled crisis had far-reaching economic ramifications across all sectors, compelling investors and portfolio managers to reevaluate their strategies and modify their asset allocations. Investors attempted to diversify their investment into new emerging assets like Cryptocurrency.

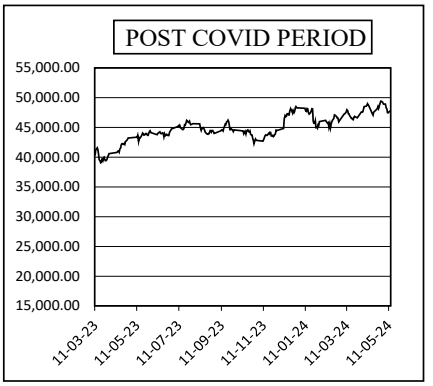
Figure 1.2: PRICE MOVEMENT OF BITCOIN



(Source: Investopedia)

Figure 1.3 PRICE MOVEMENT OF RIPPLE





Based on Figures 1.2 and 1.3, we can infer that following the WHO's declaration of COVID-19 as a pandemic, there was an observable surge in the values of Bitcoin (BTC) and Ripple (XRP), suggesting an increased reliance on digital assets during the same period.

1.1 Regulatory Framework on Cryptocurrency in India

In India, the Central Bank (RBI) put a ban on cryptocurrency in the year 2018. Later, the Supreme Court of India lifted that ban in 2020. Since then, although cryptocurrency is not regulated as a legal tender in India, trading and investing in the cryptocurrency market are legal. According to cryptocurrency data, India is home to the largest number of cryptocurrency traders globally, with an estimated 100 million traders (Moni et al., 2022). The Indian government, in the year 2022, has added a new 115BBH section to the Income Tax Act 1961 to implement a flat 30% tax and 1% TDS on income generated from the cryptocurrency market (Singh,2024). Furthermore, the government launched its own Central Bank Digital Currency (e-rupee) in 2023 along with RBI.

1.2 Research Gap

The increasing adoptions of cryptocurrency as a significant asset highlight the necessity for thoroughly examining its implications. While previous research has established a correlation between cryptocurrency and banking volatility on a global scale (Corbet et al., 2014) and the National Stock Market (NSE) (Seth et al., 2022; Jana & Sahu, 2023) and the Bombay Stock Exchange (BSE) (Jeribi et al., 2021), there remains a gap in understanding its impact on the Indian Bank Nifty. Our study aims to address this research gap by investigating potential spillover effects between cryptocurrency and Bank Nifty. Further, we have observed how one market reacts to shock on the other market and tried to predict the forecasted return of the assets till 31st December 2024.

1.3 Description of Blockchain and Cryptocurrency

When implementing a software system, its architecture is the key. There are two primary approaches of it, centralised and distributed. Centralised systems have components linked to a central element, while distributed systems have interconnected components without a central coordinating element. This can be visually observed in Figures 1.4 and 1.5, which illustrate the centralised and distributed system architectures.

Figure 1.4: Centralized system architecture

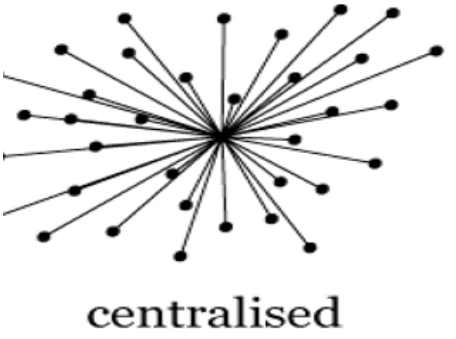
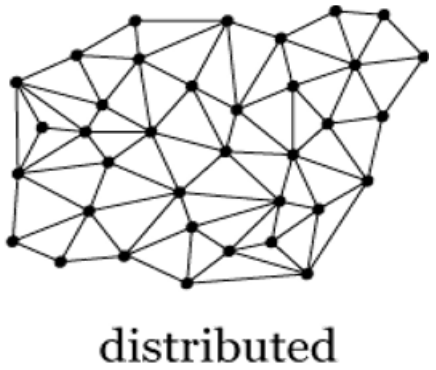


Figure 1.5 Distributed system architecture



One defining feature of distributed system architecture is the Peer-to-Peer system. In this context, a peer-to-peer system is a distributed software system comprising individual nodes (computers) that directly share their computational resources with others.

Another crucial technology to consider is Blockchain. This can be described as a tool for establishing and preserving integrity within distributed systems. It operates as a decentralised, distributed ledger that records the chain of ownership of virtual currency. From a technical standpoint, blockchain encompasses three key components: blocks, nodes, and miners. A block is a collective term for Data, Nonce, and Hash, and miners are individuals responsible for mining and adding new blocks to an existing chain. What makes blockchain important is its decentralised nature, which allows for peer-to-peer systems to achieve and maintain system integrity.

1.4 Introduction of Bitcoin and Ripple

Bitcoin (BTC)

Bitcoin, also known as BTC, is a revolutionary decentralised digital currency that operates on a peer-to-peer network, eliminating the need for a central bank. This means that transactions are verified and confirmed by the entire network, making it extremely difficult to disrupt, manipulate, or control due to the absence of a single point of failure. The origins of Bitcoin are surrounded by mystery and conspiracy theories, but the widely accepted belief is that it was created by an anonymous individual or group known as Satoshi Nakamoto. In 2009, Nakamoto introduced Bitcoin to the world through a paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System," published on October 31, 2008. The smallest unit of Bitcoin is known as 1 Satoshi, which is equivalent to 0.00000001 BTC.

Recently, according to the well-respected source CoinGecko, Bitcoin's market capitalisation is an impressive $1.3 trillion, reflecting a remarkable 146.1% increase from the previous year. This market cap represents 51.79% of the global cryptocurrency market, which currently stands at $2.51 trillion, highlighting Bitcoin's substantial influence on the entire cryptocurrency market.

Ripple (XRP)

In 2004, the concept of Ripple was born when Ryan Fugger introduced RipplePay. In 2012, Ripple Labs took over the project and introduced XRP, a cryptocurrency used for payment transfers. XRP enables almost instantaneous settlement of assets,

making transactions more cost-effective, transparent, and secure compared to traditional banking systems like SWIFT. It is particularly advantageous for cross-border remittances. XRP currently ranks as the seventh-largest cryptocurrency by market capitalization.

2. Literature Review

Baele (2007) examines if diversified banks gain a competitive advantage in long-run activities and risk assessment compared to specialized competitors. The study also looks at how diversification affects systematic and idiosyncratic risk in bank stock returns. It concludes that diversifying revenue increases systematic risk but decreases idiosyncratic risk.

Saxena's (2008) determines the effect of crises on output growth, considering globalization and the contagion effect. The study finds out that the banking industry and stock market crises may be higher due to the reduction in output growth rates of currency. Globalization can stimulate a country's economic growth in the long run.

Othman (2019) found that increasing cryptocurrency market capitalization has a negative impact on banks' deposit variability, while decreases have a positive effect in the long term.

Gupta et al. (2022) have examined how several assets, including gold, currency, debt, money market, and cryptocurrency, have performed in the forms of volatility and return during the COVID-19 pandemic in India. According to them, in the first wave of COVID-19, most currencies, except currency and gold, experienced negative returns and showed significant volatility. There was significantly high volatility across various assets.

Nabilou (2022) has investigated the relationship between central banks and cryptocurrencies in their study. The study concluded that cryptocurrency can directly affect central banks' activities regarding price stability, monetary policy, and their monopoly on money issuing. It also has an indirect impact on central bank activities through the system of bank supervision.

Mitawa (2022) has suggested that without bank involvement, cryptocurrency is a digital currency that can be used to supplement other currencies. The application of cryptocurrencies and blockchain is still in the inaugural phases in the financial market, although Bitcoin has emerged for almost ten years. Since Bitcoin is extensively well-accepted and mostly unregulated by the regulatory authority, India has not enforced any restrictions on its usage.

Nikhil et al. (2023) have discussed the volatility modelling of the Indian bank Nifty return using the GARCH methodology. The study found that the volatility of the Bank Nifty returns tends to rise in response to positive shocks relative to adverse shocks of equal magnitude in India.

3. Methodology

3.1 Data and Study Period

The closing values of the Nifty Bank Index were collected from the National Stock Exchange between January 14, 2020, and May 13, 2024. These values were then used to study and predict the volatility using a total of 1078 data points. The Bank Nifty

index comprises 12 highly liquid stocks with significant market capitalisations from the banking sector, all of which are traded on the NSE. It serves as an important benchmark, offering market intermediaries and investors a quick overview of the overall market performance of the banking sector in India. In order to comprehend the cryptocurrency market, we gathered data on Bitcoin and Ripple. These two cryptocurrencies are particularly significant: Bitcoin boasts the highest cryptocurrency market capitalisation. Ripple ranks among the top ten cryptocurrencies in market capitalisation and is also developed to support the banking system and provide an alternative to SWIFT transactions. The Bitcoin and Ripple data were sourced from Crypto Compare for equivalent periods, excluding weekend data, which had minimal impact on the analysis results.

3.2 Methodology

Initially, the returns data (R_t) are accrued as compounded returns:

$$R_t = ln\left(\frac{Pt}{Pt-1}\right), \quad (1)$$

Where ln represents the log-normal, P_t is the present day's stock price, and P_{t-1} is the previous day's stock price.

Financial time series frequently display heightened volatility when faced with negative market shocks, a phenomenon that is commonly referred to as market asymmetry or the Leverage effect (Black & Cox, 1976). Before data processing, we carefully examined the descriptive statistics for each asset. After that, we analysed the descriptive statistics again after making the data stationary and compared the two sets. Next, we utilized the Augmented Dickey-Fuller (ADF) test to identify any presence of Unit Root. We then inspected the Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) to determine the specific lags. In general, PACF indicates autoregression (AR), suggesting that the current data's value relies on its past values, while ACF indicates a moving average (MA), signifying that today's value is influenced by both its past values and past errors. Upon determining the lags for both variables, we proceeded to evaluate multiple Autoregressive Moving Average Model (ARMA) models to choose the most appropriate prediction model. The ARMA model combines AR and MA components, indicating that the value is influenced not only by its own past behaviour as inputs for the model while capturing market participant effects, such as momentum and mean reversion in stock trading, but it also characterises "shock" information to a series, such as a surprise earnings announcement or unexpected event.

ARMA process with order of r and m is as:

$$Y_t = \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \ldots + \alpha_r Y_{t-r} + u_t + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \ldots + \beta_m u_{t-m} \quad (2)$$

The variable Y has characteristics of both AR and MA in the above formula.

3.2.1 ARCH and GARCH

The assessment of conditional heteroscedasticity is crucial for understanding the volatility present in a dataset's returns. We began by visually examining the data over time to identify any patterns of volatility clustering. Following this, we conducted tests using the Autoregressive Conditional

Heteroscedasticity (ARCH) model to forecast stock returns data. Building on this, in accordance with Bollerslev's recommendation in 1986, we employed the Generalized ARCH (GARCH) model, a well-regarded approach that uses past squared observations and variances to model the variance at a specific point in time. We selected the GARCH (1,1) model due to its heavy-tailed nature, as highlighted by Posedol (2005). Generally, GARCH models with heavy tails are effective for managing risk as they can account for volatility clustering and the presence of fat tails. The

$$\sigma_t^2=\omega+\alpha_1\varepsilon_{t-1}^2+\beta_1\sigma_{t-1}^2. \quad (3)$$

The above formula represents the idea that the current conditional variance (σ_t^2) depends on a constant term (ω), the lagged squared error term $(\alpha\cdot\varepsilon_{t-1}^2)$, and the lagged conditional variance $(\beta_1\sigma_{t-1}^2)$. Subsequently, we visualized the results to obtain the predicted returns. All analyses were performed using Gretl software. Additionally, we attempted to forecast returns up to December 31, 2024, using Excel.

The last phase of our study is focused on measuring the potential spill-over effects independently between Bank Nifty, BTC, and XRP. To do so, we conducted a VAR lag selection test to determine the optimal lag between Bank Nifty and BTC and, subsequently, between Bank Nifty and XRP. Using this information, we then performed Vector Autoregression to assess the presence of any Granger causality. In the context of this study, Granger causality refers to the predictive relationship between variables, where past values of one variable (X) are useful for predicting another variable (Y). This analysis allows for the identification of unidirectional causality from X to Y, from Y to X, bi-directional causality, or no causality. This test is particularly useful for exploring causal relationships among time series data but is limited to drawing conclusions based on observational data without the ability to conduct experiments over the observed phenomena. Lastly, we examined how each variable responds to negative shocks in the other variable.

4. Analysis and Findings

The comparative descriptive statistics of Bank Nifty, XRP and BTC are in Tables 4.1,4.2 and 4.3 as follows:

Table 4.1: Comparative Descriptive Statistics of Bank Nifty

Bank Nifty	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Ex. Kurtosis
price	36274	36846.	49424.	16918.	7971.0	-0.61005	-0.42592
d_l_price	0.00036798	0.00090464	0.099951	-0.18313	0.016978	-1.4551	17.459

The d_l_price statistical analysis indicates that the data is stationary. Before achieving stationarity, the mean was 36274, while the standard deviation was significantly higher at 7971.0. A lower mean suggests higher volatility in the data. Even after making

the data stationary, the mean and standard deviation decreased to 0.00036798 and 0.016978, respectively, but volatility remains present in the data. The negative skewness coefficient (-0.61005) suggests that Bank Nifty is negatively skewed. Moreover, after achieving stationarity, the negativity in the skewness increased to (-1.4551). Prior to achieving stationarity, the kurtosis was negative but close to zero (-0.42592), indicating a normal distribution. However, after achieving stationarity, a positive kurtosis indicates the presence of a fat tail in the distribution.

Table 4.2: Comparative Descriptive Statistics of Ripple

Ripple	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Ex. Kurtosis
price	0.54232	0.49615	1.8363	0.13600	0.28846	-0.61005	1.7305
d_l_price	0.00048410	0.00083403	0.54812	-0.54101	0.056991	-1.4551	20.763

In the case of XRP, before achieving stationarity, the mean was 0.54232, while the standard deviation was at a low of 0.28846. A higher mean suggests a comparatively lower presence of volatility in the data for the taken time period. However, after making the data stationary, the mean and standard deviation decreased to 0.00048410 and 0.056991respectively, but volatility gets higher in the data. The positive skewness coefficient (1.2532) suggests that Ripple is positively skewed. However, after achieving stationarity, the positivity of the skewness moved more to normality at (0.44195). The kurtosis before stationarity indicates a departure from the normal distribution which gets to leptokurtic after stationarity of the data.

Table 4.3: Comparative Descriptive Statistics of Bitcoin

Bitcoin	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Ex. Kurtosis
price	31444	29178	73066	4826.	16665	0.41306	-0.71434
d_l_price	0.0012423	0.00064515	0.17742	-0.49728	0.035720	-1.7439	25.922

Lastly for BTC, before achieving stationarity, the mean was as high as 31444, while the standard deviation was at a low of 16665. A higher mean suggests a comparatively lower presence of volatility in the data. However, after making the data stationary, the mean and standard deviation decreased to 0.0012423 and 0.035720, respectively, but volatility got higher in the data. Similar to Ripple, the positive skewness coefficient (0.41306) suggests that BTC is positively skewed. However, unlike the previous case, after achieving stationarity, the data became negatively skewed. The kurtosis before stationarity indicates that the distribution tail is lighter than the normal distribution but it gets to leptokurtic after stationarity of the data.

Figures 4.1,4.2 and 4.3 show both the non-stationary and stationarity of data for the Bitcoin, Bank Nifty index and XRP, respectively.

Figure 4.1: The trend (Closing Price) and the data Bitcoin after stationarity during the sample period

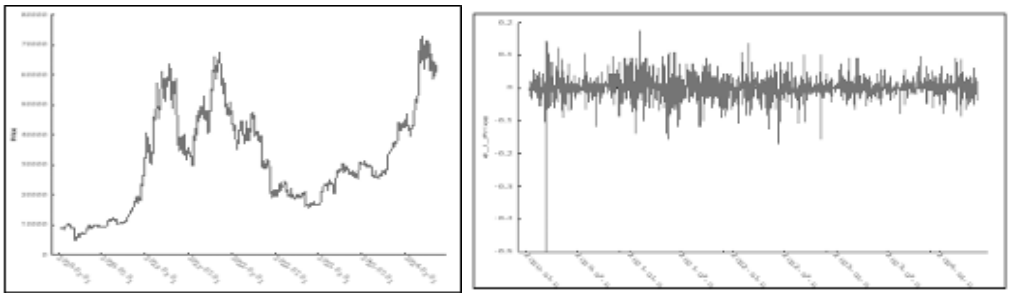


Figure 4.2: The trend (Closing Price) and the Bank Nifty index data after stationarity during the sample period

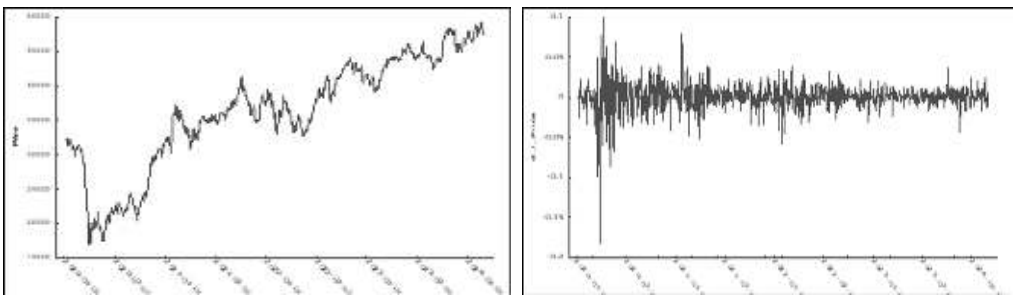
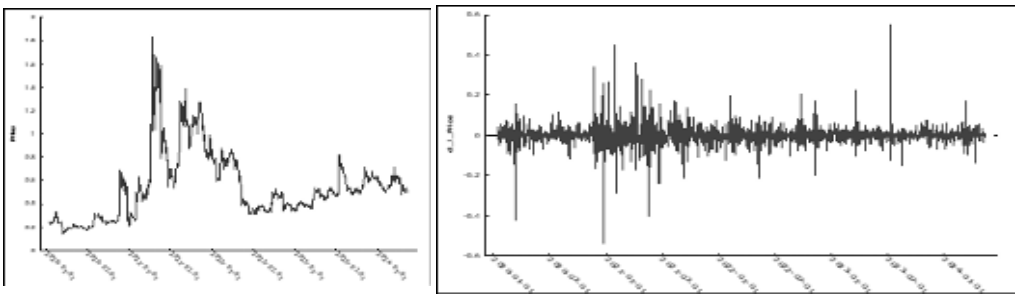


Figure 4.3: The trend (Closing Price) and the Ripple data after stationarity during the sample period



4.1 Empirical Results

Table 4.4 displays the results of the unit root test using the Augmented Dickey-Fuller test with a constant, as well as with a trend and constant, for the three assets.

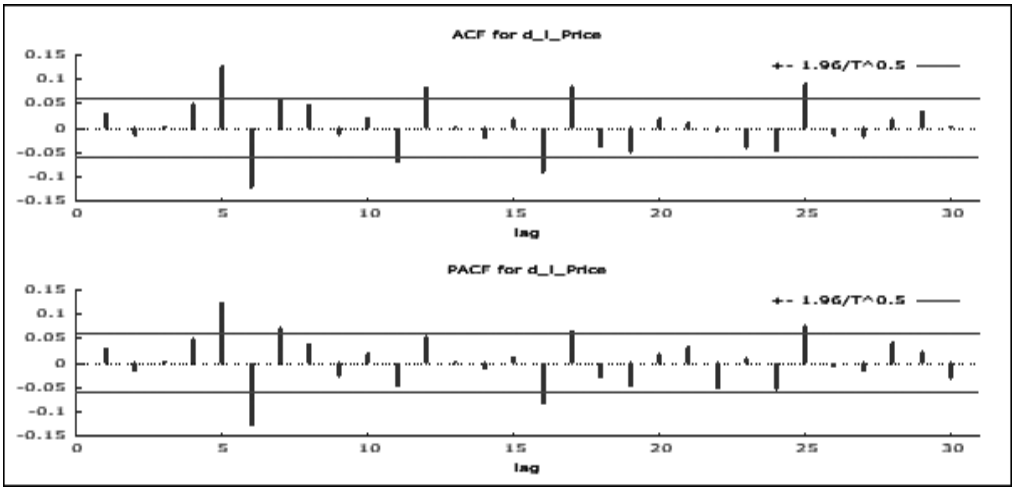
Table 4.4: ADF test for Unit Root

NAMES	test with constant	with constant and trend
BANK NIFTY	1.799e-11	9.734e-11
BTC	1.684e-44	1.107e-61
XRP	1.238e-13	1.311e-139

The p-value is less than 0.05 in all the scenarios, which means that we reject the null hypothesis and conclude that the data is stationary. The next step is the correlogram test to decide the appropriate lag for the three assets.

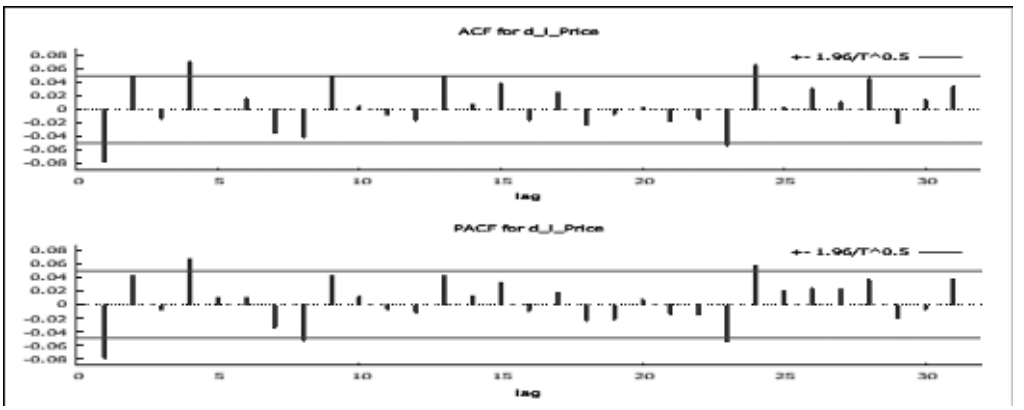
The correlogram of the three assets is shown in Figures 4.4,4.5 and 4.6.

Figure 4.4: Correlogram of Bank Nifty



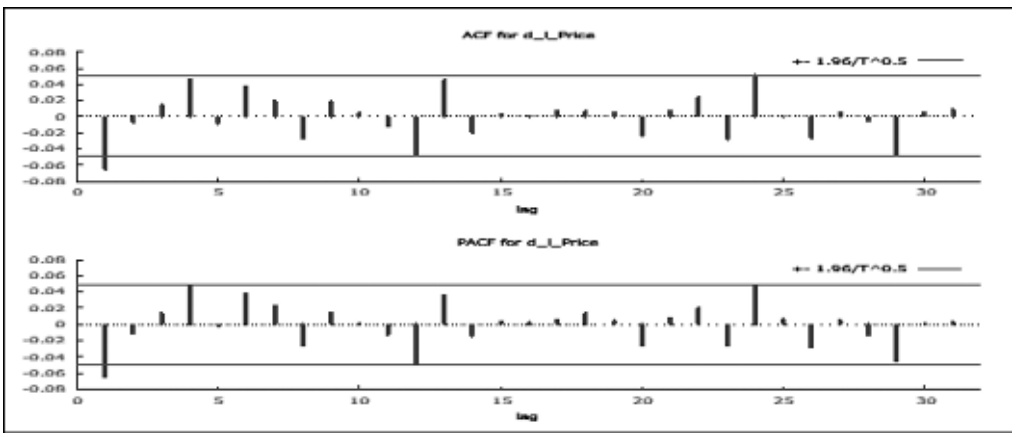
From the figure, it can be clearly stated that the lags for the bank nifty index for the sample period are 5 and 6.

Figure 4.5: Correlogram of BTC



In the case of Bitcoin, the lags are 1 and 4. Similarly, for Ripple, the lag is only 1, as shown in Figure 4.6.

Figure 4.6: Correlogram of XRP



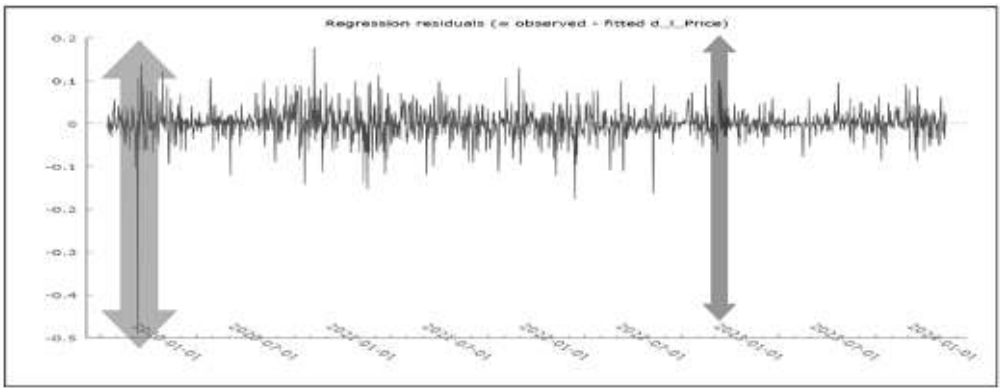
The subsequent stage involves identifying the most suitable ARMA model for all the assets. Following the evaluation of different models, the most suitable model for all three assets is AR1 And MA0. This determination is based on the model parameter with the lowest Schwarz criterion. Table 4.5 displays the ARMA model values for all the assets.

Table 4.5: ARMA values for the three variables

NAMES	CONSTANT	Phi1	Phi 4	Phi 5	Phi 6
BANK NIFTY COEFFICIENT	0.0003 65167			0.129 827	−0.12 4840
BITCOIN COEFFICIENT	0.0012 4124	−0.077 3013	0.069 8694		
RIPPLE COEFFICIENT	0.0004 83883	−0.065 3234			

In the next step, we visualised the presence of clustering of volatility through a graph plot of residuals against time. Residual against time showcases the time gap between when any incident of high volatility occurs and its return to the mean. The waiting period for its recovery to mean is known as the clustering of volatility.

Figure 4.7: Residual against time plot of BTC



In Figure 4.7, the highlighted area represents the duration for the volatility to revert to the mean, a phenomenon referred to as the clustering of volatility. Furthermore, we conducted an analysis to assess the presence of volatility in Bank Nifty and Ripple. Additionally, we performed the ARCH test to forecast volatility. The results of the ARCH test, including the values for the three assets, are presented in Table 4.6.

Table 4.6: ARCH values of Bank Nifty, BTC and XRP

NAMES	P-VALUES
BANK NIFTY	5.5875e-46
BITCOIN	0.0299029
RIPPLE	9.06883e-08

The p-values for all three assets, BTC, XRP, and Bank Nifty index, are significantly less than 0.05. Specifically, the p-value for BTC is 0.0299029, and for XRP and Bank Nifty index, it is close to 0.000. This indicates that the p-values are statistically significant, leading us to reject the null hypothesis that there is no presence of the ARCH effect. Further moving on we did the GARCH (1,1) test.

Table 4.7: GARCH (1,1) values of Bank Nifty, BTC and XRP

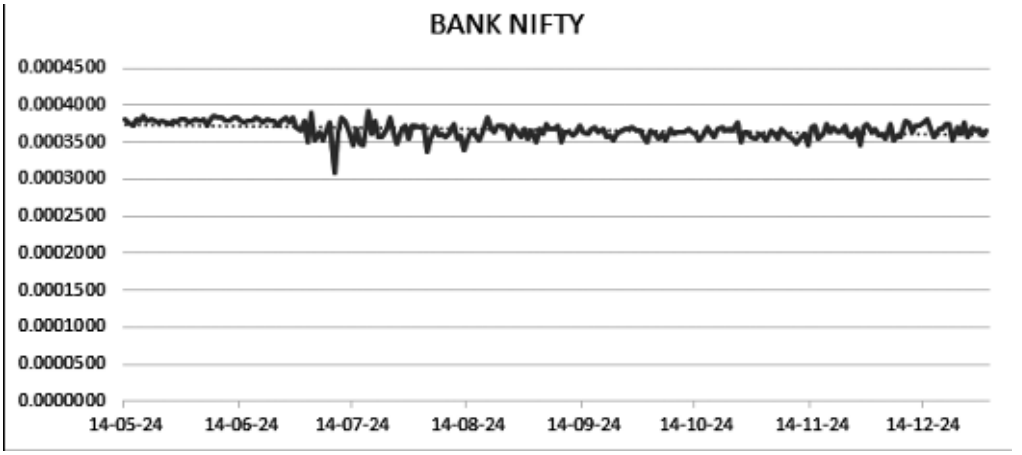
NAMES	Constant	$Alpha_1$	$Beta_1$
BANK NIFTY	0.000703335	0.0975636	0.892586
BITCOIN	0.00209378	0.130030	0.848149
RIPPLE	−0.000298173	0.390954	0.523308

In Table 4.7, the GARCH values demonstrate a high level of statistical significance across all assets. This indicates that a significant excess return, whether positive or negative, is likely to lead to an extended period of elevated forecasted variance in the future. This highlights the GARCH model's effectiveness as an indicator in situations characterized by heightened volatility.

4.2 Forecasting Returns

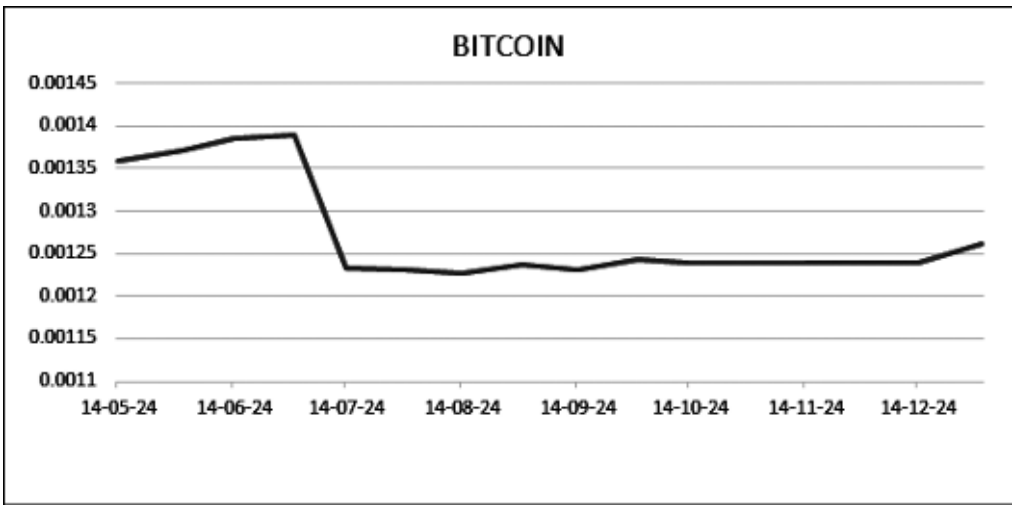
With the values from the econometric models, we tried to predict the returns of the three assets for a period till December 31, 2024. After prediction, we created a line chart for those same to get a visualisation of the values. Figures 4.8,4.9 and 4.10 show the line charts for those same.

Figure 4.8: Prediction of returns from Bank Nifty



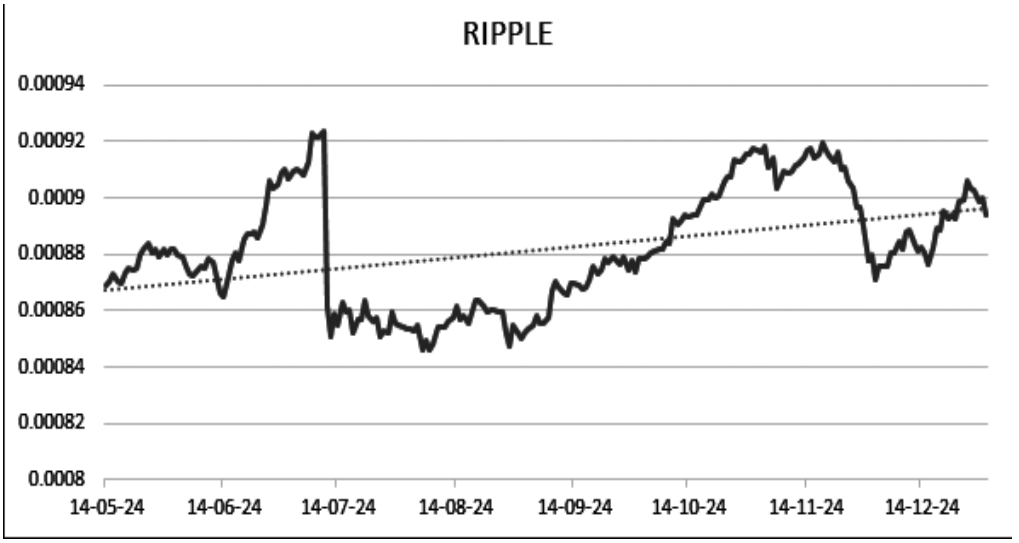
The line chart illustrates that the expected performance of Bank Nifty is anticipated to remain consistently high and stable for the remainder of the year, provided there are no significant unexpected events. The provided information also suggests that the anticipated volatility level is projected to stay fairly consistent with minimal changes.

Figure 4.9: Predicted Returns of Bitcoin for the year 2024



In Figure 4.9, the data indicates that BTC is projected to yield high returns in the middle of the year 2024. However, it also suggests a decrease in returns during the second half of the year. It's important to note that this prediction is based on a relatively limited historical period, which could impact the accuracy of the forecast. Therefore, it's possible that with a more extensive dataset, the prediction could differ.

Figure 4.10: Predicted Return of Ripple for the year 2024



Through Figure 4.10, we can see that Ripple will be more volatile throughout the year where at first during May 2024, it will fall, then in July, there is a possibility for its return to rise, which will fall again in August 2024 but during October to December 2024, it will make a significant jump in its return.

4.3 Granger-Causality Test Result

The Granger causality test is a statistical test used to determine if one time series can be used to predict another. It is a method used in analysing multivariate time series data. If past values of variable X are helpful in predicting variable Y with given past values of Y, then variable X is considered to Granger cause variable Y. Granger causality is measured by regressing Y on its own lagged values and lagged values of X. If the null hypothesis is rejected, it suggests that variable X Granger causes variable Y. We have chosen the appropriate lag based on the VAR lag selection test, meeting the criteria of Akaike Information Criterion (AIC). Table 8 displays the AIC for the Bank Nifty and Ripple.

Table 4.8: VAR lag selection with the endogenous variables Bank Nifty and Ripple

VAR system, maximum lag order 14

The asterisks below indicate the best (that is, minimized) values
of the respective information criteria, AIC = Akaike criterion,
BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.

lags	loglik	p(LR)	AIC	BIC	HQC
1	8858.55379		-16.687189	-16.659101	-16.676544
2	8928.45538	0.00000	-16.811414	-16.764600	-16.793673
3	8984.95650	0.00000	-16.910380	-16.844840	-16.885542
4	9034.52105	0.00000	-16.996270	-16.912004	-16.964335
5	9046.27275	0.00010	-17.010882	-16.907891	-16.971851
6	9066.55208	0.00000	-17.041568	-16.919852*	-16.995441
7	9075.71642	0.00106	-17.051303*	-16.910861	-16.998079*
8	9078.15162	0.30086	-17.048354	-16.889186	-16.988033
9	9082.87671	0.05078	-17.049720	-16.871827	-16.982303
10	9084.22163	0.61100	-17.044716	-16.848097	-16.970202
11	9090.71682	0.01132	-17.049419	-16.834075	-16.967809

From Table 4.8, we get the AIC is significant for lag 7. Thus, with the lag order of 7, we run the Vector Autoregression test in Gretl to see the effect of Granger Causality. We have kept the robust standard errors with HC1 to exclude the presence of any outlier in the data. Tables 4.9 and 4.10 depict the results of the tests.

Table 4.9.1 Granger Causality Test

Granger Causality Test Indicators Between Nifty and Ripple (with Bank Nifty as the Dependent variable)	
Portmanteau test: LB (48) = 260.146, df = 164	0.00000
P- value (F)	6.52e-69
Durbin-Watson	2.014483

Based on the data in Table 4.9.1, it can be inferred that the Portmanteau test yields a value of 0.0000, indicating the presence of serial auto-correlation as its p-value is significantly less than 0.05. Consequently, the null hypothesis is rejected. Furthermore, the p-value of equation 1 in the test is considerably lower than that of 0.05, indicating Ripple Granger causing Bank Nifty. However, a Durbin-Watson test with a value exceeding 2 suggests the absence of auto-correlation.

Table 4.9.2. Granger Causality Test

Granger Causality Test Indicators Between Nifty and Ripple (with Ripple as the Dependent variable)	
Portmanteau test: LB (48) = 260.146, df = 164	0.00000
P- value (F)	0.024036
Durbin-Watson	2.000493

Based on the data in Table 4.9.2, the p-value of equation 2 in the test is considerably lower than 0.05, which indicates that Bank Nifty Granger is causing Ripple. Again, a Durbin-Watson test with a value exceeding 2 suggests the absence of auto-correlation. After this, we checked the Granger causality between Bank nifty and Bitcoin.

Table 4.10.1 Granger Causality Test

Granger Causality Test Indicators Between Nifty and Bitcoin (with Bank Nifty as the Dependent variable)	
Portmanteau test: LB (48) = 252.107, df = 140	0.00000
P- value (F)	8.57e-98
Durbin-Watson	2.003840

Table 4.10.2 Granger Causality Test

Granger Causality Test Indicators Between Nifty and Bitcoin (with Bitcoin as the Dependent variable)	
Portmanteau test: LB(48) = 252.107, df = 140	0.00000
P- value (F)	3.22e-16
Durbin-Watson	1.999133

In our Granger causality analysis between Bitcoin and Bank Nifty, we observed a spillover effect between the two markets, indicating that each market influences the other. However, it was noted that Bitcoin has a lesser influence on Bank Nifty compared to the influence of Bank Nifty on Bitcoin.

4.4 Measuring Shock Effect through Impulse Response Function Graph

In the end, we have also checked that when there is a negative shock in one market, to what extent the other market also gets affected through the Impulse Response Function graph.

Chart 1: Shock response from Bank Nifty to Ripple and vice-versa

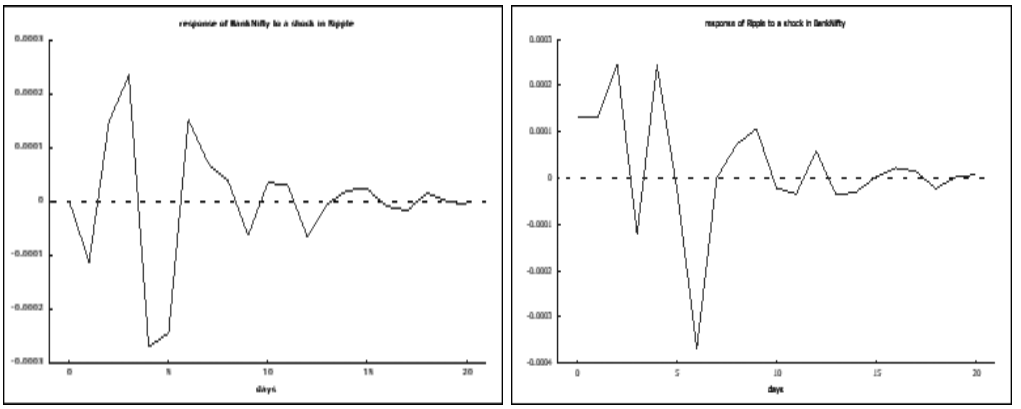
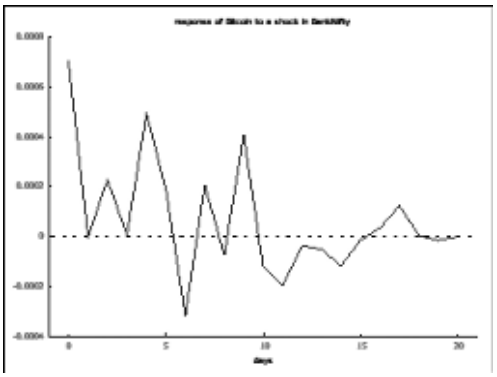


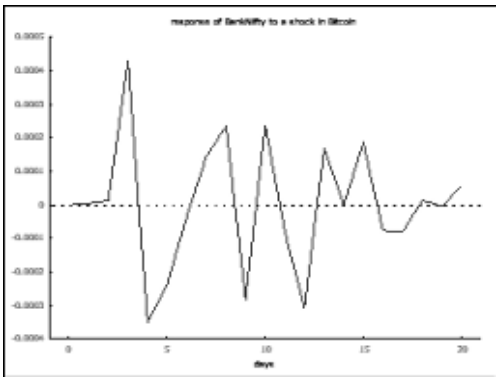
Chart 1 illustrates the reaction of both the assets to each other in two different figures. The first figure indicates that a sudden shock in Ripple initially hurts Bank Nifty. However, the market quickly rebounds within just two to three days, showing resilience. The volatility also experiences significant fluctuations as a result.

However, the XRP reacts just in the opposite direction to a shock in Bank Nifty. The XRP rises at first then drops down to mean and again rises quickly. Thus, we can say that if there is a shock in the Bank Nifty, XRP reacts positively but in case of a shock in XRP, the Bank Nifty index gets affected quickly.

In the same manner, we have seen the shock absorption between the Bank Nifty index and BTC.

Chart 2: Shock response from Bank Nifty to BTC and vice-versa





The initial chart shows Bitcoin's response to a Bank Nifty shock, while the following chart illustrates the reverse scenario. It indicates that a Bank Nifty shock will likely have a positive impact on BTC, while a shock in BTC will have a minimal initial impact on Bank Nifty.

5. CONCLUSION

Our research sought to create a model for the conditional variance of Bank Nifty Returns, Bitcoin returns, and Ripple Returns. Our analysis revealed that the data was non-stationary in all three variables. Although volatility in the Bank Nifty decreased after achieving stationarity, it increased in Ripple. To examine long memory and asymmetrical effects in the data, we performed ARCH and GARCH modelling. The results indicate that a significant excess return, whether positive or negative, will likely lead to an extended period of elevated forecasted variance. This underscores the effectiveness of the GARCH model as an indicator in situations characterised by heightened volatility.

Additionally, we attempted to forecast the returns of the variables based on the sample period. The results indicated that Ripple is expected to yield the maximum return, followed by Bitcoin and the Bank Nifty index. We also observed that the potential returns from cryptocurrencies are substantial, suggesting that investors can consider including cryptocurrencies in their portfolios for wealth maximisation. One limitation of our study is the relatively short period, focused from COVID-19 until the present date, which may restrict the accuracy of predictions.

Furthermore, we sought to determine whether the returns from the variables have a spillover effect on each other. Our findings revealed the existence of a spillover effect between the Bank Nifty index and cryptocurrencies in the short term. In the case of shocks, cryptocurrencies either have a positive effect or act as neutral in absorbing the shock from the Bank Nifty, while the Bank Nifty absorbs any shock

from the cryptocurrency market in a more negative way. This suggests that investment in portfolios containing cryptocurrencies can act as a haven in the short run, which goes in line with previous studies (Okorie, 2020; Koutmos et al.,2021; Phochanachan et al., 2022). However, further research is warranted to study this in the long-run scenario.

As the returns from the traditional market and cryptocurrency market differ, we anticipate an increase in the market capitalisation of the latter. Our study also suggests that cryptocurrency can serve as a hedging tool in the short run in the event of shocks from the Bank Nifty market.

6. Policy Implications And Recommendations

Following the Supreme Court of India's decision to lift the RBI's ban on cryptocurrency on March 4, 2020, recent data indicates that Indian citizens are actively participating in the global cryptocurrency market. The Government of India's stance on this matter is currently unclear, but it has demonstrated optimism by imposing a tax on income from cryptocurrency. Yet, establishing regulations for Know Your Customer (KYC) norms is essential to ensure transparent transactions. Strict KYC standards, including linking Permanent Account Number with Aadhar, thorough reporting, and auditing of the transactions, are necessary to achieve this objective.

Moreover, the legal and governing frameworks lack a precise definition of cryptocurrency. It can be viewed as both a "computer program" and an intangible "good" (Thakur et al., 2022). Thus, it is important to define how investors should treat cryptocurrency. The recent Crypto Asset Reporting Framework (CARF) development at the G20 Summit of 2023 (Mohanka,2023) showed that the national regulators in India, especially those in the securities market sectors, have acknowledged the opportunities that cryptocurrency presents for investors' portfolio hedging and diversification.

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CBDC AND ESG PRINCIPLES IN INDIA - A SYNERGETIC FRAMEWORK FOR SUSTAINABLE FINANCE

Jyothi G.H.

Abstract

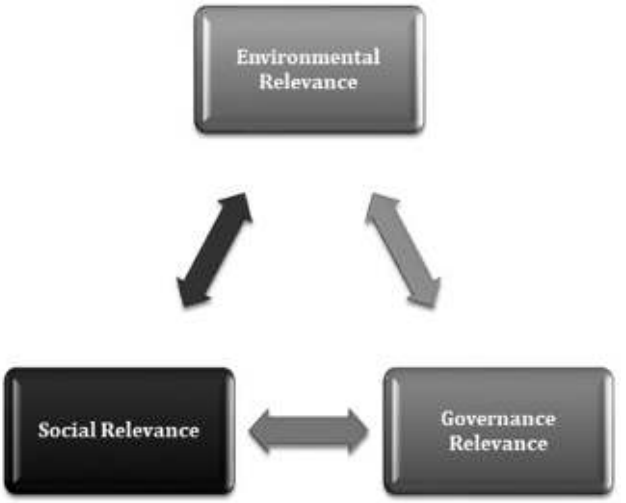
As India aims to achieve its SDGs by 2030, innovative financial solutions are essential for enhancing transparency, efficiency, and inclusivity within its economic framework. CBDCs represent a digital evolution of traditional currencies, providing significant opportunities to align financial practices with ESG principles. This alignment can drive investments towards renewable energy projects, enhance financial inclusion, and strengthen governance through improved transparency and accountability. However, the deployment of CBDCs also presents challenges, including increased energy consumption, electronic waste, the digital divide, data privacy concerns, and cyber security risks. Addressing these challenges is vital to ensuring that CBDCs contribute positively to sustainable finance in India. In this background, this paper analyzes the role of CBDCs in promoting environmental sustainability, social inclusivity, and good governance, while also examining the operational challenges and implications for India's financial ecosystem.

Keywords:

CBDC, ESG, SDGs, Sustainable Finance, India, Digital Currency, Financial Inclusion, Environmental Sustainability, Economic Development

Introduction:

The integration of Central Bank Digital Currency (CBDC) with Environmental, Social, and Governance (ESG) principles is pivotal for advancing India's sustainable development goals (SDGs). As India strives to meet its SDGs by 2030, innovative financial solutions are essential to enhance transparency, efficiency, and inclusivity within its economic framework. CBDCs, representing a digital evolution of traditional currencies, present a significant opportunity to align financial practices with ESG principles, addressing key aspects of sustainable development in below figure – 1 and followed by an analysis.



a) **Environ mental Relevance:** CBDCs can play a crucial role in promoting environmental sustainability by enabling precise tracking of carbon footprints and facilitating green finance. This digital transparency can drive investments towards renewable energy projects and other sustainable initiatives, supporting India's climate action goals (SDG 13). By incentivizing eco-friendly practices through transparent financial mechanisms, CBDCs can help reduce environmental impact.

b) **Social Relevance:** One of the most compelling advantages of CBDCs is their potential to enhance financial inclusion. In India, where a significant portion of the population remains unbanked or underbanked, CBDCs can provide accessible and affordable financial services. This aligns with the objectives of reducing poverty (SDG 1) and promoting decent work and economic growth (SDG 8). By lowering transaction costs and expanding access

to digital financial services, CBDCs can help bridge socio-economic gaps.

c) **Governance Relevance:** CBDCs can strengthen governance by improving transparency and accountability in financial transactions, thereby reducing corruption and financial misconduct. This aligns with the goals of promoting peace, justice, and strong institutions (SDG 16). Enhanced transparency through CBDCs can also streamline regulatory compliance and reporting, fostering better corporate governance practices.

Indian Monetary System and Fiat Money

The Indian monetary system serves as the backbone of the country's economy, encompassing the mechanisms through which money is circulated, regulated, and utilized. At its core is the Indian rupee (INR), the official currency issued and managed by the Reserve Bank of India (RBI). With a dynamic and diverse economy, India's monetary system plays a pivotal role in facilitating transactions, investment, and economic growth across various sectors. The RBI, as the central banking authority, formulates monetary policy to maintain price stability and promote sustainable economic development. Additionally, the Indian monetary system interfaces with international markets through exchange rate mechanisms, influencing trade dynamics and capital flows. Over the years, India has undergone significant monetary reforms, including the demonetization of high-denomination currency notes and the adoption of digital payment solutions, reflecting efforts to modernize and enhance the efficiency of the monetary ecosystem. As India continues to navigate economic challenges and opportunities, the resilience and adaptability of its monetary system remain crucial for fostering stability, resilience, and prosperity.

Fiat money involves the extensive use of resources like paper, ink, and metals for coinage, contributing to deforestation, pollution, and resource depletion. Decommissioning of old or damaged currency leads to waste disposal challenges, with significant environmental consequences. The lifecycle of fiat money, from production to disposal, contributes to its carbon footprint, necessitating sustainable alternatives to mitigate environmental impact.

Fiat money's physical nature can pose barriers to access for marginalized communities lacking banking infrastructure, exacerbating social inequalities. Physical cash is susceptible to theft, jeopardizing the safety and security of individuals, especially in economically disadvantaged areas. Fiat money faces the risk of counterfeiting, necessitating robust regulatory measures and law enforcement efforts to maintain currency integrity. Governments incur substantial expenses in printing, distributing, and managing fiat currency, diverting resources from other socio-economic priorities. In this background, the trend in bank notes circulation in volume and value during the last 3 years is analysed. The year-wise banknotes circulation details are presented in table – 1.

Table - 1: Banknotes in Circulation (end-March)

Denomination (Rs.)	Volume (Pieces in lakh)			Value (Rs. Crore)		
	2021	2022	2023	2021	2022	2023
2 and 5	1,11,728	1,11,261	1,10,843	4,307	4,284	4,263
	(9.0)	(8.5)	(8.1)	(0.2)	(0.1)	(0.1)
10	2,93,681	2,78,046	2,62,123	29,368	27,805	26,212
	(23.6)	(21.3)	(19.2)	(1.0)	(0.9)	(0.8)
20	90,579	1,10,129	1,25,802	18,116	22,026	25,160
	(7.3)	(8.4)	(9.2)	(0.6)	(0.7)	(0.8)
50	87,524	87,141	85,716	43,762	43,571	42,858
	(7.0)	(6.7)	(6.3)	(1.5)	(1.4)	(1.3)
100	1,90,555	1,81,420	1,80,584	1,90,555	1,81,421	1,80,584
	(15.3)	(13.9)	(13.3)	(6.7)	(5.8)	(5.4)
200	58,304	60,441	62,620	1,16,608	1,20,881	1,25,241
	(4.7)	(4.6)	(4.6)	(4.1)	(3.9)	(3.7)
500	3,86,790	4,55,468	5,16,338	19,33,951	22,77,340	25,81,690
	(31.1)	(34.9)	(37.9)	(68.4)	(73.3)	(77.1)
2000	24,510	21,420	18,111	4,90,195	4,28,394	3,62,220
	(2.0)	(1.6)	(1.3)	(17.3)	(13.8)	(10.8)
Total	**12,43,671**	**13,05,326**	**13,62,137**	**28,26,863**	**31,05,721**	**33,48,228**

Source: RBI Annual Report

A close perusal of the content of the above table shows the volume of banknotes rose from 12,43,671 lakh pieces to 13,62,137 lakh pieces, while the total value increased from Rs. 28,26,863 crore to Rs. 33,48,228 crore. The Rs. 500 denomination saw the most significant increase, both in volume and value, indicating its growing importance in the economy. Meanwhile, the volume of Rs. 2,000 notes decreased, suggesting a decline in their usage. Smaller denominations like Rs. 10 and Rs. 100 saw a decrease in their share of the total volume and value, reflecting a possible shift towards higher denomination notes for transactions. Further, between 2021 and 2023, the total volume and value of banknotes in circulation in India increased. Table 2 illustrates the circulation of coins in India from 2021 to 2023, detailing volume and value across various denominations. Small coins, 1, 2, 5, 10, and 20 rupees are examined, showcasing fluctuations over the years. Total figures highlight the cumulative volume and value for the specified period.

Table - 2: Coins in Circulation (end-March)

Denomination (Rs.)	Volume (pieces in lakh)			Value (Rs. crore)		
	2021	**2022**	**2023**	**2021**	**2022**	**2023**
Small coins	1,47,880	1,47,880	1,47,880	700	700	700
	(12.0)	(11.9)	(11.6)	(2.6)	(2.5)	(2.3)
1	5,12,597	5,15,879	5,21,618	5,126	5,159	5,216
	(41.7)	(41.4)	(40.8)	(19.1)	(18.4)	(17.2)
2	3,37,863	3,40,792	3,47,277	6,757	6,816	6,946
	(27.5)	(27.3)	(27.1)	(25.1)	(24.4)	(23.0)
5	1,79,360	1,84,331	1,94,155	8,968	9,217	9,708
	(14.6)	(14.8)	(15.2)	(33.4)	(33.0)	(32.1)
10	51,391	54,044	59,764	5,139	5,404	5,976
	(4.2)	(4.3)	(4.7)	(19.1)	(19.3)	(19.8)
20	896	3,372	8,483	179	674	1,697
	(0.1)	(0.3)	(0.7)	(0.7)	(2.4)	(5.6)
Total	**12,29,988**	**12,46,298**	**12,79,178**		**26,870**	**27,970**

Source: RBI Annual Report

It is unequivocal from the above table that the volume and value of coins in circulation in India from 2021 to 2023, indicating a steady increase in total coin volume from 1,229,988 lakh pieces to 1,279,178 lakh pieces. Despite the overall increase, small coins' share slightly declined in both volume and value. The 1 and 2 rupee coins also showed a minor decrease in their proportional volume and value, while the 5 and 10 rupee coins increased in volume but slightly decreased in their value proportion. Notably, the 20 rupee coins saw a significant rise in both volume and value, reflecting an increased circulation of higher denomination coins. This trend suggests a gradual shift towards higher denomination coins in the economy.

Changing Payment Modes – Motives

The Reserve Bank of India (RBI) prints various denominations of notes, each with its associated printing cost. For instance, the cost of printing a single Rs. 2,000 note is approximately Rs. 4, showing a decrease from Rs. 4.18 in 2018 to Rs. 3.53 later on. Interestingly, the highest printing expenditure is linked to Rs. 10 notes, with it costing Rs. 960 to print 1,000 notes, significantly surpassing its face value. This highlights the disparity in printing costs across different denominations. For

instance, printing 1,000 notes of Rs. 100 costs Rs. 1,770, Rs. 200 notes cost Rs. 2,370, and Rs. 500 notes cost Rs. 2,290. Surprisingly, the cost of printing 1,000 notes of Rs. 2,000 is lower compared to some of these denominations, making it a more cost-effective option in terms of printing expenses. Table 3 shows the disposal of solid bank notes.

It can be observed from the table that during 2020-21 to 2022-23, there has been a significant increase in the disposal of soiled banknotes across most denominations in India. The total number of disposed notes rose from 99,702 lakh pieces in 2020-21 to 2,29,264 lakh pieces in 2022-23. The most notable increases were observed in the 500 rupee notes, which surged from 5,909 lakh pieces to 51,092 lakh pieces, and the 10 rupee notes, which increased from 21,999 lakh pieces to 45,077 lakh pieces over the same period. This trend indicates a growing volume of worn-out currency being removed from circulation, possibly reflecting higher usage and the wear and tear of lower-denomination notes. The consistency in the disposal of high-denomination 2,000 rupee notes, with a slight fluctuation, suggests a stable but significant rate of withdrawal of these notes from the market.

Table - 3: Disposal of Soiled Banknotes(April to March) Pieces in lakh

Denomination (Rs.)	2020-21	2021-22	2022-23
2000	4,548	3,847	4,824
1000	-	-	-
500	5,909	22,082	51,092
200	1,186	6,167	13,062
100	42,433	59,203	58,282
50	12,738	27,696	34,219
20	10,325	20,771	21,393
10	21,999	46,778	45,077
Up to 5	564	1,257	1,315
Total	**99,702**	**1,87,801**	**2,29,264**

Source: RBI Annual Report

Table 4 presents data on the detection of counterfeit currency notes from April to March, detailing the number of counterfeit notes detected during this period. The table

provides insights into the prevalence of counterfeit currency and trends in detection efforts over time, aiding in understanding currency security measures.

Table - 4: Number of Counterfeit Notes Detected - April to March (Number of pieces)

Year	Detection at the Reserve Bank	Detection at Other Banks	Total
2020-21	8,107	2,00,518	2,08,625
	(3.9)	(96.1)	(100.0)
2021-22	15,878	2,15,093	2,30,971
	(6.9)	(93.1)	(100.0)
2022-23	10,465	2,15,304	2,25,769
	(4.6)	(95.4)	(100.0)

Source: RBI Annual Report

The data on counterfeit note detections from 2020-21 to 2022-23 reveals that the total number of counterfeit notes detected has fluctuated slightly over the three years. The majority of counterfeit notes were detected at other banks rather than at the Reserve Bank, with other banks accounting for over 90% of detections each year. Specifically, detections at other banks were 96.1% in 2020-21, 93.1% in 2021-22, and 95.4% in 2022-23. Although there was an increase in total detections from 2,08,625 in 2020-21 to 2,30,971 in 2021-22, the number slightly decreased to 2,25,769 in 2022-23. This indicates that while there was a significant rise in counterfeit note detection in 2021-22, the trend showed a minor decline in the following year, with other banks consistently playing a major role in identifying counterfeit currency.

Table 5 offers a breakdown of counterfeit currency detections in the banking system by denomination, covering the period from April to March. It illustrates the distribution of counterfeit notes across different denominations, highlighting areas of vulnerability and assisting in the assessment of currency security measures.

Table - 5: Denomination-wise CounterfeitNotes Detected in the Banking System - April to March (Number of pieces)

Denomination (Rs.)	2020-21	2021-22	2022-23
2 and 5	9	1	3
10	304	354	313
20	267	311	337
50	24,802	17,696	17,755
100	1,10,736	92,237	78,699
200	24,245	27,074	27,258
500 (Specified Banknotes)	9	14	6
500	39,453	79,669	91,110
1000 (Specified Banknotes)	2	11	482
2000	8,798	13,604	9,806
Total	**2,08,625**	**2,30,971**	**2,25,769**

Source: RBI Annual Report

One can observed that the total number of counterfeit notes detected in the banking system has fluctuated, peaking at 2,30,971 pieces in 2021-22 before slightly decreasing to 2,25,769 pieces in 2022-23. High-denomination notes such as the Rs. 500 and Rs. 2000 have seen significant counterfeit activity, with Rs. 500 notes increasing sharply from 39,453 in 2020-21 to 91,110 in 2022-23. Lower denominations like Rs. 2, Rs. 5, and Rs. 10 had minimal counterfeit occurrences. Notably, counterfeit Rs. 1000 notes, which were specified banknotes, surged from 11 pieces in 2021-22 to 482 pieces in 2022-23, indicating a targeted counterfeiting effort for these discontinued notes. Overall, despite some variations, the data suggests a persistent and evolving challenge in detecting and managing counterfeit currency.

India's Commitment and Status towards Hard Cash Circulation

India has a complex relationship with cash, being one of the world's largest cash-dependent economies. Historically, cash has played a dominant role in transactions, particularly in rural and unbanked areas. However, the government has made significant efforts to reduce cash dependency and promote digital payments. A pivotal moment in India's cash circulation policy was the demonetization initiative on November 8, 2016. The government invalidated Rs. 500 and Rs. 1,000 banknotes, which constituted about

86% of the cash in circulation, aiming to combat black money, counterfeit currency, and promote digital transactions. This move significantly disrupted cash usage and accelerated the adoption of digital payment methods.

In the meantime, Digital India initiative launched in 2015, this campaign promotes digital payments as a key component. Initiatives under this program include the development of digital infrastructure, increasing internet access, and promoting financial literacy. Similarly, the introduction of UPI (Unified Payments Interface) has revolutionized digital transactions in India. UPI facilitates real-time, inter-bank transactions through mobile phones, making digital payments accessible and convenient for a broad segment of the population. Even, the government has introduced tax incentives for digital transactions and imposed penalties on high-value cash transactions to discourage cash usage. For instance, cash transactions above a certain limit (e.g., Rs. 2 lakh) are penalized. Limits on cash withdrawals from banks have been imposed at various times to control cash flow and encourage digital payments.

In addition, Jan Dhan Yojana and Direct Benefit Transfer schemes aim to ensure access to banking services for all households. By opening millions of bank accounts, the government promotes the shift from cash to digital transactions. Subsidies and benefits are directly transferred to beneficiaries' bank accounts, reducing cash leakages and promoting digital financial inclusion.

Moving forward, the Reserve Bank of India (RBI) has laid out a vision to encourage digital transactions. Initiatives include enhancing the security and efficiency of payment systems and promoting innovations in the digital payments space. Thus, the RBI is exploring the introduction of a CBDC, which could further reduce the reliance on physical cash. A digital rupee would offer the benefits of digital transactions with the security and trust of central bank money.

On the lines of the above, India is committed to reducing its reliance on hard cash through various initiatives promoting digital payments and financial inclusion. While significant progress has been made, ongoing efforts to address infrastructure gaps and build trust in digital systems are vital for achieving a less cash-dependent economy.

Major Global Initiatives on CBDC – An Overview

Central Bank Digital Currencies (CBDCs) have gained significant momentum in recent years, with many central banks exploring or launching their own initiatives. However, some of the major global CBDC initiatives are presented below.

1) China - Digital Yuan (e-CNY): China is at the forefront of CBDC development with its Digital Yuan or e-CNY, initiated by the People's Bank of China (PBoC). It is the most advanced CBDC project among large economies. China has conducted numerous pilot programs in cities like Shenzhen, Beijing, and Shanghai, and expanded to wider use cases, including the 2022 Winter Olympics. To modernize payments,

reduce reliance on private digital payment platforms (Alipay, WeChat), and internationalize the Yuan.

2) European Central Bank (ECB) - Digital Euro: The Digital Euro is being explored by the European Central Bank (ECB) as a complement to physical cash and aimed at providing citizens and firms with a secure digital payment option. The ECB has completed its investigation phase and is expected to move into a pilot phase, with an official launch potentially around 2026. To maintain sovereignty over European payments, enhance financial inclusion, and provide a digital counterpart to physical cash.
3) United States - Digital Dollar (FedCoin): The U.S. is in the early stages of exploring a Digital Dollar, spearheaded by the Federal Reserve. While no concrete decision has been made, the Fed has released discussion papers on potential designs and implications. Ongoing discussions and research, with initiatives such as MIT's Project Hamilton studying the technical aspects. Improve payment efficiency, protect the U.S. dollar's role in global finance, and enhance monetary policy tools.
4) Sweden - e-Krona: Sweden's Riksbank is exploring the e-Krona as a response to the country's diminishing use of cash, ensuring that a central bank-backed payment system remains available. The e-Krona is in its pilot phase, and Sweden continues to explore how it can coexist with existing payment methods. Ensure the stability of Sweden's payment system and maintain public access to central bank money.
5) Bahamas - Sand Dollar: The Sand Dollar is the world's first fully deployed CBDC, launched by the Central Bank of The Bahamas in 2020. Fully operational and in use for retail payments. Increase financial inclusion across the country's scattered islands and provide a secure and modern payment system.
6) Eastern Caribbean – Dcash: The Eastern Caribbean Central Bank (ECCB) launched DCash, a CBDC used in the Eastern Caribbean region. Launched in 2021, it's operational in countries like Saint Kitts and Nevis, Antigua and Barbuda, and Grenada. Foster financial inclusion and resilience in the region and reduce dependency on cash.
7) Bank of England - Digital Pound: The Bank of England (BoE) is researching a Digital Pound as part of its efforts to modernize the UK's payment infrastructure. Early stages of research and consultations. Ensure a stable payment system and potentially provide a more efficient way to implement monetary policy.
8) Russia - Digital Ruble: The Central Bank of Russia has been actively working on a Digital Ruble, with pilot programs starting in 2023. In the advanced pilot stage. Reduce reliance on external payment systems, enhance cross-border payments, and provide more efficient financial services domestically.
9) Brazil - Digital Real: The Central Bank of Brazil is working on a Digital Real to boost financial inclusion and

improve the efficiency of the country's payment systems. In the testing phase, with launch expected within the next few years. Improve domestic payments and modernize the financial ecosystem.

10) Nigeria – eNaira: eNaira is Nigeria's official CBDC launched by the Central Bank of Nigeria in 2021. Operational, with efforts to expand adoption across the country. Promote financial inclusion, facilitate remittances, and strengthen the national payment infrastructure.

Present Status of CBDC in India

In line with the Union Budget 2022-23's digitization efforts, the Reserve Bank of India (RBI) introduced the Central Bank Digital Currency (CBDC) in phases. The RBI launched pilots for the Digital Rupee (e Rs.) for wholesale transactions on November 1, 2022, and for retail transactions on December 1, 2022. These pilots followed the issuance of a 'Concept Note' to raise awareness about CBDCs and the features of the e Rs. In 2023-24, the RBI plans to expand these pilots. For the Digital Rupee - Wholesale Segment (eRs.-W), the focus is on settling secondary market transactions in government securities, which is expected to make the inter-bank market more efficient by reducing transaction costs and the need for settlement guarantees. Nine banks, including State Bank of India and ICICI Bank, are participating in this pilot.

The Retail Digital Rupee (eRs.-R) pilot started in Mumbai, New Delhi, Bengaluru, and Bhubaneswar with a closed user group of customers and merchants. It has since expanded to additional locations like Ahmedabad and Hyderabad, and more banks are joining the pilot. Initially, four banks participated, with more banks joining gradually. The pilot aims to offer a digital alternative to physical cash, ensuring trust, safety, and settlement finality. The results so far have been satisfactory and met expectations.

CBDC Deployment in terms of ESG Integrity – Few Operational Challenges

1) CBDC deployment may increase energy consumption, especially if it relies on energy-intensive block chain technologies for transaction validation.
2) The rapid turnover of digital devices necessary for CBDC transactions could contribute to electronic waste accumulation, posing environmental hazards if not properly managed. CBDC adoption may widen the digital divide, excluding populations without access to technology or digital literacy from participating in the financial system.
3) CBDC transactions raise concerns about data privacy and surveillance, potentially infringing on individuals' rights to financial privacy and autonomy.
4) CBDC systems are susceptible to cyber-attacks, requiring robust cyber security measures to safeguard against hacking, data breaches, and fraud.
5) Ensuring compliance with existing regulations and international standards while navigating evolving regulatory landscapes presents governance challenges for CBDC deployment.
6) Inadequate consideration of environmental, social, and governance

factors in CBDC deployment could lead to unintended consequences, undermining ESG integrity and sustainability goals.

Conclusion and Implications:

CBDC presents a viable alternative to traditional fiat currency, offering efficiencies in resource utilization and reducing the carbon footprint associated with currency production and circulation. By transitioning towards digital currency, central banks can minimize environmental degradation and contribute to global efforts towards sustainability. CBDC holds promise in promoting financial inclusion and empowering marginalized communities by providing universal access to digital payment infrastructure. Through enhanced accessibility and security, CBDC can bridge the gap between the unbanked and formal financial services, fostering economic participation and reducing socio-economic disparities. Moreover, CBDC initiatives have significant implications for governance, offering transparency, accountability, and regulatory oversight in financial transactions. The programmable nature of CBDC enables real-time monitoring and compliance measures, mitigating risks such as money laundering, fraud, and corruption, and bolstering the integrity of the financial system. As central banks continue to explore the feasibility and implementation of CBDC, it is imperative to prioritize ESG considerations and ensure alignment with sustainability goals. Proactive measures such as energy-efficient block chain protocols, inclusive digital literacy programs, strong data protection frameworks, and comprehensive regulatory oversight are essential for mitigating risks and upholding ESG integrity in CBDC deployment.

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CRITICAL REVIEW OF SELECT ENERGY CPSUS UNDER INDIA'S ENERGY TRANSITION

Padmanabhan Satyes Kumar

Abstract

The massive ecosystem in and around the major Energy sector CPSUs in India makes their role in India's Greener future very critical not only for the success of overall transition the country aims to achieve in the next few decades, but also for realignment and sustainable survival of these companies and their innumerable stakeholders in the long run.

With the same in mind an effort is made to critically review the crucial policy directions these CPSUs have initiated, their detailed roadmap and implementation for achieving their Net Zero targets , so that course corrections/ suggestions, if any, can be indicated based on the same to ***make the initiatives more adaptable and effective*** *in this country where the multitudes still look up to* ***affordable modes of greener energy for effective mass transition*** *and play a cardinal role in India's energy security as well energy transition in the long run.*

Keywords:

Net Zero Goals, CPSUs, Green Energy, Green Hydrogen, Bio-Fuels, CCUS Technologies

A. Introduction:

India has been on an aggressive path towards Energy transition, particularly in the past few years. However, its developing and dense population which is still dependent on huge imports, has been the cardinal factor behind its deferment of phasing out plans of fossil fuel energy both for Electricity and Transportation sector.

Against this backdrop, this research study reviews the transition efforts of some mega CPSUs since they have a very significant role under the short term energy security needs of the nation but seems to be inclined to align with green energy by 2040s.

The review is based on the details of transition plans of the 4 CPSUs namely NTPC, ONGC, CIL and IOC. At the same time, these initiatives will also determine the sustainable future of these CPSUs critical for not only multitude of their stakeholders but also its customers.

Research Methodology: *detailed review of the Net Zero initiatives, based on their latest published Annual Reports and other web publications and various projections and reports of IEA etc on long term transition needs.*

B. Relevant Citations: ***(References are indexed as R# and Suggestions as S#)***

1. Sectors Impacted By Transition (Ref#1) Fossil fuel (in Power and Transportation) result in almost 70% of global GHG emission but also contributes nearly 20% of Global GDP and hence will have great impact on future job trends. **Emerging nations especially African, Latin American and India** would spend greater % of their GDP on Greener assets compared to advanced countries, suffer more job loss and climate impacts, somewhat balanced by natural endowments like greater sunshine hours. **But they will benefit with better climate, public health etc**. Hence they need significant adjustments for climate actions best supported **through coordinated action by governments, businesses, and enabling institutions (S#1)**
2. Green transition & energy jobs (Ref#2) The IEA predicts an additional 13 million jobs in clean energy and related sectors by 2030 based on CC plans of the nations giving rise to questions on access to these jobs, skill required and the impact on fossil fuel community. **As per IEA a**bout 65 million people work in the energy industry worldwide, more than half of which in green energy sector comprising of jobs in bio-energy supply, RE power, EVs, and energy efficiency etc and fossil sector jobs have gone down since 2020 despite rising price. Located mostly in Middle East and Russia the fossil jobs will be replaced with RE sector jobs all over the world **with China and India already leading in RE sector jobs**. Workers in coal, oil and gas enjoy higher wages than those in RE as RE jobs are more contractual in nature than unionized fossil sector jobs.

Impact on workers: many of their skills are transferable in a greener economy. Those working on offshore oil rigs, for example, have many skills that would be useful to offshore wind farms. Challenges on displacement and n**eed for retraining and re-skilling is unavoidable**. **(S#2)**

3. **With RE 'unstoppable,' fossil fuels will peak by 2030** ***(Ref#3)***
   The IEA report notes that though the pace of creation of RE plants has increased recently, still the shift away from fossil will risk climate goals. Coal is expected to peak out by 2030 but the desired climate goal of limiting global temperature rise to 1.5 degree Celsius from the present level by 2100 AD looks very remote at current pace.
   Hence the need to further accelerate RE and make CCUS mandatory for coal based plants will depend on China and India to phase down their coal consumption. **(S#3)**
4. Fuels and electricity in India (Ref#4)
   India's electricity demand is projected to grow by almost 5% per year to 2040 which will nearly double the overall energy demand from the 2020 levels. Solar and wind energy are expected to add 75% of the incremental capacity by 2040 but coal will still be the major fuel in power sector. **Improved grid levels for better RE utilization will be needed more**. On the demand side increased AC consumption will necessitate improved efficiency machines. **(S#4)**
   To reduce imports, expanding domestic supply of oil is inevitable but challenging because of the complexity and limited size of domestic resource. **(S#5)**
   In coal sector, domestic resource base is large enough, but current consumption is very high.
   It needs to improve operational efficiency, adopting CCUS, as well as alternative approaches to cooling at coal-fired plants as over 80% of coal plants are cooled by freshwater sources. **(S#6)**
5. Oxygen factored under GH2 cost(Ref#5)
   GH2 per ton evolves nearly 8 Tons of Oxygen that can be commercially used for medical, aquaculture or any other industrial use, potentially raising the viability of GH2.(S#7)
6. GOI evaluation of 23 bids under tranch II of GH2 policy (Ref#6)
   GOI received bids from 23 companies for award of incentives linked to production of Electrolyzers under the tranch II of the SIGHT scheme which will boost the indigenous availability of the equipment needed for GH2 production.(S#8)
7. Biotechnology (E3) Policy (Ref#7)
   One of the six pillars of this policy announced by GOI is to cater research and entrepreneurship in CCUS and hence will boost the green energy and environmental improvements. (S#9)

C. Detailed Inputs on Transition Efforts by the Four CPSUs :(Ref#8)
Before we proceed, it would be relevant to note the size and the ecosystem of the CPSUs:

Company	Turnover (Rs Cr)	Contribution toGOI (CtG)	Manpower	Market share	Sharehold-ers	CSR Span
ONGC	640400	74,640 cr	26000	70%	1520000	23 lakh
IOCL	935000	240,185 cr	31000	28% Ref	1878000	57 lakh
CIL	138250	56,500 cr	239000	80%	1320000	10 lakh e
NTPC	178000	20,000 cr @	136000	25% Gen	984000	16 lakh

Ref- refinery capacity; Gen- Power Generation; e- Estimated numbers; @including dividend;
(For inference please refer S#10)

C1) ONGC: *this CPSU which is a MNC with operations spanning from Russia to Latin America, primarily engaged in oil and gas exploration, is now having the main objective of expanding its domestic oil reserves to lessen country's dependence on imports. From the FY* ***2022-23 it has raised it production after a declining trend of nearly 7 years along with specific target of Net Zero fixed at 2038,*** *the roadmap for which includes as under:*

i) **ONGC Energy Centre**: an independent agency associated with ONGC focuses on projects related to RE such as GH2 and Geothermal.
ii) **Various MoUs of ONGC** includes those for CCS/CCUS projects, recovery of Helium from Natural Gas, GH2 through indigenous membrane-less electrolyzer etc.
iii) **Corporate sustainability plans:** a) Clean Development Mechanism (CDM); b) Greenhouse Gas Accounting and Mitigation and c) Global Methane initiatives.
iv) **Solar and Wind energy** initiatives: current based of 190 MW and aims to cross 10,000 MW by 2030 along with 1 MMT p.a. Green Ammonia plant at Mangalore.
v) **Carbon Capture, Storage and Utilization** ONGC entered into a MoU with IOCL for Enhanced Oil Recovery (EOR) for Koyali refinery which has the potential for sequestrating 5 to 6 Million T of CO2 by the year 2040. **(S#11)**

Some other inputs on ONGC's Net Zero plans:

a) **ONGC Investment for Net-Zero Transition by 2038(Ref#9)**
ONGC plans to invest Rs 2 lakh crore ($27 billion) in achieving its net-zero transition targets by 2038 including 1 lakh crore by 2030 **mainly for RE assets of 10 GW apart from collaborations for low carbon options, GH2, Green**

Ammonia and CCUS etc. (S#11)

b) ONGC Net Zero Plans (Ref#10)

ONGC anticipates India's fossil energy demand will keep going up till 2040 unlike other developed nations peaking by 2030. Major components of its Net Zero plans include huge outlays for RE assets-solar and offshore plants. Also it is investing on Green Ammonia plant.

ONGC produced 19.584 million ton (MT) of oil in 2022-23, up from 19.545 MT of previous year. The annual output is likely to touch 23MT in next 3 years. As per their internal assessment they have already reduced emission by 17% in last 5 years while the overall quantum is likely to increase due to expansion of production. (Ref#11)

c) ONGC transforming into low-carbon energy in a big way (Ref#12)

In line with the PM's vision, ONGC has aligned itself with India's goals of curtailing carbon emissions by 1 billion tons and reduce carbon intensity by 45% by 2030 with its technology intensive scheme expected to unlock extra output from its existing reserves and its development/redevelopment plans expected to supplement crude output. **(S#12)**

d) **India's oil import to exceed USD 100 bn in FY25 (Ref#13)**

India is still importing nearly 85% of its total crude oil consumption despite 15% reduction in import price due to cheaper Russian crude in FY 23-24, import cost remains very high.

In volume terms, the share of crude petroleum imported from Russia jumped to 36% in April-February FY2024 from 2% in FY2022, while that from West Asian countries (Saudi Arabia, the UAE and Kuwait) fell to 23% from 34%, respectively. With the Russian crude now being lower and back to dependence on gulf nations, the imports poised to cross $100 billion **(S#13)**

C2) IOCL: *happens to be one of the biggest CPSU with an yearly turnover of nearly 9 lakh crore and daily customer base of nearly 3 crore Indians and nearly 30% of India's total refinery capacity managed by them.* ***Though it employs hardly 40000 staff the indirect employment associated through its multifarious marketing and distribution channels is estimated to cross 100 times its employee base****. Their current plan for Net Zero includes:*

i) Currently it has 240 MW of RE , but aims at 31000 MW RE by 2030, 1 MMT capacity for Bio Gas production; in the interim it has entered into a mega JV with NTPC for round the clock RE supply.

ii) Also entered JV with L&T and ReNew Power for **developing the Green Hydrogen ecosystem** in India and become a GH2 producer.

iii) Emission mitigation pathways planned for Net Zero by 2046 include energy conservation measures, shifting from fuel oil, gas oil and naphtha to natural gas, moving towards GH2, CCUS, RE, tree plantation, purchase of carbon credits etc.

Supplementary details on IOCL's Net Zero plan:

IndianOil to go Net Zero by 2046 (Ref#14)

IOCL targets the year 2046 for achieving Net zero operational emissions with an outlay of over Rs 2 lakh crore for areas such as **green hydrogen, bio-fuels, RE, carbon offsetting and CCUS technologies.**

IOCL's current operational GHG emission stands around 24 million metric tonnes of carbon which is expected to rise above 40 MMTCO2e by 2030 through expanded outputs.

Focus Areas (S#14)

1. **Achieve Reduced emissions: Based on initiatives derived from** consultancy, audit, in-house R&D and collaborations.
2. **Expansion projects through RE:** IOCL plans to meet the electricity needs of its refinery expansion projects using RE power.
3. **Greener fuels:** Products like SERVO Raftaar, Xtra Tej, XP95, Xtragreen, IndiGreen to reduce carbon footprint of nealy 3 crore daily consumers of IOCL.
4. **Low carbon energy partnerships:** IOCL have taken initiatives to develop low carbon technologies like Green hydrogen, CCUS, alternate energy, EVs etc.
5. **Engagement with value chain partners:** to reduce emissions across the current network.
6. **Upgrade employee skills:** Aligning skilled manpower for greener future of company through trainings, technology exposure etc. in the long run.
7. **Establish IOCL as a leader in environment sustainability:** necessary to maintain leadership in the changing business environment.

Pathways to Net Zero: Energy Conservation Measures; Increasing Boiler / Furnace efficiency; Shifting from Fuel Oil, Gas Oil & Naphtha to Natural Gas; Green Hydrogen; CCUS, RE, Biogas, Tree plantation etc. These are in addition to current practices on Ethanol blending, EV charging stations and Greener supply chain etc.

b) IOCL: Striving for net zero by 2046 (Ref #15)

IOCL operates across a wide range of sectors such as petrochemicals, gas, oil, refining, pipeline transportation, technology as well as in emerging areas such as nanotech, solar, bio energy, GH2 and fuel cell technologies.

Traditionally a big player in fossil fuel from 1959 it now aims transition through "**The Green Umbrella Entity" initiative** encompassing various domains, such as bio-fuels, RE, GH2, carbon offsets, CCUS, retail outlets operational on Solar power, Compressed BioGas production and sale under the Sustainable Alternative Toward Affordable Transportation (SATAT) program through 46 Indi green outlets spanning nine states in addition to daily output of over 200 tonnes biogas mainly at Gorakhpur utilizing agricultural crop residue.

For the highly promising future energy in the form of GH2, IOCL is starting with a capacity of 10 kilo tons plant in Panipat currently under execution. In 2023, the company initiated a partnership with Snam, Italy, to repurpose current gas pipelines for

the effective transportation of hydrogen. **(S#15)**

Another focus area is EV charging infrastructure across India at over 5500 stations and 76 battery swapping stations, and has an expectation to expand it to 10,000 EV charging station (EVCS) network in the near future. **(S#16)**

CCUS: Using chemical, biochemical, and electro bio-catalytic approaches through innovative research. Its enzyme-solvent fusion accelerates carbon capture compared to conventional CCUS methods.

Sustainable aviation fuel(SAF) to reduce pollution in the Aviation sector, it entered a JV with LanzaJet for SAF plant in Panipat; inaugural commercial passenger flight test on SAF made through domestic feedstock provided by IOCL; finalized JV with Praj Industries to support initiatives for SAF and other bio-fuels. IOCL also targets 2% bio fuel mixing plans for aviation fuels by 2030. **(S#17)**

Future plans: involves implementing transparent and precise accounting, monitoring, reporting and verification of GHG emissions apart from investment in carbon markets, CBG, green hydrogen, RE, energy efficiency, and CCUS and diversify into RE generation in the long run with ventures like it has recently finalized with NTPC Green Energy and SJVN Limited.

c) Non Oil plans of IOCL(Ref#16)

IOCL reaffirms its plans for expanding Natural Gas sales by 300% from current level and expanding its RE assets to 31 GW in addition to setting up a 5 GWh of lithium–ion battery making capacity by 2031 to substantially diversify from oil business. (S#18)

C3) Coal India Limited *: CIL constitutes one of the biggest CPSUs in India with an employee base of over 2 lakh and currently the single largest producer of coal in India.* ***This will certainly be one of the biggest company going to be impacted by phasing out coal and hence pertinent to target Net zero along with diversification plans to redeploy the assets and the dependent stakeholders by 2040****. Its transition plan includes:*

- Greening the mining areas: helped in creating about 81,000 tonnes of carbon sink per year.
- Creation of Eco-Park: converting its abandoned mines into Eco parks with 30 completed.
- Adopted of a mix of energy efficient measures resulting in reduction of 69k tonnes of Co2.
- Total savings on energy was 84.20 million KwH (units) due to various efficiency reviews.
- Novel out-of-the-box initiative resulted in sand from overburden material used for buildings.
- Mine water discharged from mines benefitted 11.10 lakh people in 837 villages.

MoU with BHEL for promoting indigenously developed Pressurized Fluidized Bed Gasifier (PFBG) technology will result in **cleaner use of coal under the gasification mode**. **(S19)**

Diversification efforts: plans include new units for Aluminium, RE , Critical mineral, BESS, GH2 etc.**(S#20)**

Other Inputs on Coal's Future in India:

a) Why India Cannot Ignore Coal Anytime Soon (Ref#17)

As per the recent report of IIM Ahmedabad, coal is projected to continue as the **backbone of the Indian energy system until the next two decades** and its phase-down will require active policies on critical minerals.

The report said India's emissions would range between 0.56 btCO2 (billion-ton of carbon dioxide) and 1.0 btCO2 in 2070 as the remaining gap in emission is likely to be offset through sequestration in forest covers. **(S21)**

Clean, affordable electricity at low cost can be achieved in net-zero pathways, especially with a focus on nuclear power and renewable power.

The study by IIM is coordinated by NITI Ayog and important for GOI's long term plans on coal sector.

b) Sustainable Development for Coal Sector (Ref#18)

Government has put major thrust on sustainable development in coal mining and is taking multi-pronged action on both environmental & social fronts through Out of Box measure like: **(S#22)**

i) **Utlization of Mine Water:** Top most priority is being given to gainful utilization of Mine Water for irrigation & providing treated water.

ii) **Eco Parks:**10 new Eco-Parks in different mining areas are under different stages of development in ddition to 15 eco-parks already developed.

iii) **Bamboo Plantation** along coal transport roads and on the edges of mines will help in minimizing dust pollution.

iv) **Extraction and use of Sand from Over Burden (OB):** for use as construction & stowing materials resulting in cheaper sand and minimization of the land required for OB dump in future projects.

v) **First Mile Connectivity (FMC)** :coal is being transported through conveyor belt from Coal Handling Plants to Silo for loading resulting in reduced transporation and related carbon footprints.

vi) **Renewable Energy:** Towards use of renewable energy, CIL has set a target to establish 3 GW of Solar PV projects by FY24 to become self reliant in electricity.

vii) **Bio Reclamation and Tree Plantation:** Bio-Reclamation and massive tree plantation with new techniques like seed ball plantation have been adopted in many mines for providing green cover on Over Burden Dumps monitored through remote sensing. Similarly, systematic mine closure plan with land reclamation & restoration is also vigorously monitored to reuse the reclaimed land for agriculture purpose in future.

c) Coal India Aims for Net Zero in next 4 years (Ref#19)

Biggest miner of the fuel by output in the world, CIL plans to become a net-zero carbon emitter in three to four years through RE, greater internal energy efficiency,

cleaner transport and efforts to boost green cover, as per their CMD in a presentation to the 15th Indian Coal Markets Conference. Especially they plan to utilize their land resources to build solar parks and use that RE power in their operations to reduce operational emission **(S#23)**

d) Coal India pursuing lithium assets in Argentina (Ref#20)

Coal India in collaboration with an US company is exploring investments in the Kachi lithium block of Argentina with an objective to secure the supply chain for battery companies.(S#22)

C4) NTPC: *the biggest power producer in India with over 72000 MW installed capacity* ***generating nearly 25% of nation's total electricity and hence vital for nations energy stability,*** *plans to retain its leadership in power sector by optimizing the thermal and RE power assets in the long run. It's Net zero roadmap includes:*

i) RE capacity nearly 20GW (including under execution) targeting 60 GW (40% of total) by 2032. **(S#24)**
ii) CC actions include decommissioning of old units, enhanced share of RE assets; CCUS and FGD technology for coal based plant etc.
iii) Net zero plans under finalization with NITI Ayog for 2030, 2037, 2047 scenario modeling.
iv) RE Generation Obligation (RGO) regulations introduced by GOI from Feb 2023 requiring any coal plant targeting COD from 1/4/23 to mandatorily built/ procure 40% capacity of the coal plant from RE sources.
v) Business Responsibility Report Sec C Rule 6 (ref page 286-296 of the AR) gives detailed disclosure of emission and other natural capital impacted by business duly reviewed/ audited by independent entity namely KPMG **(S#25)**

Supplementary notes on NTPC roadmap for cleaner energy:

a) Blue Coal Power Plants for India's Net Zero Targets (Ref#21)

Energy transition is inevitable but for a developing country like India, where per capita energy consumption much lower than global average, ensuring its security, sustainability and affordability are significant too.

The electricity requirement is expected to grow with GDP growth and the per capita consumption may rise to 3000 KWh by 2040 from 1800 KWh now.

RE capacity alone seems inadequate and hence focus on cleaner use of fossil based power is also important. Fossil based plants **are facilitating the integration of variable renewable energy into the grid by providing the required flexible operation and ancillary services for grid stability. (S#26)**

A comprehensive roadmap thus include phasing out the inefficient plants, biomass co-firing, use of high efficiency low emission (HELE) and Ultra Super Critical (USC) technologies and CCUS technologies.

This shall provide a win-win situation i.e. cheapest solution for de-carbonization, facilitating integration of variable RE to the grid and also provide opportunity for utilizing coal resources.

b) G20 Meet on CCUS Organised by NTPC (Ref# 22)

NTPC Limited hosted an international seminar on 'Carbon Capture Utilization and Storage (CCUS)' at the First Energy Transitions Working Group (ETWG) meeting of G20 nations.

Along with NITI Ayog members, NTPC officials explained the importance of CCUS technologies for clean energy transition leading to Net-Zero goal. They also shared several important CO2 emission mitigation measures and key green initiatives being spearheaded by India. This was attended by over 200 delegates who shared their experiences on same.

A Study Report on "CCUS Technology Gaps and International Collaboration" was show cased along with NTPC's flagship project on Flue Gas CO2 by capturing it and converting it into useful hydrocarbons, i.e., Methanol. **(S#27)**

c) Clean Energy Powers Up NTPC (Ref#23)

NTPC steadily moving towards expansion of RE in the long term while ensuring fossil based needs in the short term as reflected by its FY 23 results. Yearly addition of RE capacity for the year crossed fossil fuel plants added in the year. **Yearly generation increased 11% overall but the RE generation was double of the FY22 RE generation**.

NTPC now has 89 power generation facilities: 35 coal-based plants, 29 solar, 11 gas-based facilities, 11 hydro plants and 3 wind power stations.

While it has crossed a total profile of 72GW power plants, it targets 16GW RE plants in next 2 years while limiting fossil fuel plant addition to just 10GW.

NTPC is developing a net zero roadmap with government think tank Niti Aayog called "Brighter Plan" with clear key performance indicators and target. It already has 38 million trees in and around projects to act as carbon sinks and a mega eco-park at Badarpur in Delhi. It has implemented zero liquid discharge at 19 stations. Commencement of Air cooled condenser at North Karanpura plant is expected to save around 75% water. Ash utilization has increased to 83% under sustainable waste management while the company targets130GW by 2032. **(S#28)**

Its global initiative under RE includes solar plants of over 6500 MW in Sri Lanka, and some African country. NTPC believes in optimizing the mix of RE and conventional fuel based generation in the long run.

A) Conclusions/ Suggestions: (linked to above with S#)

S#1) Convergence with GOI policies is critical for major companies of Power and Transportation sector.

S#2) ***While the IEA report is encouraging for India's RE sector potential for job creation, long term skill development and redeployment needs attention****.*

S#3) Though there seems a short term respite from immediate coal phase out, India should plan for better cleaner utilization of coal up to 2040 and phase out thereafter.

S#4) Better RE utilization (now constrained by Grid limitation) and AC machines optimization linked to innovations like RE based ACs, should make transition effective.

S#5) ONGC's expansion of its fossil

operations for energy security of the nation for next 20 years will reduce immediate import burden of India.

S#6) NTPC's adoption of Air Cooled Condensers (instead of conventional water cooled condensers) will reduce water use.

S#7) Viability of the current GH2 needs to be improved drastically for it mass usage.

S#8) Electrolyzers are very costly and hence GOI efforts to reduce its cost.

S#9) Bio(E3) seems to be another major milestone in cleaner use of the fossil based oil and needs to be quickly adapted by companies like ONGC and IOCL.

S#10) The 4 CPSUs with combined turnover of over 18 lakh crore , CtG of nearly 4 lakh crore, Manpower over 4 lakh, Shareholders over 50 lakh and CSR touching over 100 lakh lives, thus have a very significant number of stakeholders delicately poised due to imminent fossil fuel phase out and need the transition and diversification .

S#11) As ONGC's aims adopts CCUS to reduce production emission, in the long run it should adopt diversification of products under RE, GH2 etc.

S#12) Rising import of crude oil is a major concern for India's energy independence.

S#13) IOCL plans for 30 GW RE capacity (as against 60GW by NTPC) by 2030 will make it a future mega player under power sector.

S#14) The well structured ***Focus Areas*** *of IOCL should become benchmark practice for other companies to follow.*

S#15) Though, GH2 seems to be a very good form of clean energy for the future, its current production cost needs to become viable.

S#16) EV charging stations alongside most of the fuel stations if operative on RE would make the EV industries truly greener.

S#17) India's expanding aviation sector should encourage the fuels like SAF to become one of the best green energy products of IOCL.

S#18) IOCL seems to be the most focused company to diversify from its fossil base.

S#19) Coal Gasification and carbon sinks seems to be the two best short term measures to substantially reduce emissions.

S#20) These diversification plans of CIL seems to be in the right direction and will gain gradual intensity with the coal phasing out stages.

S#21) Out of box measures listed now by coal sector to minimize the impact of its emission can be expanded with local options for using the reclaimed land.

S#22) Operational emission of Coal India can easily be curtailed though the product itself is poised for phase out and hence needing replacement and cleaner use.

S#23) Coal India's mining diversification under RE related material is truly positive.

S#24) NTPC should not only aim to built RE assets to the tune of over 50% of its total installed capacity but also gradually substantially upgrade RE power generation.

S#25) Emission control in power sector entities like NTPC is one of the cardinal areas of Climate Actions ***and hence 3rd party evaluation is a must****.*

S#26) Effective emission reduction through comprehensive optimization of variable mix of low carbon coal power

and higher proportion of RE generation needs to be optimized by NTPC in the long run

S#27) Sharing of experience on Global forums really improves Climate Actions.

S#28) Comprehensive approach to CC includes emission controls, water optimization, waste water utilization and other related issues like ash utilization.

Conclusion*:*

Net Zero goals & detailed roadmap of the four CPSUs seem to be rightly initiated but would require ***timely finance (internal resources should suffice) and focused monitoring for success****.*

The real challenge for effective transition for these CPSUs will depend on their ability to ***constantly innovate and indigenize various mix of lower emission but viable energy forms and retrain and redeploy the vast labor force along with realigning the ecosystem of various stakeholders around these companies*** *so that they are attuned to the sustainable green energy chain. This may require a pro-active Board level committee to effectively monitor its implementation phase including being flexible and quickly adapt emerging technology.*

Also there should be a better mechanism of coordination between ONGC and IOCL on one hand and between CIL and NTPC on the other to smother out common issues.

At the same time these CPSUs should also realize the importance of applied R&D and widespread outreach plans to mould customer preferences for greener energy in the long run to successfully transit as major market share players in the Green Energy Ecosystem by somewhere around 2040 and also become major pillars of India's energy independence by 2047 AD. In the next 2 decades the ownership structure may also change but the path of consistent adoption of greener and cleaner products should never be diluted to remain sustainable.

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Ref#22-Media publication dated 02/05/23 in NTPC web
Ref#23- Article in fortuneindia.com dated 05/12/2023

Abbreviations used

GHG- Green House Gas (Emission); RE: Renewable Energy (Solar/wind/hydro);
CCUS: Carbon Capture, Utilization and Storage; BESS: Battery Energy Storage Systems;
EVs- Electrical Vehicles; GH2- Green Hydrogen (RE Based); CBG- Compressed Bio Gas
CPSUs-Central Public Sector Undertakings; COP- Conference of Parties (Annual Summit); IEA- International Energy Authority;
ONGC-Oil & Natural Gas Corporation Limited; IOCL- Indian Oil Corporation Limited;
CIL- Coal India Limited; NTPC- National Thermal Power Corporation Limited

EL NINO AND THE INDIAN FINANCIAL MARKET - AN ANALYSIS OF NIFTY AND USD-INR

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Abstract

This study employs quantitative analysis to examine the performance of the Nifty Index and the USD-INR exchange rate in the Indian financial market over the 27-years period spanning from 1996 to 2022, differentiate between periods characterized by El Nino period and the period other than such phenomena. By assessing daily returns, study results reveal that the average daily returns for the both Nifty index and USD-INR exchange rate show similarities between El Nino and non-El Nino periods. During El Nino periods, both the Nifty index and USD-INR exchange rate exhibit reduced volatility compared to non-El Nino periods, with statistical tests confirming the significance of this difference. Furthermore, the comparative regression analysis underscores a statistically significant negative relationship between the Indian Rupee (INR) value and Nifty index, with slightly stronger effects observed during non-El Nino periods. This research provides valuable insights for investors and policymakers aiming to gain a deeper understanding of the stability and performance of the Indian financial market within the context of climatic influences.

Keywords:

El Nino, Exchange rate, Nifty, Financial market, Stock market

Introduction

El Nino is a pattern of climate characterized by elevated sea surface temperatures in the Pacific, exerts widespread consequences worldwide. In the Indian context, it profoundly disrupts the critical South Asian monsoon, affecting agricultural yields and, consequently, the economic stability of the country. India's heavy dependence on the monsoon for agricultural sustenance exposes it to the influences of El Nino. The question at hand is whether this impact extends to the Indian equity market's performance, and the nation's currency value. Understanding the intricate connection between climatic events, specifically El Nino, and financial indicators is crucial in the context of Indian economy, given the pronounced adverse impacts of El Nino on Indian monsoon.

The El Nino occurrence, commonly known as "El Nino," is a climate Incident characterized by the periodic elevation of temperature on sea surface in the eastern and central equatorial Pacific Ocean. It constitutes a part of the ENSO (El Nino-Southern Oscillation), a multifaceted climate pattern with global implications for weather. El Nino occurrence tend to happen every 2 to 7 years and can persist for several months. During El Nino episodes, the rise in ocean temperatures initiates changes in patterns of atmospheric circulation, which, in turn, have consequences on worldwide weather conditions. These alterations may lead to a variety of effects, including increased rainfall in certain regions, droughts in others, and disturbances in the ecosystems of marine. El Nino can exert far-reaching impacts on fisheries, agriculture, and economies, underscoring its significance as a phenomenon that necessitates close monitoring and comprehension.

The relevance of this study stems from the growing body of literature suggesting that climatic phenomena like El Nino can have profound economic impacts, particularly in agriculture-dependent economies like India. El Nino events are known to disrupt monsoon patterns, leading to agricultural shortfalls, which can impact the broader economy. This, in turn, can affect the financial markets, including stock indices like Nifty and exchange rates like USD-INR. The motivation behind this study is to empirically investigate whether these macroeconomic disruptions due to El Nino have a statistically significant impact on the Indian financial markets. Previous studies have suggested a potential link, but there is a paucity of research specifically analysing the Indian context, particularly in relation to exchange rates. This study aims to fill that gap.

The economic relationship between El Niño and non-El Niño periods with stocks/exchange rates is intricate and multifaceted, unfolded by various factors such as agricultural production, commodity markets, consumer spending, monetary policy, and investor sentiment. During El Niño events, regions heavily reliant on agriculture may suffer from adverse effects like droughts or floods, leading to decreased crop yields and increased food prices, negatively impacting stocks which are reliant on the agricultural sector. Disruptions in global commodity markets due to El Niño can affect commodity

prices, influencing the profitability of related companies and their stock prices. Additionally, changes in food prices during El Niño may affect consumer spending patterns, impacting sectors such as retail and discretionary spending. Central banks may adjust monetary policy in response to El Niño-induced inflationary pressures, affecting stock prices and exchange rates. Exchange rates would be influenced by disruptions in agricultural production and changes in commodity prices, as well as by investor sentiment and risk perception. Overall, El Niño events introduces uncertainty into financial markets, leading to higher volatility as investors reassess their risk exposures. Understanding these dynamics is crucial for analyzing how El Niño events may impact financial markets.

This study aims to explore the relationship between climate variability and the stability of India's financial markets, specifically focusing on the Nifty Index and the INR value during El Nino and non-El Nino periods. This study posits that the El Nino climatic event has the potential to affect psychological factors and the agriculture sector, both of which wield significant influence over the economy. Consequently, these impacts may indirectly extend to affect financial factors. The study will rely on historical data analysis and empirical evidence, without accounting for other macroeconomic factors that may affect these financial indicators. It is not intended for predicting future market trends but rather to uncover historical connections between El Nino occurrences and India's financial markets.

Findings of this study may be useful for policymakers, investors, and financial institutions in India as it aims to reveal how El Nino affects the Nifty Index and the INR exchange rate. By understanding this relationship, it provides insights into the vulnerability of India's financial sector to climate-related risks. These findings can guide stakeholders in making informed decisions and taking measures to mitigate potential disruptions caused by the El Nino occurrences. Additionally, the research has broader implications for climate economics and sustainable financial management by highlighting the link between climatic variations and financial market performance.

This study commences with an introduction to the phenomenon of El Nino and its potential implications within the Indian context. Subsequently, it offers a concise summary of pertinent literature, followed by an emphasis on the study's objectives and hypothesis, while also detailing the research methodology. The focal point of the study is dedicated to presenting and analysing the results of empirical tests. Lastly, the study concludes by summarizing its findings and offering suggestions.

This study focuses on analyzing the impact of El Niño on the Indian financial market, specifically the Nifty Index and USD-INR exchange rate, without considering global currencies or markets. The analysis is limited to comparing performance during El Niño and non-El Niño periods, without examining potential lead-lag relationships between variables. Additionally, structural breaks in the data were not formally analyzed, as it falls outside the primary objective of understanding the correlation

between El Niño and market movements. Future research could address these gaps by expanding the scope to include other currencies, studying lead-lag relationships, and incorporating structural break analysis for more comprehensive insights.

Review of Previous Studies

Several studies have investigated the relationship between El Nino occurrences and their impact on various economic indicators. The connection between El Nino occurrences and a nation's GDP was explored by Brunner (2002), revealing that a significant El Nino event could lead to fluctuations in GDP ranging from 10% to 20%. Cashin et al. (2017) highlighted the Undesirable effects of El Nino on primary sector, particularly in regions vulnerable to droughts or heavy rainfall. Their work emphasized that the extent of the impact on GDP growth is contingent upon the volume of primary sector and the level of economic diversification. These findings underscore the vulnerability of economies to the disruptive forces of the El Nino, highlighting the requisition for proactive measures to mitigate its adverse effects.

Some Studies have delved into the influence of weather patterns on performance of stock market. Saunders (1993) identified a strong correlation between the stock performance on the New York Stock Exchange and sunny days, attributed to the psychological influence known as mood. Hirshleifer and Shumway (2003) emphasized on the psychological impact of weather, specifically morning sunshine, on daily returns of market index across multiple countries. Their findings indicate a significant correlation between stock returns and sunshine, whereas snow and rain show no such relationship. Kamstra et al. (2003) provided compelling evidence suggesting the significant impact of Seasonal Affective Disorder (SAD) on global stock market returns, particularly in higher-latitude countries. Chang et al. (2006) utilized a threshold model with the GJR-GARCH process to explore the connections between weather elements and stock market returns in Taiwan, focusing on temperature, humidity, and cloud cover. Analyzing daily data, the research identifies temperature and cloud cover as influential factors impacting stock returns in Taiwan. Furthermore, the study reinforces the necessity to include behaviorally neutral economic variables in asset pricing models. Additionally, Symeonidis et al. (2010) focused on the influence of various weather elements such as cloudiness, precipitation, temperature, and nighttime length on volatility of stock market, revealing an inverse relationship between cloudiness and nighttime length with volatility. Novy-Marx (2014) identifies a connection between cold weather and the observed size anomaly in January, potentially influencing aggressive risk-taking behavior. Additionally, the influence of the El Nino on market behavior is recognized as a known anomaly, with return strategies linked to the distinctive climate pattern. Wang et al. (2018) explore the weather impact on stock returns in Taiwan, Japan, and Hong Kong, considering factors such as temperature, humidity, and cloud cover and incorporating market conditions through the GJR-GARCH model. These studies collectively provide insights into the

intersection of weather, natural disasters, and stock market dynamics. The studies collectively shed light on the importance of psychological and behavioral factors in shaping investment behavior and market dynamics, pointing towards the need for comprehensive analyses that integrate such variables.

The Repercussion of climate change on financial markets have become a focal point of research. The association between El Nino and economic crises is explored by Smith (1998), connecting the appearance of the 1997 El Nino with the Asian Crisis during the same year. Smith's analysis points to the sudden economic reversal in the Thai economy, coinciding with a global downturn triggered by the overproduction of semiconductors, impacting the computer and electronics sectors worldwide. The rise in sea surface temperature is among the consequences of El Niño. Considering the inverse relationship between temperature and stock returns, this connection is possibly influenced by apathy and aggression (Cao & Wei, 2005). Consequently, recent years have seen a pursuit for the influence of weather on stock markets. The connection between stock market performance and climate change is explored by Beatty and Shimshack (2010), who highlight the immediate and significant impact of climate ratings on capital market returns. Seetharam's (2017) study examines the repercussion of natural disasters on the performance of US-listed stocks, revealing a significant decrease in stock market valuations for exposed companies relative to non-exposed firms. Hong et al. (2019) examined the stock market efficiency in pricing risks associated with climate change, revealing the market's underreaction to critical climate risks such as drought. Bansal et al. (2016) identified the Adverse influence of persistent temperature shifts on overall wealth, coupled with a positive risk premium in US and global equity markets, emphasizing the need to incorporate long-term temperature changes in forward-looking equity prices. The analysis of the impact of natural disasters on Hong Kong's stock market highlighted the immediate negative impacts on market returns and volatility, emphasizing the efficacy of Hong Kong's emergency response system in mitigating these impacts (Nguyen and Chaiechi 2021). These studies collectively underscore the prominence of understanding the interplay between climate-related risks and financial market dynamics, calling for further comprehensive investigations into these phenomena.

In summary, the above literature collectively delves into various facets of the relationship between weather patterns, climate change, and environmental phenomena with financial markets and economic indicators. It highlights the growing body of research that underscores the multifaceted influence of factors like El Nino, other weather and climate changes, and natural disasters on stock market behaviour, GDP, and financial market dynamics. Despite the recognized influence of El Nino on worldwide weather patterns and the economy, there remains a notable gap in the understanding of its specific effects on the financial market of India, particularly the Nifty Index and the INR exchange rate.

Objective

The primary objective of this study is to quantitatively analyse and compare the performance of the Nifty Index and the USD-INR exchange rate during El Nino periods and non-El Nino periods.

Hypothesis

- There is no significant difference in the performance of both the Nifty Index and the USD-INR exchange rate between the El Nino and non- El Nino periods.

The statistical tests were conducted to rigorously assess the performance of the Indian financial markets, particularly the Nifty index and the USD-INR exchange rate under El Nino events and other time period. The basic hypothesis is that there is no significant difference in the performance of Indian financial market under El Nino events and other time period. The tests employed include the t-test for mean differences, f-test for variance differences, and regression analysis to quantify the impact difference. Each of these tests is justified by the need to establish a robust and statistically significant relationship.

Data and Period

Table 1 – Classification of Study Period

El Nino Period	Months	Non-El Nino Period	Months
April 1997-June 1998	15	January 1996- March 1997	15
May 2002-March 2003	11	July 1998-April 2002	46
June 2004-March 2005	10	April 2003-May 2004	14
August 2006-February 2007	7	April 2005-July 2006	16
June 2009-April 2010	11	March 2007-May 2009	27
September 2014-May 2016	21	May 2010-August 2014	52
August 2018-July 2019	12	June 2016-July 2018	26
-	-	August 2019-December 2022	41
Total months	**87**	**Total months**	**237**

Source: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

The study period for this analysis ranges from January, 1996 to December, 2022 (324 months). Daily closing rates of USD-INR exchange rate and the Nifty index were sourced from investing.com, and subsequently, daily returns were calculated. We aim to exclusively focus on El Nino periods. To achieve this, we begin by gathering historical Oceanic Nino Index (ONI) values {published by the National Oceanic and Atmospheric Administration (NOAA)} for our study period. The criteria for El Nino occurrences, which typically involve a positive ONI value surpassing

a +0.5°C threshold, sustained for a 5 consecutive overlapping seasons. The whole study period was classified into El Nino period and non-El Nino period as in Table 1.

Methodology

Statistical Terms

The statistical terms used to measure the performance of USD-INR exchange rate and the Nifty index are as follows:

Average Daily Change (ADC): ADC represents the mean or average change in value of an index or exchange rate on a daily basis over a specified period.

$ADC = \frac{1}{n}\sum_{i=1}^{n} DC_i$, Where DC_i denotes the change in value for each individual day, and *n* represents the total number of days in the period.

$DC_i = \frac{(V_1 - V_0)}{V_0} \times 100$, Where V_1 denotes the value of variable for the day1 of which change is calculated and V_0 denotes the value of variable for the previous day of day1.

Variance: Variance measures the dispersion or spread of the daily changes of an index or exchange rate from its mean.

$$\text{Variance} = \frac{1}{n}\sum_{i=1}^{n}(DC_i - ADC)^2$$

Standard Deviation: Standard deviation quantifies the average deviation or dispersion of the daily changes of an index or exchange rate from its mean.

Standard Deviation = $\sqrt{\text{Variance}}$

Downside Risk: Downside risk measures the potential loss or downside volatility associated with an investment. It focuses on negative changes.

Downside Risk = $\sqrt{\frac{1}{n}\sum_{i=1}^{n}(NDC_i - NADC)^2}$. Where NDC_i denotes the negative change in value for each individual day, and NADC denotes the average of daily negative change.

Regression Analysis

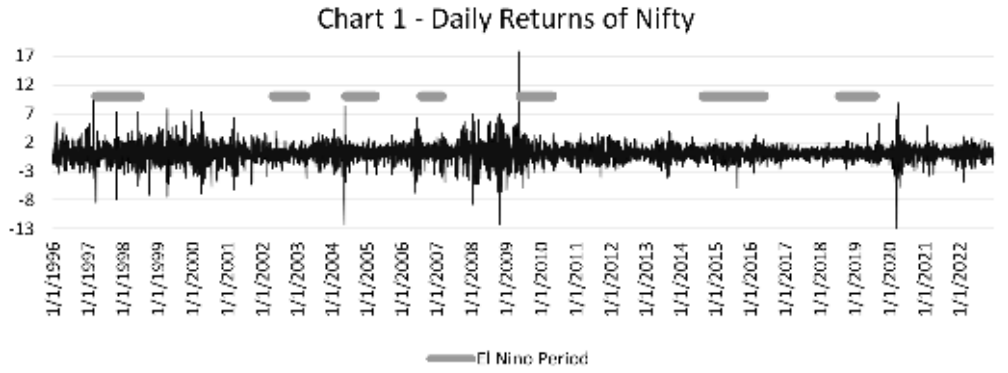
The regression analysis was conducted to examine the relationship between the Returns of nifty and INR value for both El Nino and non-El Nino periods.

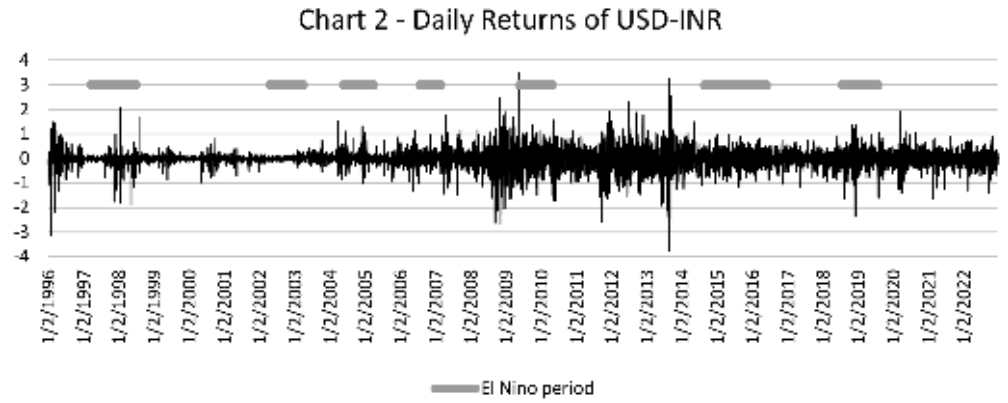
Hypothesis tests

Z-test for mean difference was performed to compare the means of daily changes between El Nino and non-El Nino periods for both Nifty and USD-INR. F-test two-sample for variances was conducted to compare the variances of daily changes between the two periods.

Results and Analysis

The Chart 1 and Chart 2 display the data of daily returns for the Nifty index and the USD-INR exchange rate respectively, from January 1996 to December 2022, with highlighting the El Nino period.





The performance comparison in Table 2 is based on the percentage change in the Nifty index and the USD-INR exchange rate during the periods of El Nino events and non El-Nino periods. The variables under comparison are the average returns (for Nifty) and the exchange rate (USD-INR). For the Nifty Index, throughout El Nino periods, the average daily return remains at 0.03709, while it is little higher at 0.06216 during non-El Nino periods, suggesting better market performance during these times. The variance demonstrates fluctuations in the Nifty Index, with a value of 1.43404 during El Nino periods, which is greater of 2.45398 during non-El Nino periods, indicating a higher degree of variability in returns during the latter periods. Similarly, standard deviation sees a marginal difference from 1.19751 in El Nino periods to 1.56652 non-El Nino periods, pointing towards heightened volatility in the Nifty Index during non-El Nino periods. Moreover, the downside risk

follows a similar trend, with a relatively lower risk of 0.84638 in El Nino periods compared to 1.18187 during non-El Nino periods, highlighting a heightened possibility of losses during non-El Nino periods.

Table 2 - Performance Comparison of USD-INR and Nifty in El Nino and Non-El Nino Periods

Data	Nifty		USD-INR	
Statistic	**El Nino Period**	**Non-El Nino Period**	**El Nino Period**	**Non-El Nino Period**
Average Daily Return	0.03709	0.06216	-0.00546	-0.01565
Variance	1.43404	2.45398	0.12021	0.16297
Standard deviation	1.19751	1.56652	0.34671	0.40369
Downside risk	0.84638	1.18187	0.27720	0.33414

Pertaining to USD-INR dynamics, during El Nino periods, the average daily return experiences a minor dip, settling at -0.00546, while non-El Nino periods witness a more negative return, registering at -0.01565. Additionally, the variance of 0.12021 in El Nino periods indicates fluctuations in the exchange rate, while a relatively higher variance of 0.16297 characterizes non-El Nino periods, reflecting a more stable market during the El Nino. Standard deviation, which measures data dispersion, illustrates a relatively lower volatility of 0.34671 in El Nino periods and a slightly higher value of 0.40369 during non-El Nino periods, indicating a more stable USD-INR exchange rate in El Nino periods. Furthermore, the downside risk, depicting the potential for losses, exhibits a slightly lower value of 0.27720 in El Nino periods, contrasting with 0.33414 during non-El Nino periods, suggesting a relatively reduced risk of losses in El Nino periods.

Table 3 – Z Test For Mean Difference

	Nifty		USD-INR	
Statistic	**El Nino Period**	**Non-El Nino Period**	**El Nino Period**	**Non-El Nino Period**
Mean	0.037094	0.062155	-0.00546	-0.01565
Known Variance	1.43404	2.45398	0.12021	0.16297
Observations	1791	4928	1892	5147
Z	-0.69543		1.18523	

*P (Z ≤ z) one-tail	0.24339	0.11796
z Critical value (one-tail)	1.64485	1.64485
*P (Z ≤ z) two-tail	0.48679	0.23592
z Critical value (two-tail)	1.95996	1.95996
Null Hypothesis	There is no significant difference in the mean of data between both the periods.	
	Accepted	Accepted

Note: * At significance level of 0.05

Table 3 presents the z-Test results of Nifty and USD-INR, meticulously compares the means (averages) of two distinct periods, namely the El Nino Period and the Non-El Nino Period. With respect to the Nifty, with the presumption of null hypothesis stating the absence of any significant disparity between the means of the two periods (Mean Difference = 0). For the Nifty, a z-value of -0.69543 was computed. One-tailed and two-tailed tests were conducted, resulting in p-values of 0.24339 and 0.48679, respectively, both of which exceeded the typical significance level of 0.05. This suggests that there isn't enough evidence to refute the null hypothesis., suggesting similarity between the mean returns of the Nifty during El Nino and non-El Nino periods.

Regarding USD-INR, a z-value of 1.18523 was obtained. Similar one-tailed and two-tailed tests were conducted, with p-values of 0.11796 and 0.23592, respectively, exceeding the significance level (that is 0.05). This also suggests a lack of substantial support to deny null hypothesis, indicating similarity in the means of USD-INR during El Nino and non-El Nino periods. In summary, both Nifty and USD-INR show similar performance during these different climate periods.

Table 4 - F-Test Two-Sample for Variances

	Nifty		USD-INR	
Statistic	**El Nino Period**	**N on-El Nino Period**	**El Nino Period**	**Non-El Nino Period**
Mean	0.03709	0.06216	-0.00546	-0.01565
Variance	1.43404	2.45398	0.12021	0.16297
Observations	1791	4928	1892	5147
df	1790	4927	1891	5146

F	0.58437	0.73760
*P	0.00000	0.00000
Null Hypothesis	There is no significant difference in the variance of data between both the periods.	
	Rejected	Rejected

Note: * At significance level of 0.05

Table 4 presents the outcomes of the F-Test Two-Sample for Variances, which aims to examine the differences in variances between El Nino Period and Non-El Nino Period. For the Nifty, the El Nino Period has a variance of 1.43404, while the Non-El Nino Period exhibits a higher variance of 2.45398. These variance calculations are based on substantial sample sizes, with 1791 observations for El Nino Period and 4928 observations for the Non-El Nino Period. The degrees of freedom (df) are 1790 for the El Nino Period and 4927 for the Non-El Nino Period, reflecting the statistical constraints. The computed F-value is 0.58437, and p-value is 0, indicating variance in El Nino period is significantly subtle than in the non-El Nino period. This analysis underscores a clear disparity in variances between the El Nino Period and the Non-El Nino Period, highlighting their distinct characteristics and underlying dynamics.

Regarding USD-INR, in El Nino Period, the mean is -0.00546, with a corresponding variance of 0.12021, conceived from 1892 observations. In contrast, for the Non-El Nino Period, the mean is -0.01565, and the variance is 0.16297, with observations from a larger sample size of 5147. The degrees of freedom are calculated as 1891 for the El Nino Period and 5146 for the Non-El Nino Period. The resulting F-value is 0.73760. In a one-tailed test, the obtained p-value is 0, indicating a significant lower variance in the El Nino period compared to non-El Nino period. This highlights a significant disparity between the variances of the El Nino Period and the Non-El Nino Period, signifying their distinct characteristics and indicating substantial variation in the data between these distinct timeframes.

Table 5 – Comparative Regression Analysis

Regression	Period	Correlation	Adjusted R-Square	Coefficient	*P-value
Impact of INR on Nifty	El Nino	-0.29692	0.08765	-1.00636	0.00000
	Non- El Nino	-0.30330	0.09181	-1.15861	0.00000
Impact of Nifty on INR	El Nino	-0.29692	0.08765	-0.08760	0.00000
	Non- El Nino	-0.30330	0.09181	-0.07940	0.00000

Note: * At significance level of 0.05

The Table 5 show a comparative regression analysis for two different periods (El Nino and Non-El Nino) and two different regressions (Impact of INR on Nifty and Impact of Nifty on INR).

Regarding the impact of INR on Nifty, a negative correlation between the Indian Rupee (INR) value and the Nifty stock market index in both the El Nino and Non-El Nino periods, with a slightly stronger negative correlation observed during the Non-El Nino period (-0.30330) compared to the El Nino period (-0.29692). The adjusted R-squared values for both periods are relatively low, suggesting that the regression models explain only a small percentage of the variation in Nifty's movement. In the El Nino period, the model accounts for approximately 8.765% of the variation, while in the Non-El Nino period, it describes about 9.181% of the variation. Coefficients of both periods are negative and reveal the estimated effect of INR on Nifty. During the El Nino period, for each unit rise in INR, Nifty is expected to decrease by approximately 1.00636 units. In the Non-El Nino period, the effect is slightly stronger, with each unit rise in INR leading to an expected decrease in Nifty by approximately 1.15861 units. The low p-values (0) in both cases suggest that the relationship between INR and Nifty is statistically valid during both El Nino and Non-El Nino periods.

In terms of the impact of Nifty on INR, negative correlation observed during both El Nino and Non-El Nino periods, with similar correlation values of approximately -0.297 for El Nino and -0.30330 for Non-El Nino. Adjusted R-squared values for both periods are low (0.08765 for El Nino and 0.09181 for Non-El Nino), indicating that the model explains a relatively small portion of the changes in INR during these periods. The coefficients for both periods are negative, signifying the estimated effect of Nifty on INR. In El Nino period, for each unit increase in Nifty, INR expected to decrease by approximately 0.08760 units. In the Non-El Nino period, this effect is slightly weaker, with each unit rise in Nifty leading to an expected decrease in INR by approximately 0.07940 units. The low p-values (0.00000) suggest that the connection between Nifty and INR is statistically valid, but the practical significance, as indicated by the coefficient size, is very small.

In summary, It seems evident that a statistically valid inverse correlation exists between INR value and Nifty, during both El Nino and Non-El Nino periods, with slightly stronger negative effects during the Non-El Nino period. However, the impact of Nifty on INR is weak during both periods, compared to the impact of INR on Nifty.

Conclusion

This research explores the Nifty Index and INR exchange rate performance in the Indian financial market, during El Nino periods and other periods. El Nino appearances refer to climate phenomena marked by elevated temperature of sea surface in eastern and central Pacific Ocean. These events are part of the ENSO pattern and can disrupt global weather patterns, impacting rainfall, droughts, and more. In India, El Nino Incidents significantly

influence the monsoon, thereby impacting agriculture and economic stability.

The findings of this analysis unveiled that the average daily returns for both Nifty and USD-INR were approximately identical in El Nino periods and non-El Nino periods. However, a noteworthy distinction in the variances of both Nifty and USD-INR between these two time frames, with slightly higher variance observed during the non-El Nino period. Furthermore, the comparative regression analysis revealed a statistically valid, weak inverse relationship between INR value and Nifty (stock value) during both periods, with a slightly more pronounced effect seen in the non-El Nino period.

In summary, the study indicates that the impact of El Nino climate events on the financial market has been relatively limited, with indications that other factors may exert more significant effects on financial markets during the specific study period. While El Nino's influence is acknowledged, it proves not to be the primary driver of financial market outcomes, underscoring the intricate and multifaceted nature of market dynamics. These findings provide valuable insights. for investors, policymakers, and stakeholders seeking to make informed decisions within the financial landscape under examination.

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EMERGING GLOBAL ECONOMIC SCENARIO: IMPACT ON INDIA'S FINANCIAL LANDSCAPE

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Haritha Ravi

Abstract

Global wars and policies of superpowers like the European Union, the United States of America, and China will have a significant impact on India's Financial Landscape. The researchers selected multi-stage stratified random sampling and developed a questionnaire after conducting a pilot study consisting of 60 respondents. Reliability, Normality, and Validity measures have been calculated and found to be satisfactory. Factor Analysis techniques like EFA, CFA, and Structural models like SEM have been applied. Chi-square values and Fit indices have been observed to be satisfactory and within the cut-off levels.

Keywords:

Global Economic Impacts, India's Financial Landscape, Economic Policies , Economic policy of European Union, Impact of Economic policy of the United States of America, Global Wars

Introduction and Statement of Problem

Financial markets, financial services, exchange rates, foreign trade flow, Balance of payment, etc. are the different phenomena that depend upon Global developments across the Globe. Gold prices in the Indian market, crude oil prices, and stock exchange indices are other factors that rely on worldwide developments. Not only the COVID-19 pandemic but also various other factors have to be considered to gain better insight into the ever-changing financial landscape of India. Stock exchange rates are affected by trade conflicts among major developed countries across the Globe. (Krishnan et al., 2022)[1]. Global uncertainty and increased costs in global transactions are the resultant aftereffects of the COVID-19 pandemic, which affected worldwide irrespective of the size of the economy. (Ciravegna & Michaliova, 2021)[2]. Before the COVID-19 Pandemic, many more studies pointed out the weakness of India in attracting foreign direct investment. India is still incapable of attracting foreign investment to its size and potential (Brahmbhatt et al., 2016)3. In 2014 another study pointed out that new global socio-economic powers like India, China, and Brazil challenge the century-old supremacy attached to the United States of America in the World Trade and Commerce (Hopewell. k, 2014)[4]. At this Juncture a study about various events / factors that affected the economic policy of India is of paramount significance. It requires added significance, given the fact that there is a dearth of findings in that domain.

Review of the Literature

Indian economy and its different sectors have suffered huge losses due to the COVID-19 pandemic. Export and manufacturing activities have been affected severely. Even the MSME sector has to face hardships during the turbulent period (Pravakar Sahoo, & Ashwani, 2020)[5]. Different developments across the globe certainly affect the Indian economy thanks to the Liberalization, Privatization, and Globalization regimes and liberal trade policies of India and developed countries across the Globe. Policies of the European Union and China's Economic problems have a significant impact on the world economy in 2016 (David, 2016)[6]. During 2014-2015 the share of high-income countries like the United States in the global agricultural output showed a declining trend whereas the share of middle-income countries like China, India, Brazil, and Indonesia represented a rising share.(Alston&Pardey,2014)[7]. Global South is the new reality. China and India are the economic powerhouses of the past. (Jakovljevic, M.,et al,2021)[8]. Foregin Direct Investment cannot be neglected in a developing country like India and it is dependent on global economic conditions. (Fernandez, M, et al, 2022)[9]

Objectives of the study.

1. To examine the relationship between the Economic Policies of Europe and the Indian Economy.
2. To research the relationship between the Economic Policies of the United States of America and Global Wars.
3. To evaluate the relationship between

the Economic Policies of China and the Indian Economy.
4. To analyze the relationship between Global Wars and the Indian Economy.
5. To understand the relationship between the Economic Policies of Europe and Global Wars.
6. To examine the relationship between the Economic Policies of China and Global Wars.

Scope of the research

It includes description about different variables, research methods and period of study.

Areas

This research has taken into consideration the following areas:

1. **Policy of the European Union**
   It is very important as the majority of the developed nations in the world belong to Europe. Their major policy decisions, wars affecting the continent, trade sanctions, etc are likely to have a major impact on international trade and Commerce. Besides export to Europe from India is very significant.
2. **Policy of the United Nations towards South Asian Nations especially towards India.**
   Even though India is not a member of The North Atlantic Treaty Organization, (NATO), still India is a strategic partner of the United States of America (USA) in certain world matters. The USA has to depend on India to combat China. Therefore the policy decisions especially the decisions of the American Central Bank affect the Indian Rupee and the stock Exchange Indices of India.
3. **Policy of China**
   China is one of the largest trade partners of India. As a nation, India depends on China in certain sectors. Especially the medicinal raw materials have been supplied by China to the Indian Pharmaceuticals. India is known as the pharma hub of the world. Therefore political and economic developments in China are very significant as far as the Indian economy is concerned.
4. **Global Wars**
   World Wars like the Russia-Urkraine War. The Israel-Hamas war and Israel-Iran war negatively affects the Indian Economy.
5. **Indian Economy**
   Indian Economy cannot function in isolation. It is obviously, it is affected by political forces and economic forces at the global level.

Research Methods

The Following are the important methods applied in the research

1. **Exploratory Factor Analysis**
   Factor loadings, Correlation between the variables, Communality, etc can be analyzed with the help of Exploratory Factor Analysis (EFA). Sampling Adequacy and Reliability concerning the factors are checked here with the help of relevant tests.
   Confirmatory Factor Analysis Technique.
   Confirmatory Factor Analysis (CFA) Technique helps the researchers to confirm the factors already identified

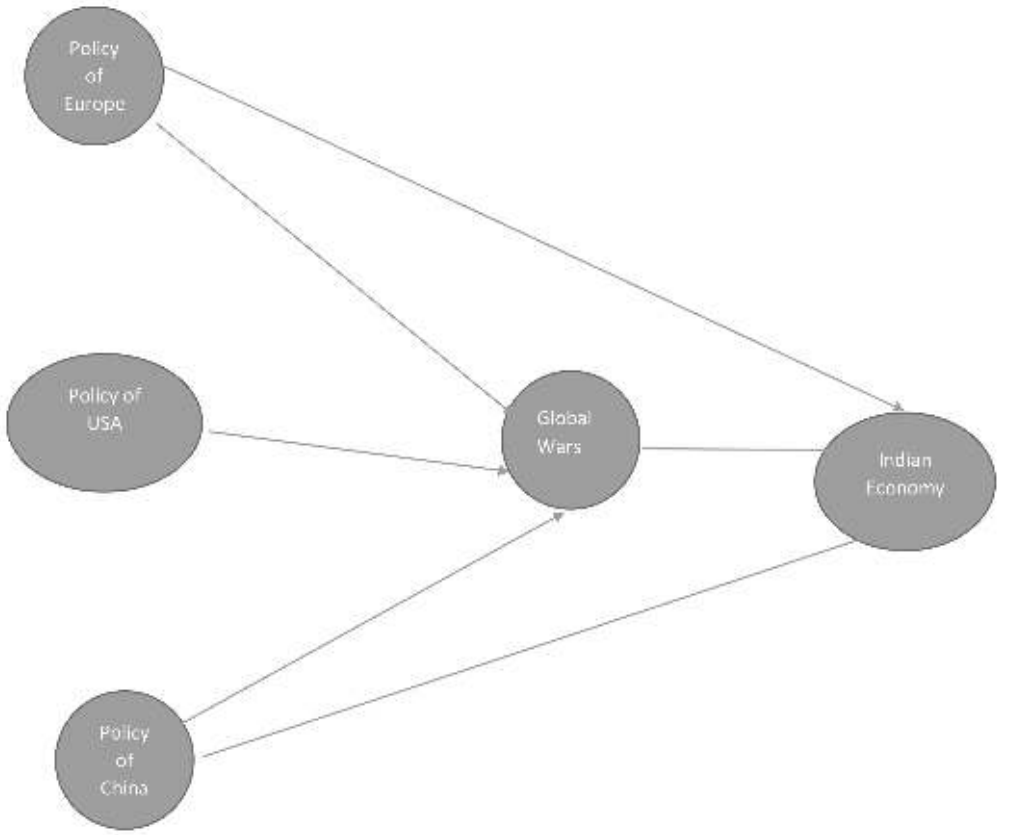
in the Factor Analysis stage. Different types of Validity are assessed here.

3. **Structural Equation Period.**
   A Theoretical model is tested and validated with the help of the Structural Equation Period. Fit Indices and Hypotheses are calculated /confirmed/ rejected with the help of the Structural Equation Period.

Period
Time span covered is 2021-2023.

Model Formulation.
Researchers have formulated a model after taking into consideration different dimensions and elements concerning the relevant theory.

Figure No: 1.Proposed Research Model.



Research Methodology.

The Population of the research.

Population concerning the present study consists of the following:

Commerce students of Kerala State, Commerce students of the Tamil Nadu State, Commerce professionals of both Kerala and the Tamil Nadu State. Commerce Professors of Both Kerala and Tamil Nadu State.

Sampling Method.

Multi-stage Stratified Random Sampling with three stages is the relevant sampling method applied in the present study. To collect the data both Google Forms and the questionnaire method have been applied by the researchers. A pilot study has been conducted on the data collected from Palakkad District. A sample size of 60 has been applied to collect the data for a pilot study. Reliability and Validity of the questionnaire has been evaluated by using the data collected. Convenient Sampling method has been adopted to collect data for the pilot study. Multi-stage Stratified Random Sampling procedure is detailed below:

Step I: Kerala State and Tamil Nadu State –Selected 5 districts from each State

Step II: Selected 5 towns from selected districts (Total 10 Towns)

Step III: Sample Collection Stage. 300 respondents from Tamil Nadu and 300 Respondents rom Kerala.

Size of each strata based on population

Commerce Professionals: 30+30=60.

Commerce Students : 200 +200=400

Commerce Professors : 70 +70=140

Total =600

Sample Size Calculation.

Here the population is indefinite. Cochran's formula is applied to find out the sample size.

$$N=Z^2pq/e^2$$

$$= (1.96) *1.96*0.5*0.5 / (0.4)^2 = 600$$

Variables

1.	Right politics in the European Union Countries	VI
2.	Economic distress in Turkey and Greece is to be addressed	V2
3.	Unemployment and Inflation in the UK is to solve	V3
4.	Cold war still exists	V4
5.	Terrorism is a problem in Europe	V5
6.	Economic distress in USA	V6
7.	Green Card in the USA is still active	V7
8.	Unemployment and inflation in USA	V8
9.	The Right political wings of the USA is good	V9
10.	Terrorism is a problem in USA	V10
11.	Terrorism is a problem in China	V11
12.	Single party is good for economy	V12
13.	Cheap Labour in Certain countries is a threat to India	V13
14.	Communist Economy is good	V14

15. Lack of Democracy is good for economic development. V15
16. The Russia-Urkraine War negatively affects the Indian Economy. V16
17. The Israel-Hamas war negatively affects the Indian Economy. V17
18. Israel-Iran war negatively affects Indian Economy. V18
19. Politics is related to economy V19
20. North Korean policy affects economic prospects V20
21. Cheap Crude Oil is significant V21
22. Wars offer opportunities to the developing Countries V22
23. Stability of Governments is a must for economic development V23
24. Global wars contribute positively to the developing Economies V24
25. Human resources contribute positively to the developing Economies V25

Factor Analysis Method, Confirmatory Factor Analysis Method and Structural Equation Modelling Method are the different types of tools applied to Explore factors, Confirm factors, and confirm the proposed research model. Different software like MS Word, MS Excel, SPSS, AMOS, and R Software are the different applied in the process.

Factor Analysis

Results and Discussion

Bartlett's Test of Sphericity is an important tool to assess the correlation dimension concerning factors.

Table No: 1. Sample Adequacy Values.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy Value.	Bartlett's Test of Sphericity Value.	Satisfactory or Not.
Observed Value:0.726	Observed Value: 0.000. Null Hypothesis is rejected.	Yes. Satisfactory. Sample is adequate.
Cut-Off Value-----0.50	Cut-Off Value Less than 0.05	Significant. Here null hypothesis is rejected by the researchers.

(Source: Based on Primary data)

Table No: 2

Communality Values

	Initial	Extraction
V1	1.000	.823
V2	1.000	.823
V3	1.000	.586
V4	1.000	.644
V5	1.000	.667
V6	1.000	.664
V7	1.000	.691
V8	1.000	.577
V9	1.000	.545
V10	1.000	.433
V11	1.000	.387
V12	1.000	.625
V13	1.000	.455
V14	1.000	.619
V15	1.000	.582
V16	1.000	.465
V17	1.000	.558
V18	1.000	.706
V19	1.000	.640
V20	1.000	.658
V21	1.000	.804
V22	1.000	.838
V23	1.000	.791
V24	1.000	.678
V25	1.000	.698

(Source: Based on Primary Data)

From Table No: 2, it is apparent that most of the values are either 0.5 or above 0.5. Therefore most of the variables are accepted based on Communality values.

Assumptions about Factor Analysis

Assumptions like Sampling Adequacy, No Significant outliers, Independence of observations and, linear relationship between variables are found to be correct in the present research.

Total Variance Explained

Total variance explained is 64%as per the Exploratory Factor Analysis.

Table No: 3

Values of the Rotated Component Matrix

Variable	Component				
	1	2	3	4	5
1		.903			
2		.903			
3		.746			
4		.757			
5		.786			
6				.780	
7				.809	
8				.722	
9				.690	
11			.566		
12			.772		
13			.621		
14			.737		
15			.741		
18					.792
19					.770
20					.775
21	.877				
22	.892				
23	.842				
24	.812				
25	.821				

(Source: Computed Values by Researchers)

The following variables are accepted as per the Factor Analysis .Factors are named as per the literature review and extensive research process. After the Exploratory Factor Analysis, 22 variables are satisfactory. Therefore researchers have taken those 22 variables for future analysis process.

1.Policy of Europe 2.Policy of USA 3.Policy of China 4.Global Wars 5.Indian Economy

PE1	PU1	PC1	GW1	IE1
PE2	PU2	PC2	GW2	IE2
PE3	PU3	PC3	GW3	IE3
PE4	PU4	PC4		IE4
PE5	PU5	PC5		IE5

Table No: 4.Reliability Measures. CRONBACH ALPHA Values.

Policy of Europe	0.884	Satisfactory .Reliable.
Policy of USA	0.774	Satisfactory. Reliable.
Policy of China	0.779	Satisfactory. Reliable.
Global Wars	0.792	Satisfactory. Reliable.
Indian Economy	0.924	Satisfactory. Reliable.

(Source: Computed Values by Researchers)

The following are the important hypotheses formulated after considering different dimensions and elements related to different concepts.

H0: The Policy formulated by Europe has no significant effect on the Indian Economy. (Null Hypothesis No: 1)

H1: The Policy formulated by Europe has a significant on the Indian Economy.

H0: The Policy formulated by the USA has no significant effect on Global Wars (Null Hypothesis No: 1I)

H2: The Policy formulated by the USA has a significant effect on Global Wars.

H0: The Policy formulated by China has no significant effect on the Indian Economy (Null Hypothesis No: 1II)

H3: The Policy formulated by China has a significant effect on the Indian Economy.

H0: Global Wars have no significant effect on the Indian Economy (Null Hypothesis No: 1V)

H4: Global Wars have a significant effect on the Indian Economy.

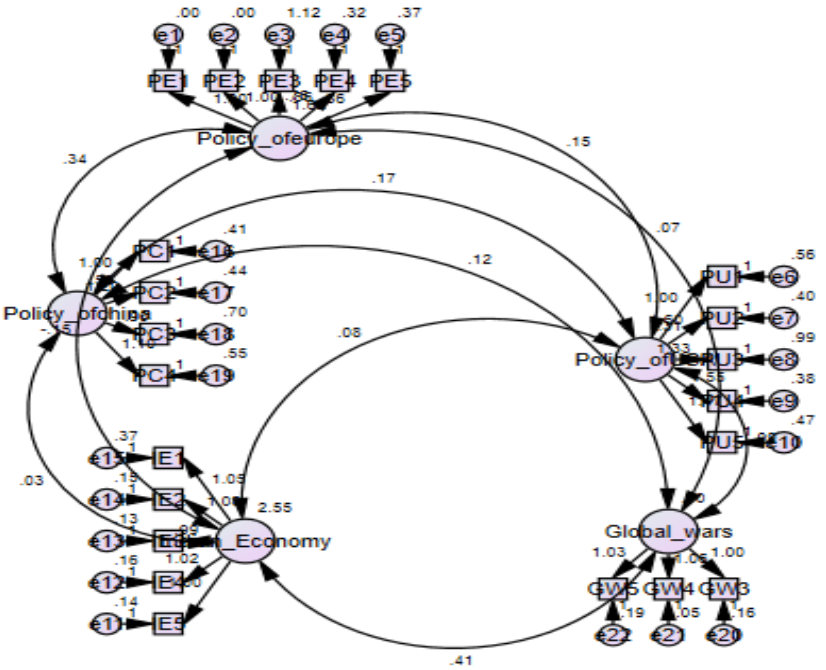
H0: The Policy formulated by Europe has no significant effect on Global Wars. (Null Hypothesis No: V)

H5: The Policy formulated by Europe has a significant effect on Global Wars.

H0: The Policy formulated by China has no significant effect on Global Wars. (Null Hypothesis No: VI).

H6: The Policy formulated by China has a significant effect on Global Wars.

Measurement Model.
Figure No:2



(Source: Drawn with the help of AMOS Software)

1.Normality assumptions Testing Process.

Table: 5
Normality Values

Variable Codes	Skewness Values	Kurtosis Values
PE1	-1.030	0.568
PE2	-1.044	0.598
PE3	-0.666	-0.382
PE4	-0.859	0.034
PE5	-0.948	0.563
PU1	-1.08	0.4
PU2	-1.13	0.8
PU3	-1.2	1.427
PU4	-1.1	0.9
PU5	-1.23	1.4
PC1	-1.57	2
PC2	-1.289	1.4
PC3	-1.455	1.98
PC4	-0.871	0.528
GW3	-1.314	1.288
GW4	-0.836	0.366
GW5	-1.077	1.036
IE1	-0.804	-0.690
IE2	-1.017	-0.387
IE3	-0.783	-0.827
IE4	-0.828	-0.539
IE5	-0.829	-0.617

(Source: Based on Primary data).

All variables follow normal distribution based on Skewness and Kurtosis values shown in Table 5.

Table: 6
Fit Statistics of the relevant Measurement Model

Fit Indices	Particulars	Obtained Values.	Desirable or Not
Overall Model Ch-square	Chi-square		Desirable
	Degrees of freedom		Desirable
	Probability		Desirable
	Chi-square/Degrees of freedom	7.118	Partially Desirable
Absolute Fit Values	Goodness-of-Fit Index (GFI) Value.	0.913	Desirable
	Root Mean Square Error of Approximation Value.	0.101	Partially Desirable
	Root Mean Square Residual (RMR) Value.	0.05	Desirable
	Standardized Root Mean Residual (SRMR) Value.	0.05	Desirable
Incremental Fit Indices can be classified into four.	Normal Fit indices (NFI) is	0.8	Partially Desirable
	Comparative Fit Index (CFI) is	0.803	Partially Desirable
	Tucker Lewis Index (TLI) is	0.805	Desirable
Parsimony Fit Indices can be classified into two.	Parsimony goodness of Fit (PGFI) index is	0.71	Desirable
	Parsimony normed fit index (PNFI) is	0.704	Desirable

(Source: Based on Primary data).

Even though certain Fit Indices are only partially desirable, the overall model is good enough for testing the structural model. Conclusions are based on the Structural model developed by the researchers.

Validity Testing Values

1 **Criterion Validity**
   - **A. Predictive Validity**- Based on regression analysis, the validity aspect is tested and proved satisfactory.
   - **B. Concurrent Validity-** It is good as far as the construct is concerned based on previous results.
   - **C. Postdictive Validity.**-On the basis of correlation analysis, the validity aspect is tested and proven it as satisfactory.

2. **Face Validity**- It is good as far as the construct is concerned based on expert opinion.
3. **Content Validity**
   The questionnaire has been sent to 20 Experts and 6 of them marked it as" Essential "'.Then CVR=ne-(N/2)/(N/2)=16-10/10=0.6. Any value that is greater than 0.05 is good. Here Content Validity assumptions are good.
4. **Construct Validity**
   It includes two types of Validity measures.
   1. Convergent Validity.
   2. Discriminant Validity

   To understand Convergent Validity and Discriminant Validity, the researcher has computed the following values.
   Convergent Validity measures –AVE and Construct Reliability or Composite Reliability are two measures of Convergent Validity.

Convergent Validity measures

Table No: 7
Validity Measures

Items	Standardized Regression Weights	Average Variance Extract (AVE)	Construct Reliability or Composite Reliability
PE1	1.000		
PE2	1.000		
PE3	.673		
PE4	.889		
PE5	.874	0.8	0.95
PU1	.596		
PU2	.813		

PU3	.593		
PU4	.813		
PU5	.765	0.52	0.74
PC1	.974		
PC2	.971		
PC3	.976		
PC4	.977	0.95	0.98
GW3	.941		
GW4	.767		
GW5	.811	0.71	0.88
IE1	.636		
IE2	.749		
IE3	.903		
IE4	.967		
IE5	.895	0.7	0.92

(Source: Computed by authors).

Both Average Variance Extract Values and Construct Reliability or Composite Reliability Values help the researcher to understand the Convergent Validity dimensions. If the value of the relevant Average Variance Extract is greater than 0.5, it shows good Convergent Validity with respect to the collected data .Likewise, if the value of Construct Reliability or Composite Reliability is greater than 0.7, it shows good Convergent Validity with respect to the collected data.

Table No:8
Table showing Discriminant Validity Dimensions.

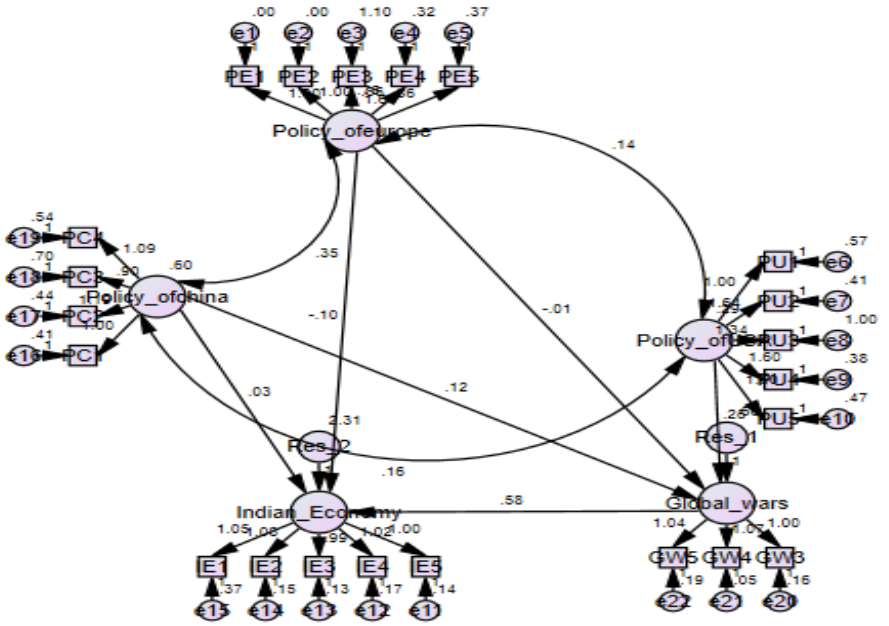
	CR Values	AVE Values	1	2	3	4	5
PE	0.95	0.8	**0.89**				
PU	0.74	0.52	0.220	**0.72**			
PC	0.98	0.95	0.351	0.93	**0.97**		
GW	0.88	0.71	0.069	0.201	0.180	**0.84**	
IE	0.92	0.7	-0.72	0.085	0.026	0.305	**0.83**

(Source: Computed by authors).

All the Square root of the AVEs are larger than the inter constructs correlations. So, the discriminant validity is established for this CFA model.

Structural Model

Figure:3. Structural Model



(Source: Based on primary data)

Here structural Equation Model depicts the relationship between various exogenous and endogenous variables .Besides structural relationships, co-variance relationships have also been portrayed in figure 3.

1.Normality assumptions Testing Process.

Table: 9
Normality Values

Variable Codes	Skewness Values	Kurtosis Values
PE1	-1.077	1.036
PE2	-.836	.366
PE3	-1.314	1.288

PE4	-.871	.528
PE5	-1.455	1.979
PU1	-1.225	1.403
PU2	-1.597	2.838
PU3	-.804	-.690
PU4	-1.017	-.387
PU5	-.783	-.827
PC1	-.828	-.539
PC2	-.829	-.617
PC3	-1.117	.967
PC4	-1.242	1.405
GW3	-1.135	.832
GW4	-1.086	.451
GW5	-1.269	1.664
IE1	-.948	.563
IE2	-.859	.034
IE3	-.666	-.382
IE4	-1.044	.598
IE5	-1.030	.568

(Source: Based on Primary data)

From the table 9, based on Skewness and Kurtosis values it is inferred that all variables follow normal distribution.

Table: 10
Fit Statistics of the relevant Measurement Model

Fit Indices	Particulars	Obtained Values.	Desirable or Not
Overall Model Ch-square	Chi-square		Desirable
	Degrees of freedom		Desirable
	Probability		Desirable
	Chi-square/Degrees of freedom	7.090	Partially Desirable

Absolute Fit Measures can be classified into four.	Goodness-of-Fit Index(GFI) is	0.848	Partially Desirable
	Root Mean Square Error of Approximation is	0.07	Desirable
	Root Mean Square Residual (RMR) is	0.04	Desirable
	Standardized Root Mean Residual(SRMR) is	0.03	Desirable
Incremental Fit Indices can be classified into three.	Normal Fit indices(NFI) is	0.782	Desirable
	Comparative Fit Index(CFI) is	0.948	Desirable
	Tucker Lewis Index (TLI) is	0.8	Desirable
Parsimony Fit Index can be classified into two.	Parsimony goodness of Fit(PGFI) is	0.671	Desirable
	Parsimony normed fit index (PNFI) is	0.677	Desirable

(Source: Based on Primary data).

Even though certain Fit Indices are only partially desirable, the overall model is good which describes the relationship between the different constructs.

Table No:11
Values of Regression Weights

			Estimate	S.E(Values)	C.R.	P
Global Wars	<---	Policy of USA	.246	.061	4.048	***
Global Wars	<---	Policy of Europe	-.009	.022	-.404	.686
Global Wars	<---	Policy of China	.118	.044	2.707	.007
Indian Economy	<---	Policy of Europe	-.101	.045	-2.249	.024
Indian Economy	<---	Policy of China	.033	.068	.484	.629
Indian Economy	<---	Global Wars	.576	.049	11.780	***
PE1	<---	Policy of Europe	1.000			
PE2	<---	Policy of Europe	1.000	.000	5495.675	***
PE3	<---	Policy of Europe	.760	.020	38.929	***
PE4	<---	Policy of Europe	.860	.020	43.225	***
PE5	<---	Policy of Europe	.862	.024	36.519	***
PU1	<---	Policy of USA	1.000			
PU2	<---	Policy of USA	1.639	.093	17.578	***

			Estimate	S.E(Values)	C.R.	P
PU3	<---	Policy of USA	1.342	.093	14.350	***
PU4	<---	Policy of USA	1.600	.099	16.098	***
PU5	<---	Policy of USA	1.501	.096	15.604	***
IE5	<---	Indian Economy	1.000			
IE4	<---	Indian Economy	1.024	.010	98.484	***
IE3	<---	Indian Economy	.992	.014	73.293	***
IE2	<---	Indian Economy	1.083	.015	74.224	***
IE1	<---	Indian Economy	1.050	.015	72.324	***
PC1	<---	Policy of China	1.000			
PC2	<---	Policy of China	1.191	.035	33.670	***
PC3	<---	Policy of China	.904	.031	29.096	***
PC4	<---	Policy of China	1.089	.040	27.343	***
GW3	<---	Global Wars	1.000			
GW4	<---	Global Wars	1.067	.032	33.612	***
GW5	<---	Global Wars	1.036	.031	33.090	***

(Source: Based on Primary Data)

Table 11 portrays the results based on the Structural Equation Modelling Technique.

Table 12: Hypothesis Testing

Null Hypothesis	Description	Estimate	SE	t-value	p-value	Decision
H_0	The Policy formulated by Europe has no significant effect on Indian Economy.	-.101	0.045	-2.249	0.024	Null Hypothesis rejected at 0.05.
H_0	The Policy formulated by the USA has no significant effect on Global Wars	0.246	0.061	4.048	***	Null Hypothesis rejected
H_0	The Policy formulated by China has no significant effect on the Indian Economy	0.033	0.068	0.484	0.629	Null Hypothesis cannot be rejected

H_0	Global Wars has no significant effect on the Indian Economy	0.576	0.049	11.780	***	Null Hypothesis rejected
H_0	The Policy formulated by Europe has no significant effect on Global Wars	-.009	.022	-.404	.686	Null Hypothesis cannot be rejected
H_0	The Policy formulated by China has no significant effect on Global Wars	.118	.044	2.707	.007	Null Hypothesis rejected at 0.05

(Source: Based on Primary data).

From Table 12, it is observed that null hypothesis formulated based on theory (based on reality) is rejected in 4 cases and it cannot be rejected in two cases. The value **p-value** is less than 0.05 in the following cases.

1. Hypothesis I
2. Hypothesis II
3. Hypothesis IV
4. Hypothesis VI

The value **p-value** is greater than 0.05 in the following cases.

1. Hypothesis III
2. Hypothesis V

Findings

1. It is observed that the Policy formulated by Europe has a significant effect on the Indian Economy. The specific finding is based on the null hypothesis I
2. It has been noted that the Policy formulated by the USA has a significant effect on Global Wars. This finding is related to the null hypothesis II. The p-value is less than 0.05 in that case.
3. It is inferred that the Policy formulated by China has no significant effect on the Indian Economy. Null hypothesis III is related here. The P-value is 0.629. Therefore the researchers cannot reject the null hypothesis.
4. It is seen that Global Wars have a significant effect on the Indian Economy. The p-value is less than the level of significance. Hence the null hypothesis can be rejected.
5. It is discovered that the Policy formulated by Europe has no significant effect on Global Wars. The P-value is 0.686. Therefore the researchers cannot reject the null hypothesis.
6. It is reported that the Policy formulated by China has a significant effect on Global Wars. The P-value is 0.007. Therefore the researchers cannot reject the null hypothesis.

Concluding Observations.

Evidently the Indian economy cannot stand in the isolation. As a developing nation and the nation which want to become the fourth largest economy by 2025, third largest economy by 2030 and second largest

economy by 2047 and first largest economy by 2080, India has to closely monitor the international developments especially in Europe, China and USA.

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EMPOWERING APPROACH TO SOCIO-ECONOMIC TRANSFORMATION: A CASE STUDY OF ZOHO'S IMPACT IN TENKASI

Sunil Shivaji Khandbahale
Sachin Raghunath Pachorkar

Abstract

This article explores Zoho Corporation's CSR initiatives in Tenkasi, India, using diverse secondary data sources. Through thematic analysis of qualitative data, it evaluates Zoho's impact on the local community, aligning with theoretical frameworks for CSR assessment. Findings highlight positive contributions in employment, education, procurement, and ecology. Recommendations aim to enhance Zoho's socio-economic impact, aligning with its values. The study emphasises empowering CSR's role in inclusive growth and sustainable development, advocating for ongoing evaluation and innovation.

Keywords:

Social Impact Assessment, Corporate Social Responsibility, Socio-economic Development, Sustainability, Inclusive Growth

Introduction

Zoho Corporation, founded in 1996, is a leading technology company known for its innovative business applications. Expanding beyond urban centres, Zoho has entered Tenkasi, Tamil Nadu, India, aiming for socio-economic development. Zoho's move to Tenkasi signifies its commitment to rural upliftment and inclusive growth, diverging from industry norms. Understanding its impact in Tenkasi is crucial amid rising regional disparities. This case study examines Zoho's influence on socio-economic development, including education and entrepreneurship. Objectives include assessing Zoho's impact and proposing enhancements. The study aims to contribute to CSR and sustainable development literature.

Literature Review

Corporate Social Responsibility (CSR) is vital in modern business, reflecting the idea that companies should consider societal and environmental impacts alongside profits (Carroll, 1999). Scholars have extensively studied CSR's role in fostering positive social change (McWilliams & Siegel, 2001).

Research on CSR's impact on communities shows how corporate actions can affect socio-economic development. Orlitzky et al. (2003) emphasise CSR's role in enhancing reputation and trust, leading to sustainable outcomes. Margolis and Walsh (2003) demonstrate synergies between profitability and social responsibility, challenging the idea of a trade-off between financial success and ethical behaviour.

Prior research extensively delves into the socio-economic impact of multinational corporations (MNCs) in developing regions, revealing insights into corporate engagement dynamics and its effects on local stakeholders. Through secondary data analysis, scholars explore various aspects of MNC activities, from employment and economic growth to social welfare and environmental sustainability. These studies illuminate the intricate interactions between corporate entities and host communities, highlighting both opportunities and challenges in MNC-led development endeavours.

Theoretical frameworks offer a lens to understand how corporate initiatives impact socio-economic development. Stakeholder theory, for instance, suggests businesses should consider the interests of all stakeholders. This approach aligns CSR efforts with sustainable development goals, fostering mutually beneficial relationships and long-term value creation.

By critically examining existing research, this study seeks to identify gaps, contradictions, and areas for further research, thereby contributing to the ongoing discourse on CSR and sustainable development.

Research Methodology

Thematic Analysis of Qualitative Data:

The following themes were identified, which sheds light on the various dimensions of Zoho's impact on socio-economic transformation in the region and provide valuable insights into the effectiveness of CSR initiatives in fostering positive change.

Key Themes	Quotes
Community Engagement	"Zoho's initiatives have truly brought the community together."
Environmental Sustainability	"Their commitment to sustainability is evident in their green practices." "Zoho's implementation of solar panels reduced carbon emissions by 30%."
Skill Development	"Zoho's training programs have empowered many individuals." "The 'Zoho Academy' has trained over 500 students in IT skills."
Gender Diversity	"Zoho promotes gender equality through its inclusive hiring policies." "Female representation in leadership roles has increased by 20% at Zoho."
Local Economic Development	"Zoho's presence has boosted local businesses in Tenkasi."

Word-Cloud emerged out of Thematic Analysis of Qualitative Data

1. Employment Generation:
Stakeholders noted Zoho's role in creating jobs, indicating its significant economic impact.

2. Skill Development and Education:
Zoho's focus on education and skill training was evident, highlighting its commitment to community empowerment.

3. Community Engagement:
Community involvement was emphasised, showing Zoho's collaborative approach to addressing local needs.

4. Environmental Sustainability:
Zoho's green initiatives were notable, demonstrating its commitment to environmental stewardship.

5. Social Empowerment:
Zoho promoted inclusivity and gender diversity, contributing to a more equitable society.

6. Local Economic Development:
Zoho stimulated economic growth and entrepreneurship, benefiting the local economy.

Thematic analysis reveals Zoho's holistic impact on Tenkasi's socio-economic landscape, guiding future CSR efforts.

Analysis Results

The data analysis highlights significant contributions to socio-economic development, evidenced by key metrics:

Women empowerment	Education
- 38% of women employees make their own lifestyle decisions - 64% women spend more on themselves since their employment - 22% indicate that they always make their financial decisions, and an equivalent 22% report making those decisions in conjunction with family	- 58% employees support the education of one or more family members - 50% of vendors were able to 'improve education, healthcare of their family' - Over 75% Zoho Schools of Learning students were confident about fulfilling family's aspirations
Wealth creation & redistribution	**Community impact**
- 67% employees provide monetary or other support to family/friends - 63% vendors were able to 'uplift the livelihood of their relatives and friends' - 69% vendors financially support their family	- Zoho is one of the main reasons for Tenkasi being given a district status - Farming initiatives by Zoho have created awareness about organic farming - The Panchayat has now started producing vermicompost

1. Employment Generation:
Zoho's significant workforce expansion in Tenkasi has reduced unemployment and boosted economic growth.

2. Procurement Practices:
Zoho's local sourcing practices have supported SMEs, fostering entrepreneurship and economic resilience.

3. Educational Initiatives:
Zoho's investment in education has enhanced access and skill development, benefiting youth in Tenkasi.

4. Ecological Efforts:
Zoho's sustainable initiatives include renewable energy and waste management, promoting environmental conservation.

5. Employee Perspectives:
Zoho employees appreciate the company's social responsibility and positive work culture.

6. Community Perspectives:
Local residents acknowledge Zoho's contributions to livelihoods, healthcare, and education in Tenkasi.

Discussion

Interpretation of Results:

This study sheds light on the positive impact of ethical business practices and stakeholder engagement, aligning with principles of sustainable development in CSR literature.

Synergies Between Business Operations and Societal Contributions:

The discussion highlights Zoho's symbiotic relationship between business operations and societal contributions. By integrating social and environmental aspects into its strategy, Zoho creates shared value.

SWOT Analysis of Zoho's Initiatives in Tenkasi:

Strengths:	**Weaknesses:**
- Strong commitment to corporate social responsibility and ethical business practices. - Diversified portfolio of socio-economic initiatives, spanning employment, education, and environmental sustainability. - Positive reputation and goodwill within the local community, built on trust, transparency, and accountability.	- Dependency on Zoho's continued presence and investment for sustainability of socio-economic benefits. - Potential challenges related to scalability and replicability of Zoho's model in other contexts or regions. - Limited access to resources and infrastructure in Tenkasi may constrain the scope of Zoho's impact in certain areas.
Opportunities:	**Threats:**
- Potential for collaboration with government agencies, NGOs, and other stakeholders to leverage resources and expertise for greater impact. - Scope for innovation and expansion into new sectors or initiatives aligned with community needs and market demands. - Platform for knowledge sharing and best practice dissemination to inspire and empower other corporations to adopt similar CSR strategies.	- External factors such as economic downturns, political instability, or regulatory changes that may affect Zoho's operations and investment climate in Tenkasi. - Competition from other corporate entities or alternative development models that could undermine Zoho's market position or relevance. - Risk of complacency or mission drift over time, leading to dilution of Zoho's social impact objectives.

Recommendations

1. Expansion of Educational Programs:
Zoho should expand educational programs in Tenkasi, offering skill development workshops, vocational training, and scholarships to address local needs.

2. Promotion of Gender Diversity:
Zoho should prioritise initiatives promoting gender diversity, including mentorship programs and initiatives addressing gender-based barriers to employment.

3. Strengthening Local Procurement:
Zoho should strengthen local procurement practices, supporting SMEs through capacity-building and supplier development programs.

4. Advancing Environmental Sustainability:
Zoho should intensify efforts to integrate eco-friendly practices, such as investing in renewable energy and waste reduction initiatives.

5. Community Engagement:
Zoho should prioritise community engagement and stakeholder collaboration, fostering transparent communication and partnerships with local organisations.

6. Monitoring and Evaluation:
Zoho should establish robust monitoring and evaluation mechanisms to track the progress and outcomes of its initiatives.

7. Cultivating a Culture of Continuous Improvement:
Zoho should foster a culture of continuous learning and improvement, encouraging employees to contribute ideas for addressing challenges and seizing opportunities.

By implementing these recommendations in a strategic and holistic manner, Zoho can further solidify its position as a responsible corporate citizen committed to driving sustainable development and inclusive growth in Tenkasi.

Conclusion

Zoho's engagement in Tenkasi illustrates the transformative potential of corporate involvement in socio-economic development, emphasising the importance of collaborative approaches and participatory CSR implementation.

1. The pivotal role of corporate social responsibility (CSR):
Zoho's CSR initiatives in Tenkasi create employment, promote education, and ensure environmental sustainability, aligning with ethical business practices and societal engagement.

2. For academia:
This study enriches understanding of CSR's impact on socio-economic development, offering insights into how businesses can create shared value and address social and environmental challenges.

3. From an industry perspective:
Zoho's Tenkasi experience demonstrates how integrating social and environmental considerations drives innovation, enhances brand reputation, and ensures long-term competitiveness.

4. For policy-makers and development practitioners:
This study provides practical lessons for fostering effective public-private partnerships to achieve sustainable development goals, accelerating progress towards poverty alleviation, job creation, and environmental stewardship.

Limitations of the research study

1 Reliance on Secondary Data:
This study's reliance on secondary data, including company websites, news articles, and interviews, limits the depth of insights compared to primary data collection methods.

2. Potential Bias in Secondary Data:
Secondary data sources may introduce bias, as information from company websites and media reports may be skewed towards positive outcomes, affecting the analysis' objectivity.

3. Limited Generalizability:
Findings from this case study may not be broadly applicable to other contexts or organisations due to its focus on Zoho Corporation's activities in Tenkasi.

4. Absence of Primary Data Validation:
The absence of primary data collection methods like surveys limits the validation of insights, impacting the study's robustness and validity.

5. Temporal Constraints:
The study's timeframe restricts the analysis to data available up to a certain point, potentially overlooking changes in Zoho's initiatives or Tenkasi's socio-economic landscape.

6. Subject to Interpretation:
Interpreting qualitative data from secondary sources introduces interpretation bias, influencing the study's conclusions despite efforts to maintain objectivity.

Future scope of the research study

Further research is needed to explore the long-term sustainability of Zoho's impact in Tenkasi. Longitudinal studies could track Zoho's initiatives over time, while comparative studies across regions and industries could provide broader insights. This case study underscores the importance of ongoing research to inform effective policies and practices for inclusive and sustainable development. This study highlights the transformative potential of CSR initiatives in driving positive change locally. By leveraging these insights and fostering collaboration, stakeholders can create new opportunities for socio-economic development and community well-being.

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FINTECH LANDSCAPE: INCLUSIVITY, INNOVATIONS AND IMPACT ON MANAGERIAL ACCOUNTING

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Kunal Sinha

Abstract

The global shift towards digitalization with continuous development in cutting-edge technologies led to the restructuring and redesigning of every sector, including finance. For instance, technological innovations such as artificial intelligence (AI), machine learning, and cloud computing revolutionize the financial landscape by fostering innovation, introducing new products and services, and enhancing efficiency, security and transparency. The same has transformed and broadened the scope of accounting. The present paper highlights the evolution, perspectives and challenges of Fintech, reviews current market trends of Fintech in India and examines its impact on managerial accounting.

Keywords:

Fintech, Cutting-edge technology, Managerial Accounting

1. Introduction:

In India, banks play a significant role in regulating the economy. It controls, manages, and governs finance-related activities such as borrowing and lending money, currency exchange, facilitating loans, investment and insurance products. However, numerous studies and research reports articulate that many Indians still do not have a bank account. There are several reasons, for example, lack of education, financial illiteracy, below-standard infrastructural facilities in rural and remote areas, and high charges for banking services.

With about 1.4 billion populations, India emerged as a perfect marketplace for everyone, including Fintech. In this regard, Priya and Anusha (2019) articulated that a vast percentage of the unbanked and under-banked population makes India an exhilarating global space for financial technologies. In simple terms, Fintech as a "software as a service (SaaS)" provides financial services to everyone (from individuals to multinational companies) using advanced technology. It includes digital payments and receipts, online stock trading, crowdfunding, mobile banking, cryptocurrencies, wealth management, cross-border transfers and digital accounting procedures. It works as a bridge between traditional financial institutions and their consumers. Thus, one can enunciate that Fintech can disrupt or/and reshape the conventional financial institution's function through continuous research, development, and innovations.

2. Evolution and Acceptance of Fintech:

"Fintech" was coined around the early 1990s when Citicorp's financial service technology consortium project aimed to reduce cost, improve efficiency, and enhance customer experience in delivering financial services by establishing cooperation with the emerging IT sector (Kaur et al., 2021). However, one can trace the foundation of Fintech much earlier. For instance, the transatlantic telegraph cable in 1866 and the ATM innovations in 1967 demonstrate a relationship between independent yet interlinked concepts, finance and technology. These were the foundational innovations that led to the emergence of Fintech. Additionally, the First World War (from 1914 to 1918) marked a significant period of technological development, particularly in telecommunication, which paved the way for the Fedwire system to transfer funds electronically between financial institutions. All these factors contributed to developing the present-day Fintech ecosystem.

(A) Phases of Fintech evolution:

Fintech 1.0 (Pre-Digital Era): The first phase of Fintech involved mechanical and paper-based analogue systems for keeping trade and finance-related transactions. Despite its antiquated nature, this phase provided insight into the application of technology to finance. The innovations in technology and science, such as telegraphs, railroads, canals, and the installation of transatlantic transmission cables, resulted

in the transmission of financial transactions and laying the foundation for the present telecommunication infrastructure (Varga, 2017).

Fintech 2.0 (Digitalization): This period is known for remarkable progress in IT infrastructure. These include the invention of ATM, the development of EFT systems, the establishment of the Society of Worldwide Interbank Financial Telecommunications (SWIFT) and the National Association of Securities Dealers Automated Quotations (NASDAQ), Etc.

Fintech 3.0 (Disruption and Democratization): The need for transparency, legitimacy and establishment of regulatory bodies (i.e. after the 2008 global financial crisis) represented a turning point and may have catalyzed the growth of the Fintech 3.0 era. In parallel, continuous innovation in cutting-edge technologies, rapid investment in Fintech startups, regulatory and policy support, and a shift towards digitalization transform the financial sector towards more client-centric.

Figure 1: Phases of Fintech evolution

Key Points	Fintech 1.0 (Pre-Digital Era)	Fintech 2.0 (Digitalization)	Fintech 3.0 (Disruption and Democratization)
Time Period	1866-1967	1967-2008	2008-Present
Focus	Development in infrastructure	Digitalization of financial services	Disruption and Democratization of financial services through technological advancements
Key developments	Double-entry accounting system Invention of Telegraph, Railroads and Steamships. Code Breaking Tool developed by IBM. First handheld Calculator in 1967.	Introduced the first ATM in 1967. Fedwire became an electronic system in 1970. Clearing House Interbank Payment System (CHIPS) was established in 1970. NASDAQ was established in the US in 1971.	Establishment of Startups working in finance and technology sector. Application of AI, Blockchain and Robotics in financial services. Establishment of regulatory bodies.

Impact	Laying the foundation of modern financial ecosystem.	Increase access, diversification and extension of financial services.	Create inclusive, transparent and innovative financial ecosystem.

Compilation by Author (Source: Arner, et al. (2015); Giglio, F. (2021), and Secondary Data)

Varga (2018) demonstrated that- not only did the origin of technology but its value-added design equally contribute to the evolution of Fintech. He described three layers. The first layer involves creating a low-cost ecosystem for technological development and deployment. The second layer focuses on utilizing technology. The third layer shows the efforts to overcome ongoing finance and technology-related issues by expanding the scalability of the technology while keeping human needs at the centre.

(B) Fintech Acceptance:

It is not too far-fetched to say that Fintech will become the new norm for everyone. According to Ernst & Young's 2019 report, 64% of consumers worldwide have adopted Fintech for money transfers, payments, and insurance. This report represents a significant increase of 48% compared to 2015. The main reason behind this growth is the competitive rate and fees that Fintech offers financial services. Demirguc-Kunt et al. (2018) explain that Fintech is increasing financial inclusion by reducing the cost of availing financial services and bridging the gap between financial institutions and their customers (Utami et al., 2021).

Fintech architects are constantly design and deliver considerable features and customization options to meet the emerging needs of small and medium-sized enterprises (SMEs). These features include-managing extensive transactions with just a fingertip, providing 24-hour services, and a fast and uncomplicated installation process. As a result, the adoption ratio of Fintech solutions has increased to 25% across markets like China, the USA, the UK, South Africa and Mexico. According to EY's 2019 report, 57% of adopters agree that traditional financial products and services do not meet present needs. As a result, many financial institutions developed their own Fintech solutions. The Economic Survey (2023) describes India's position in Fintech adoption as having 87% of Indian consumers adopting at least one Fintech service, which is higher than the global consumer index. Despite the adequate adoption ratio of mobile technology in India, SMEs were apprehensive about adopting innovative technology due to financial costs and uncertainty around new technologies (Gupta et al., 2022; Maldonado-Guzman et al., 2017).

3. Challenges in Fintech Solutions:

The application of advanced technology has created a whole new financial ecosystem that delivers financial services and products more efficiently, transparently, and at a lower cost and time. It offers diverse financial services and products,

from banking to insurance to consultancy. Thus, it is alarming for traditional financial institutions that they need to adopt advanced technology through further collaboration with Fintech and regulatory bodies to serve the customers (Handro, 2018). While Fintech brings forth its benefits, it also poses some challenges regarding data privacy, regulatory compliance, and the adoption and deployment of technologies.

(A) Investment Risk: The success of Fintech tools depends upon the quality of their algorithms, as even the slightest error can result in wrong decisions. Additionally, sifting towards automated business operations requires infrastructure, digital literacy and consultancy charges. Therefore, it is advisable to use data or reports generated by Fintech with precautions.

(B) Rules and Regulation: It is imperative to establish appropriate regulatory and supervisory mechanisms to ensure the responsible growth of Fintech, streamline its impact on the financial system, protect consumer interest, and uphold the welfare of all stakeholders (Das, 2019). Conducting financial transactions without the proper government regulations in place can be risky for both individuals and businesses. For instance, when lending money, Fintech platforms do not necessarily adhere to the same rules and regulations as traditional financial institutions (Lee and Shin, 2018).

(C) Technical and Security Risk: Complete digitalization of financial activities may not be a definitive solution for all consumers and banking institutions, especially considering the digital divide in developing countries like India. These can lead to a widening gap between consumers and financial institutions. Additionally, a risk of system failure always exists, as seen in any other sector. Security threats such as data privacy infringements, credit card fraud, and misleading information about data security raise concerns about utilizing digital finance (Gai et al., 2018).

(D) Trust and Ethical Risk: There is high uncertainty and risk associated with Fintech transactions, which is why trust is a determinant factor in evaluating acceptability in the market. Establishing trust can positively impact the consumer's behaviour and reduce unpredictability in utilizing financial and non-financial activities such as internet banking, mobile payment, online shopping, Etc (Hasan et al., 2020), which is why Fintech companies must prioritize creating awareness about their sustainability and ethical business practices. At the same time, banks need to integrate technology into their traditional financial model and introduce new financial products for the smooth delivery of services.

4. Current Market Trends of Fintech in India:

India's Fintech sector has grown rapidly in recent years thanks to government initiatives, technological advancements, and changing consumer behaviour. With a population of 1.5 billion, including many unbanked or underbanked, the industry has enormous growth potential. To support

this growth, the Indian government has introduced several initiatives such as AI for ALL, Demonetization, Digital India, and innovative finance-related products like Unified Payments Interface (UPI), Immediate Payments Service (IMPS), Bharat Interface for Money (BHIM), and Aadhaar-enabled Payment system (AePS) (Pant, 2020). These initiatives have accelerated the growth of the Fintech.

Moreover, the widespread availability of telecommunication services, commercialization of smartphones (i.e. Usage of smartphones increased to 54% in 2020 compared to 23% in 2016), and internet availability at reasonable rates have laid a strong foundation for the Fintech innovations. These factors have enabled Fintech solutions to expand their market base, especially among small and medium-sized enterprises (SMEs)- that have limited access to traditional financial products and services (Kandpal Mehrotra, 2019).

According to research by CB Insights on 250 Fintech companies, the sector has already entered almost all major business domains. These include business lending, capital markets and trading, credit score and analytics, financial services and infrastructure, general lending, insurance, merchant services, mortgage lending, personal and customer lending, processing and payments infrastructure, regulatory and compliance, real estate investing, and wallets and money transfer (CB Insights, 2017).

Furthermore, Fintech companies collaborate with financial institutions to offer innovative ideas and business models. These improve the position of financial institutions in the market. For instance, Niyo, a Fintech company, collaborate with ICICI bank to serve the under or unbaked workers of MSME by issuing payroll cards. Under this scheme, workers can receive funds up to Rs. 1 lack to meet their financial needs without any hesitations. Another example is the collaboration between Kotak Mahindra Bank and Pine Labs to expand financial services to retailers. Therefore, the role of Fintech in India is not just limited to using advanced technologies or innovative ideas in delivering financial products and services directly but also supporting financial institutions to sustain and grow. The Fintech industry is a game-changing sector that will continue to shape the future of financial services in India.

5. Technology, Fintech and Managerial Accounting:

By nature, managerial accounting revolves around analyzing and communicating all relevant information, from finance to operational to resource utilization, to the internal management of the business entity to support decision-making. Applying advanced technology in financial services and products significantly transformed the landscape of managerial accounting by providing more precise information with better transparency and accountability at lower cost.

For example, in blockchain technology, each block is connected and immutable, storing transaction-related information in a decentralized and distributed database shared among a computer network's nodes in a well-organized pattern, which can significantly reduce the chances of fraud

and errors. Unlike double-entry accounting systems- which in some cases are prone to error or fraud, blockchain permits triple-entry bookkeeping, where an exchange prompts not two but three entries: debit, credit and a cryptographic mark to confirm an exchange's validity (Wiatt, 2019) and ensure the reliability of the financial information. In addition, the Internet of Things (IoT) based accounting system provides real-time insights, allowing accountants to work as financial advisors and data analysts. Moreover, technologies such as ML, AI and DL can prevent and detect fraud or scandals by mitigating the shortcomings of the financial information in financial and auditing reports (Goldstein et al., 2019). Thus, the rise of Fintech influenced the landscape of managerial accounting. Here's a closer look at some key areas.

Figure 2: Intersection of Finance, Managerial Accounting and Technology

Intersection	Key Technological Elements	Shift in the role of Managerial Accounting	Impact
Finance and Technology	AI-driven financial planning and analysis tools	Transition from number cruncher to data alchemist	Automate data processing and verification, Extract valuable insights for financial planning and forecasting
Managerial Accounting and Technology	Cloud Accounting Software for multi-user access and collaboration, RPA for automate repetitive and rule-based task, and Data Visualization to identify patterns and relationships.	Transition from record keeper to process architect role	Allow multi-user access to financial data in real time, Streamline routine tasks efficiently with more accuracy, Meaningful visual representation of complex financial data and insights
Finance and Managerial Accounting	ERP, Business Intelligence (BI) tools, Financial Management and Business Process Management (BPM) software like Sage Intacct, IBM Business Process Manager, etc.	Transition from scorekeeper to strategic partner role	Facilitates more informed and strategic decision, Develop advance costing method for strategic pricing and profitability analysis, Monitoring financial and operational outcomes

Compilation by Author based on Secondary Data

6. Conclusion and Suggestions:

With the continuous development of cutting-edge technologies and their implementation, Fintech revolutionized the financial sector. It facilitates businesses to automate their processes, reduce costs, and access more comprehensive financial data. These led to more informed decision-making. It also transforms, expands and unfolds new spaces for the accountant. For instance, the year-on-year growth observed in Fintech raises the demand for professionals with expertise in data analysis, financial advisors and managerial accounting. It ensures the transparency, accountability and reliabilities of financial and accounting information, thereby strengthening the internal control management of the organization. As a result, we can conclude that the future of Fintech is exciting, and we can expect to see further developments that will continue to transform the financial sector.

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IDENTIFYING SIGNIFICANT PREDICTORS OF POLICYHOLDER'S SATISFACTION: A HIERARCHICAL REGRESSION MODEL

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Abstract

This study investigates the factors that affect policyholder satisfaction with health insurance claim settlements in Ballari District, Karnataka. The study uses hierarchical regression analysis on data from 100 policyholders to analyse the impact of Claim Process and Timelines (CPT), Insurance Executive and Customer Service (IEC), and Hospital and Medical Procedures (HMP) on the Claim Settlement Experience (CSE). The results show that CPT and HMP have a significant positive impact on CSE, underlining the importance of quick claim processes and quality medical care in network hospitals. However, IEC had no substantial direct effect on CSE in this circumstance. The findings suggest that health insurers should prioritize expediting claim procedures and maintaining high medical service standards in order to increase customer satisfaction.

Keywords:

Policyholders, Health, Insurance Claim, Predictors, Customers Experience, Hierarchical Regression

1. Introduction:

The Indian health insurance market has experienced substantial growth in recent years. in the non-life insurance market, India ranks 15th in the world. This is driven by increased awareness of health risks, rising healthcare costs, and government initiatives promoting health insurance coverage. With a diverse range of policyholders, from urban to rural population, the market presents unique challenges and opportunities for insurers.

In the rapidly evolving health insurance industry that is at a CAGR of 24% and rose about 34% in the pandemic time period (Pradhan and Jain, 2024) . The health insurance sector now makes up 37% of the general insurance industry's revenue, making it the largest segment. In FY24, it settled 2.5 crore claims worth ₹. 75,000 crore, resulting in a 25% operating profit. General Insurance Council chairman (Tapan Singhel) stated that the sector collected nearly ₹. 1,00,000 crore in premiums in FY24, showing a 20% annual growth in recent years. Additionally, more than 50 crore people are now covered by health insurance, which is 38% of the population, up from 37% in FY23 (News, 2024).

Health insurance in India is still optional and decentralized, causing many people to pay significantly less on healthcare due to inadequate insurance coverage. The healthcare system is divided into two sectors: public and private, with free services provided by government facilities. Despite this, many people prefer private health insurance for better and faster care. The market is expanding, but distribution is uneven, and the public system receives little funds, making private insurance a more appealing alternative for most people (Pradhan and Jain, 2024).

In the health insurance industry customer satisfaction is paramount. One of the most critical aspects influencing customer satisfaction is the efficiency and effectiveness of the claim settlement process. The ability of health insurance companies to settle claims promptly and accurately can significantly impact their reputation, customer loyalty, and overall success. Despite the growth, the industry faces issues such as complex claim processes, varying levels of customer service, and regulatory changes.

The complaints received from health insurance are more than any other segments of general insurance in India. Specifically, the complaints rose regarding 'claim' settlement of health insurance, it was the highest in numbers as compared to remaining type of complaints (The types of Complaints in Health Insurance claim, Coverage, Others, Policy Related, Premium, Product, Proposal Related and Refund) (IRDAI Consumer Affairs 2019-20, 2020). This indicates that there is a gap between the customer experiences with claim settlement and the insurer's role while claim settlement. The Challenge faced ranged from insurance companies rejecting claims by classifying a health condition as a pre-existing condition to only approving a partial amount. 43% health insurance policyholders who filed a claim in the last three years struggled with getting it processed (Das, 2024).

In a positive move, the IRDAI has implemented many reforms to increase health insurance coverage. These include simplifying the definition of pre-existing conditions, lowering the waiting period to 36 months, and reducing the moratorium term for new policyholders to five years. Additionally, policy renewals are now guaranteed, and individual premium loading based on health status is prohibited. The IRDAI has also clarified coverage specifics and broadened it to encompass contemporary therapies, mental illness, physical disability, and previously excluded diseases (News, 2024). The IRDAI has mandated life and general insurers to extend cover to certain identified Gram Panchayats. The General Insurance Council to identify the Gram Panchayats for extending the health covers (Sridhar, 2024). Addressing these challenges is crucial for improving the claim settlement experience and ensuring customer satisfaction in this dynamic and expanding market.

Insurance works because people band together to protect themselves from any consequences that may arise. Because insurance helps to achieve the above goal of safeguarding individuals from financial strain, it becomes vital for insurance companies to settle as many claims as they can, as well as offer insurance products that keep up with the needs of potential policyholders (Vasisht and Bhattacharjee, 2019). A claim is a payment given by the insurer to the insured or claimant upon the occurrence of the event stated in the contract in exchange for the premiums paid by the insured. This is the ideal time for the insurance to fulfill their promise that they made with the insured in the beginning during the proposal stage (S. K. S. Kadyan and Madhukar, 2020b). A third-party administrator (TPA) or a health insurance company's internal TPA settles claims. TPAs, established by the IRDAI in 2002, facilitate services for health insurance policyholders by serving as a functional link between insurers and hospitals. They play an important role in coordinating between insurance companies, insured people, and hospitals, offering services like cashless hospitalization and hassle-free claim settlements to improve client service (S. K. S. Kadyan and Madhukar, 2020b).

2. Review of Literature:

Research on factors influencing health insurance coverage and uptake has highlighted various determinants that can impact an individual's likelihood of obtaining insurance. For instance, studies have shown that municipal governments in China should consider including informal sector workers in the Basic Health Insurance (BHI) scheme due to the potential benefits outweighing the average premium costs, with subsidies and expanded insurance attributes suggested to increase coverage (Bärnighausen et al., 2007). Similarly, research in Indonesia revealed disparities in women's access to health insurance, with factors such as age, employment status, and education level playing significant roles in these disparities (Christiani et al., 2017). Another study in Delhi examined the awareness, access, and utilization of health insurance among the urban poor, finding low levels of awareness and limited coverage, particularly

regarding the Rashtriya Swasthya Bima Yojana (RSBY) (Kusuma et al., 2018). Gender-specific disparities in health insurance enrollment were also observed, reflecting differing perceptions of health risks among household decision-makers (Oraro et al., 2018). In Sudan, despite the presence of Social Health Insurance and Private Health Insurance, achieving universal coverage remains a challenge due to limited governmental resources and affordability issues (Salim & Hamed, 2018). In Nouakchott, Mauritania, a hierarchical logistic regression model was developed to analyze the uptake of health insurance, offering predictive capabilities for insurance coverage (Tourad et al., 2022).

Disparities in healthcare access and financial protection are further emphasized in studies examining socio-economic and demographic factors. Caste-based inequalities in household health expenditure in India highlight significant disparities in access to quality healthcare, with protection mechanisms needed for marginalized castes with high healthcare needs (Mukherjee et al., 2011). In the United States, factors such as poverty rates and demographic compositions have been found to significantly influence health insurance coverage rates, requiring collaborative efforts at various levels of government to address these disparities (Stone et al., 2015). Research in Ghana used multilevel logistic regression models to analyze socio-economic determinants of National Health Insurance Scheme (NHIS) enrollment, identifying education, wealth, and marital status as factors positively associated with enrollment (Salari et al., 2019). Furthermore, county-level variations in health insurance coverage in the United States are influenced by contextual factors including poverty, unemployment, and political affiliations, underscoring the need for comprehensive policy interventions (P. K. Khan et al., 2021).

Willingness to pay (WTP) for health insurance has been explored in various contexts, providing insights into insurance demand. One study identified a consistent relationship between WTP and food expenditures across different communities, suggesting that health insurance, like food, is considered a necessity even among low-income populations (Binnendijk et al., 2013). Another study concluded that educational interventions among informal sector workers increase demand for health insurance, with occupational solidarity contributing to improved WTP consistency among participants (J. A. Khan & Ahmed, 2013).

Customer satisfaction and the claims process are critical components of the health insurance experience. Satisfaction with healthcare among insured and uninsured individuals under the NHIS in Ghana has been linked to interpersonal care, highlighting the importance of patient satisfaction surveys in improving healthcare quality (Fenny et al., 2014). In India, factors influencing the buying decision of health insurance products among specific consumer groups include premium, customer service, and claims settlement history, reflecting consumer expectations (M. Khan et al., 2015). Health insurance companies in Malaysia

are advised to design effective marketing programs based on insights into customer satisfaction (Azeema et al., 2017). However, there are concerns regarding the claims settlement process, with insurers often failing to improve claims handling over the years, leading to distrust among policyholders and a decrease in policy renewals (Joy, 2018). In-house Third Party Administrator (TPA) departments of hospitals have been found to significantly affect patient loyalty, with factors like "physical evidence" and "professionalism" being key influencers (Singh et al., 2021). Addressing gaps between patient satisfaction drivers and public services through private health insurance packages could alleviate pressure on public health systems and promote preventive healthcare (Ursoiu & Rotileanu, 2021). Research utilizing Structural Equation Modeling (SEM) indicates that the design of insurance products and customer understanding significantly impact satisfaction with health insurance, particularly in the context of TPA settlement inclinations (S. K. S. Kadyan & Madhukar, 2020a; S. Kadyan et al., 2022).

Health insurance in developing countries, particularly in relation to public health, presents unique challenges and opportunities. Strengthening public healthcare provisions, especially in rural areas, is crucial for enhancing quality and accessibility, with increased public investments and advanced health infrastructure being essential (Banerjee, 2021). In China, health insurance positively impacts healthcare utilization and out-of-pocket costs among middle-aged and older adults, although it does not fully protect against catastrophic health expenditures (Chen et al., 2022). Furthermore, a study found that making health insurance more available can significantly reduce out-of-pocket spending, particularly in areas such as preventive care, chronic disease management, mental health services, and community education (Bindhu, 2023). In India, the Incurred Claim Ratio (ICR) and Claim Settlement Ratio (CSR) are important considerations when purchasing health insurance, with government-sponsored health policies showing a gradual increase while individual health insurance business declines (Pattnaik et al., 2019). Third-Party Administrators (TPAs) play a crucial role in resolving issues between insured parties and insurers, emphasizing the importance of effective communication and resolution in insurance-related matters. fraud detection in health insurance claims is a growing concern. A study introduced a new approach to spotting fake insurance claims by creating features and classifying them using clinical concepts and advanced models, achieving improved accuracy, precision, and recall scores (Mandru, 2023). This approach is expected to inspire further research in detecting fraudulent claims using essential but limited data.

3. Statement of the Problem

The Indian health insurance business has expanded significantly, owing to greater awareness, growing healthcare expenses, and government initiatives. While extensive research has been undertaken on health insurance penetration and policyholder behaviour, there is still a

significant gap in knowing the specific elements that determine policyholder's satisfaction with claim settlements. Existing research frequently skips specific quantitative evaluations of how claim processes, customer service, and medical treatments affect satisfaction levels. Furthermore, research is deficient on regional disparities, such as those in Karnataka. Most studies focus on larger national patterns or metropolitan areas, leaving smaller regions unexplored. This study makes a modest attempt to fill these gaps by using a hierarchical linear regression model to uncover significant factors of policyholder's satisfaction with claim settlements in Ballari District.

4. Objectives of the Study:

1. To Examine the Influence of Claim Process and Timelines, Insurance Executives and Customer Service, Hospital and Medical Procedures on Policyholder's Satisfaction.
2. To Identify Key Predictors of Policyholder's Satisfaction.

5. Hypotheses of the Study:

Hypothesis 1 (H_{A1}): Claim Process and Timelines would positively influence the Policyholders Claim Settlement Experience of health insurance.

Hypothesis 2 (H_{A2}): Insurance Executive and Customer Service would positively influence the Policyholders Claim Settlement Experience of health insurance.

Hypothesis 3 (H_{A3}): Hospital and Medical Procedures would positively influence the Policyholder's Claim Settlement Experience of health insurance.

6. Research Design:

Through the use of both descriptive and exploratory approaches, the study examines the variables that influence consumer satisfaction in the settlement of health insurance claims. For the purpose, the study is based on sample of 100 policyholders that were settled in 2022–2023 with a focus on the Karnataka district of Ballari (Total claims settled in Karnataka state alone 2,30,814 (IRDAI). Structured questionnaires for survey and IRDAI reports, were used to collect data. Convenience sampling was used because the full list of policyholders was not available. Utilizing Mendeley for data administration and analysis and IBM SPSS Statistics for statistical analysis, the tools used in the analysis include Cronbach's Alpha for reliability and Hierarchical Linear Regression to investigate correlations among variables.

Table 1. Policyholders details

	Percentage of Respondents	Frequency of Respondents
Gender		
Male	68%	68
Female	32%	32
Age in Years		
25 to 35 years	60%	60
36 to 45 years	26%	26
46 to 60 years	14%	14
Marital Status		
Married	87%	87
Unmarried	13%	13
Educational Qualification		
Below PUC	19%	19
Graduation	63%	63
Post-Graduation	18%	18
Occupation		
Salaried Employee	64%	64
Professional	9%	9
Non-working	15%	15
Business	8%	8
Agriculture	4%	4
Monthly income		
Less than Rs. 10000	19%	19
Rs. 10000 to Rs. 25000	24%	24
Rs. 25000 to Rs. 50000	33%	33
More than Rs. 50000	24%	24
Type of Family		
Joint Family	42%	42
Nuclear Family	54%	54
Extended Family	4%	4

Source: Compiled from primary survey data

The demographic analysis of policyholders provides(Table 1)important insights into policyholder characteristics and the potential implications for satisfaction with health insurance claim settlements. Men outweigh women (68% to 32%). The dominant age group is 25-35 (60%), followed by 36-45 (26%). This shows a greater emphasis on health insurance among young individuals. Married people (87%) are much more likely to have insurance than unmarried people (13%). Higher education appears to correspond with insurance, with graduates (63%) constituting the largest group. Salaried employees (64%) are the most common policyholders, followed by non-workers (15%). The income distribution varies, with the Rs. 25,000-Rs. 50,000 monthly group accounting for the highest share (33%). Nuclear families (54%) are the most prevalent, followed by combined families (42%).

7. Hierarchical Regression Analysis:

A statistical technique called Hierarchical Regression Analysis is used to examine the association between several independent variables and a dependent variable while accounting for the inclusion of predictors in various stages or blocks.

Table 2. Reliability test

	Sl. No	Variables	Codes	Cronbach's Alpha Reliability Test
IV's	1	Claim application process	CPT1	**0.725** Claim Process and Timelines (CPT)
	2	Claim settlement period	CPT2	
	3	Time taken to acknowledge the claim, process the claim and disburse the claim amount	CPT3	
	4	Formalities in claim settlement	CPT4	
	5	Claim settlement terms and conditions	CPT5	
	1	Cooperation of insurance executives	IEC1	**0.540** Insurance Executive and Customer Service (IEC)
	2	Knowledge of insurance executive in claim settlement	IEC2	
	3	Clarity about the information provided about the claim process	IEC3	
	4	Behavior of insurance executives	IEC4	
	5	Helpfulness and responsiveness of the customer service	IEC5	

	1	Hospital admission procedures	HMP1	**0.597** Hospital and Medical Procedures (HMP)
	2	Provision of room's allotment	HMP2	
	3	Medical expenses/Charges covered	HMP3	
	4	List of non-network hospitals	HMP4	
	5	Reimbursement Facility	HMP5	
DV's	1	Insurer communication during and claim settlement process	CSE1	**0.745** Claim Settlement Experience (CSE)
	2	Claim fully settled	CSE2	
	3	Satisfaction with Previous claim settlement	CSE3	
	4	Satisfaction with Current claim settlement	CSE4	
	5	TPA's support and concern in claim settlement	CSE5	

Table 3.Descriptive Statistics and Correlation Matrix:

	N	Mean	Std. Deviation	IV1- CPT	IV2- IEC	IV3- HMP	DV1- CSE
IV1- CPT	100	1.82	.580	1			
IV2- IEC	100	2.09	.584	.834**	1		
IV3- HMP	100	2.00	.605	.570**	.540**	1	
DV1- CSE	100	1.97	.651	.647**	.557**	.724**	1

Note:
*** Correlation is significant at the 0.01 level (2-tailed).*
IV- Independent Variable (Predictors)
DV- Dependent Variable (Outcome)

The descriptive statistics in Table 3 show that policyholders are usually satisfied with the various aspects of the claim settlement process. The correlation matrix shows strong positive nexus between all independent factors and the dependent variable (CSE), implying that changes in claim processes, customer service, and medical treatments will all improve the overall claim settlement experience. The quality of hospital and medical procedures appear to be the best predictor of claim settlement satisfaction, followed closely by claim process efficiency.

Figure 2. Model Diagrams Framed based on Hypothesis:

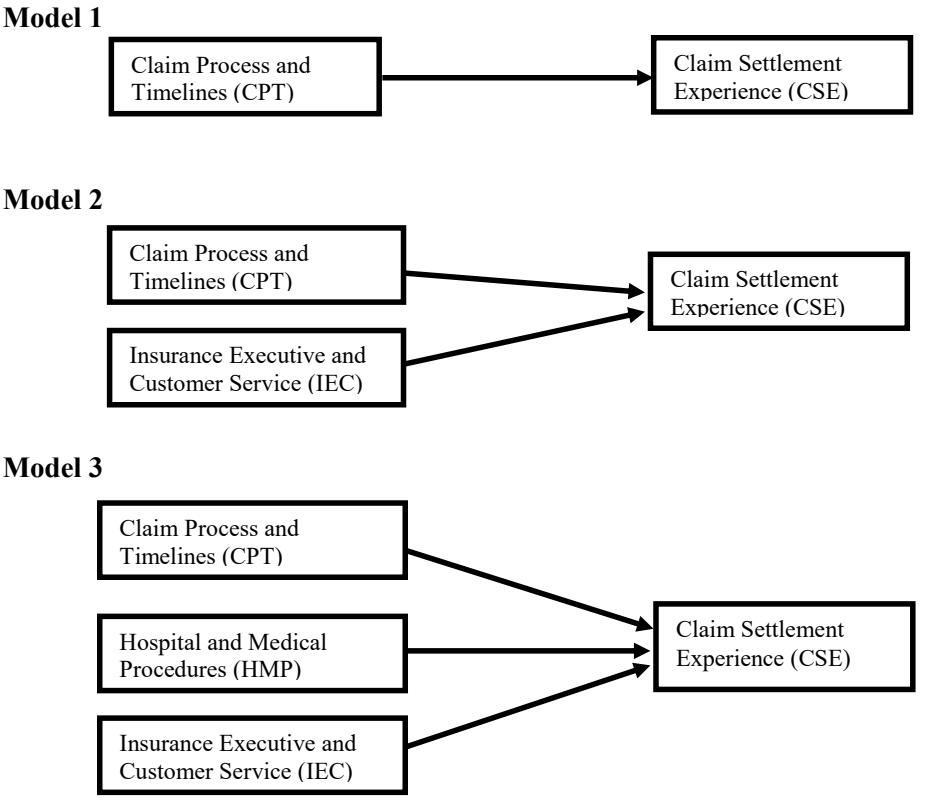

Table 4. Model Comparison (Results of the Hierarchical Regression Analysis)

Claim Settlement Experience (CSE)						
Variables	**Model 1**		**Model 2**		**Model 3**	
		CI: 95%		**CI: 95%**		**CI: 95%**
CPT	0.647***	0.555, 0.898	0.597***	0.359, 0.983	0.388***	0.168, 0.703
IEC			0.059**	-0.244, 0.376	-0.053**	-0.318, 0.200
HMP					0.532***	0.404, 0.741
Model Fit Statistics						
F- value	70.492***		0.179**		45.614***	
R^2	0.418		0.419		0.606	
ΔR^2	0.418		0.001		0.187	

Note:
* ***P*< 0.001
** *P*> 0.001
CPT - Claim Process and Timelines
IEC - Insurance Executive and Customer Service
HMP- Hospital and Medical Procedures

8. Results:

The Cronbach's alpha reliability analysis shows that Claim Process and Timelines= 0.725, Insurance Executive and Customer Service =0.540, Hospital and Medical Procedures =0.597, and Claim Settlement Experience =0.745. The analysis also met the assumption of multicollinearity given that tolerance values ranges from 0.29 to 1.00 while the value in inflation factor (VIF) ranges from 0.33 to 1.51, indicating that multicollinearity is not a an issue in this study. The results of the hierarchical regression (Table 7) show that the inclusion of CPT (Claim Process and Timelines) accounted for 41.8% variance in CSE (Claim Settlement Experience), $R^2 = 0.418$, $\Delta R^2 = 0.418$, $F(1, 98) = 70.492$, $P < .001$, and the analysis showed evidence of a significant effect of CPT on CSE ($\beta = 0.647$, CI = 0.555, 0.898, $P < .001$). Thus, we accept the research hypothesis 1. Also, the

inclusion of IEC (Insurance Executive and Customer Service) into the model 2 added additional 0.1% variance in predicting CSE, $\Delta R^2 = 0.001$, $F(1, 97)= 0.179$, $P > .001$, and it is not significantly impacted the CSE ($\beta = .059$, CI = -0.244, 0.376, $P = .673$). Thus, we reject hypothesis 2.The analysis showed that the addition of HMP (Hospital and Medical Procedures) showed additional 18.7% variance in CSE, $\Delta R^2 = 0.187$, $F(1, 96)= 45.614$, $P < .001$, and the analysis showed evidence of a significant effect of HMP on CSE ($\beta = 0.532$, CI = 0.404, 0.741, $P< .001$). Thus, we accept the research hypothesis 3.

9. Findings and Discussion:

The Model emphasizes the significance of Claim Process and Timelines (CPT) and Hospital and Medical Procedures (HMP) in influencing Policyholders' Claim Settlement Experience (CSE) in health insurance. These findings imply that health insurance companies should prioritize increasing the speed and timeliness of their claim processes, as well as providing high-quality medical care in their network hospitals, in order to increase policyholder's satisfaction. While Insurance Executive and Customer Service (IEC) did not have a big direct impact on CSE, providing outstanding customer service is still vital for the overall policyholder experience.

10. Concluding observations:

The study explores policyholder satisfaction with health insurance claim settlements in Ballari District, Karnataka. It emphasizes the need of efficient Claim Processes and Timelines (CPT) and excellent Hospital and Medical Procedures (HMP) in improving the overall Claim Settlement Experience (CSE). While Insurance Executive and Customer Service (IEC) did not have a direct impact on satisfaction, maintaining good service standards is still crucial. The findings underline the significance of prioritizing efficient claim procedures and high-quality medical care within insurance networks. Furthermore, the study emphasizes the importance of taking regional variations into account when designing health-insurance services. The study is limited to 100 respondents as population of claim settlements is large in Karnataka. In order to add understanding of the dynamics of policyholder satisfaction, future research could include additional locations and variables.

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RESEARCH BULLETIN - Volume 50 - Nos. I & II - April & July 2024

POLICY CHANGES AND BEHAVIOR OF PRIVATE CONSUMPTION AND PRIVATE INVESTMENT IN INDIA

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Abstract

The study examines the responsiveness of private consumption and private fixed capital formation for policy change particularly focusing on monetary policy (MP) shocks. The impact of structural variations is investigated by deciphering the speed of adjustment and lag in the diffusionary effects of MP. The findings reveals that following a positive interest rate shock, the lending to household sector declines with a negative effect on household consumption. The effects of shock on consumption are not instantaneous; it affects consumption from the second quarter, due to lags in the transmission process. However, the effects of rate hike are significant for private investment, influencing from the second quarter as evidenced from the impulse responses. The findings clearly indicate that the overall movements in credit to households and bank rate explain variations of private consumption in the medium term to longer duration. The variations in private investment in short term, medium and long-term is attributed to MP rate shock.

Keywords:

Monetary Policy, Aggregate demand components, SVAR Model

Introduction

Economic growth is influenced by several factors, two of the main demand-side factors that drive economic growth are private consumption and private investment (John.J.Heim, 2009). Private consumption constitutes the largest component of GDP (Wong, A. 2019), (Mishra.K.P. 2011), strong consumption forecasts persuade private investment; where in private investment is a reflection of expectations on the future economic activity. The performance of private consumption and investment has an instantaneous influence on GDP (Khasawneh.M. 2015, Keho, Y. 2019). The monetary policy transmission to general economic activities like private consumption, private investment and output is diffused mainly through the interest rate channel (Taylor, J.B.1995), credit channel (Bernanke, B. S.,& M. Gertler, 1995), asset prices channel (Meltzer, A.H. 1995) and exchange rate channel (Obstfeld, M.,& Kenneth, R. 1995).

Many empirical works (Mohan, R.2007, Mishra, P., P, M., & Rajeshwari, S. 2016) find the interest rate channel of policy shock transmission as a dominant mechanism. In short-run, the changes in lending rate affect the demand for financial and non-financial assets, altering the consumption spending and capital formation decisions of households and business sectors. The bank lending/credit channel of transmission emphasize on banks financial intermediation and any shock in monetary policy could affect the credit disbursal, affecting demand components.

In credit channel, the banking sector plays a pivotal role in ensuring external finance for both household and the business sector. The lending rates influence the spending and output decisions of the household and the enterprise sector. The asset price/ wealth channel, the monetary policy affects consumption, investment and output largely through the real estate and the equity market (Ncube, M., & Ndou, E. 2013, Purvis, D. D.1992). Lastly, the exchange rate channel exerts its influence by shifting the spending between domestic and overseas goods. In both theoretical and empirical literature, these channels have been extensively discussed; however the interest rate channel (Khundrakpam, J. K. 2017, Taylor, J. B.1995) and the credit channel (Mishra, P., & Peter, M. 2013) are the leading channels of transmission. The dominance of these two channels of transmission motivates the present study to evaluate the influence of these channels on household consumption and private investment in India. Theoretically, the monetary policy shocks are passed on to its final destination that is the output and inflation through the intermediary factors such as private consumption and private capital formation. In the Indian context, nonetheless, little attention has been given to evaluate this direct intermediary channel of transmission, therefore, the current study comprehensively plug this space and understand the efficacy and responsiveness of monetary policy on private consumption and private capital formation in India. The section II of the article presents a brief review of literature; section III discusses methods, results and discussions. Finally, the section IV concludes with policy implications.

Literature Review:

In macroeconomics literature understanding the impact of monetary policy, has received considerable theoretical and empirical attention. The vast empirical literature generally focused extensively on the various diffusion modes of policy shocks and in particular explored its effects on key macroeconomic variables. Mishra, P., P, M., & Rajeshwari, S. (2016) using SVAR model, examined the potency of bank-lending channel of monetary transmission in India. In bank-lending channel the monetary transmission takes place in two steps, firstly from the policy rates to bank lending rates and from the bank lending rates to aggregate demand. The study finds that the first step is operative and it is incomplete, however their results are inconclusive on monetary policy shocks on aggregate demand. Aleem, A. (2010), analyzed a series of VAR models to examine the three transmission mechanism such as bank lending channel, asset prices and exchange rate channels of MP in India. In bank lending channel, the response of GDP to a positive shock is statistically significant and it shows similar responses to the asset price and exchange rate modes. Khundrakpam,J. K.(2011) also finds the credit mode of monetary diffusion to be more momentous and forceful. Pandit, B. L., & Vashisht, P. (2011), finds that in seven emerging market economies a policy rate shocks and its variations are the major determinant factors in explaining the firm's demand for bank credit. Khundrakpam, L. K. (2017), point out that an unanticipated reduction in policy rate impacts private capital formation negatively and its impact is symmetric, whereas it is asymmetric on private consumption. In a conceptually similar paper, Suwannajak, J.,Yamaka, W., Sriboonchitta, S., & Tansuchat, R. (2018), using TVP-VAR with stochastic volatility model analyzed the effectiveness of monetary policy shocks in Thailand. The results show a dominant influence of credit channel on private consumption and investment. The impulse responses of TVP-VAR model are more detailed and show greater variability over time to a shock than the VAR impulse responses. Using the similar model Owusu-Sekyere, E. (2016), tests the interest rate mode of monetary transmission on household consumption in South Africa. The study finds that consumption declined during the periods of monetary contraction and post inflation-targeting period and it augmented in monetary build-up period.

In addition, several studies, (Ncube, M., & Ndou, E.2013),(Patra, M. D., & Kapur, M. 2012),(Khasawneh, M. 2015), (Bhoi, B. K., Mitra, A.K.,Singh, B.J., & Sivaramakrishnan, G.2016),(Nahm, D., & Macri, J. 2016), and(Chernis, T., & Luu, C.2018), finds private/residential investment, house prices, consumption expenditure responds to interest rate changes, however the response of consumption is marginal. The majority of empirical studies assessing the impact of monetary policy shocks generally focus on inflation and output. In this context, the paper contributes to the existing literature by evaluating the intermediary influence of private consumption and private investment to policy shock in India by building separate SVAR models.

Methods

Data and Model

The quarterly aggregate monetary and macroeconomic data for variables such as private final consumption expenditure (PC), gross fixed capital formation (PI), domestic credit to households (Credit_HS), repo rate (r) and bank lending rate (BankRate) is accessed from the real-time handbook of statistics on the Indian economy, published by Reserve Bank of India for the period from Q1- [April-May-June] -2004-05 to Q2 [July-August-September] -2019 -20. The data for total credit to the private non-financial sector (Credit_PS) is obtained from FRED, Economic Data, Federal Reserve Bank, St.Louis, U.S.A.

Econometric Model

The ascend in the significance of monetary policy in developed economies led to the widespread application of VAR technique developed by Sims, C.A. (1980). Further, the development of structural VAR (SVAR) methodology smoothed the process of identification of contemporaneous and dynamic relationships between macroeconomic variables and the policy instruments (Raghavan, M., & Silvapulle, P. 2008). The current study followed the empirical framework of Zakaria, Z. (2007) and Ziaei, S. M. (2014).

To study estimates two separate SVAR model wherein each model consists of four variables, represented by the vector X_t.

$$X_{1t} = (PC_t, CH_t, BLR_t, R_t) \quad (1)$$

$$X_{2t} = (PI_t, CP_t, BLR_t, R_t) \quad (2)$$

Where, X_{1t} and X_{2t} is a vector of variables related to private consumption (PC_t) and Private Investment (PI_t). The credit variables are CH_t (Credit to Households) and CP_t (Credit to Private Sector). The two common variables of the model are bank lending rate (BLR_t) and R_t is repo rate, an instrument of monetary policy. The monetary policy shocks are determined and established through a standard structural decomposition of orthogonalized reduced-form disturbances with the ordering of variables respectively. The restrictions imposed on the contemporaneous relationships among the variables of interest are depicted in equation (3). The identified system $A_0 u_t = B\varepsilon_t$ is as follows:

The identification of equation (1)

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ \alpha 21 & 1 & 0 & 0 \\ 0 & \alpha 32 & 1 & 0 \\ \alpha 41 & \alpha 42 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_t^{PC} \\ u_t^{CH} \\ u_t^{BLR} \\ u_t^{R} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{PC} \\ \varepsilon_t^{CH} \\ \varepsilon_t^{BLR} \\ \varepsilon_t^{R} \end{bmatrix} \quad (3)$$

The identification for equation (2)

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ \alpha 21 & 1 & 0 & 0 \\ 0 & \alpha 32 & 1 & 0 \\ \alpha 41 & \alpha 42 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_t^{PI} \\ u_t^{CP} \\ u_t^{BLR} \\ u_t^{R} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{PI} \\ \varepsilon_t^{CP} \\ \varepsilon_t^{BLR} \\ \varepsilon_t^{R} \end{bmatrix} \quad (4)$$

Where a^{o}_{ij}, for i :1...4 and j :1...4 is the coefficientofcontemporaneousrelationinthe matrix A_0, $\varepsilon_t PC$, $\varepsilon_t PI$, ε_tCH, ε_tCP, $\varepsilon_t BLR$ and$\varepsilon_t R$ are the structural shocks associated with the respective equations; *bii* , for i:1…4, is the diagonal element of the matrix B.

$$PC_t = C_1 + \sum_{i=1}^{k} \alpha 11\ PC_{t-i} + b11\ \varepsilon_t^{PC} \quad (5)$$

$$CH_t = -\alpha^{0}_{21}\ PC_t + \sum_{i=1}^{k} a^{i}_{21}\ PC_{t-i} + \sum_{i=1}^{k} a^{i}_{22}\ CH_{t-i} + c_2 + b_{22}\ \varepsilon_t^{CH} \quad (6)$$

$$BLR_t = -\alpha^{0}_{32}\ CH_t + \sum_{i=1}^{k} a^{i}_{33}\ BLR_{t-i} + c_3 + b_{33}\ \varepsilon_t^{BLR} \quad (7)$$

$$R_t = \alpha^{0}_{41}\ PC_t - \alpha^{0}_{42}\ CH_t + c_4 + b_{44}\varepsilon_t^{R} \quad (8)$$

$$PI_t = C_1 + \sum_{i=1}^{k} a_{11}\ PI_{t-i} + b_{11}\ \varepsilon_t^{PI} \quad (9)$$

$$CP_t = -\alpha^{0}_{21} PI_t + \sum_{i=1}^{k} a^{i}_{21}\ PI_{t-i} + \sum_{i=1}^{k} a^{i}_{22}\ CP_{t-i} + c_2 + b_{22}\varepsilon_t^{CP} \quad (10)$$

$$BLR_t = -\alpha^{0}_{32}\ CP_t + \sum_{i=1}^{k} a^{i}_{33}\ BLR_{t-i} + c_3 + b_{33}\varepsilon_t^{BLR} \quad (11)$$

$$R_t = \alpha^{0}_{41}\ PI_t + \alpha^{0}_{42}\ CP_t + c4 + b_{44}\varepsilon_t^{R} \quad (12)$$

In the SVAR model, the coefficients b_{ij} point out that variable j affects variable i, immediately. The equation (5 & 9) illustrate the sluggish reaction of private consumption/investment to sudden changes in credit to households/private sector, bank lending rate and repo rate. The equation (6 &10) shows that credit to households/private sector also counters leisurely to sudden changes in bank lending rate and repo rate, but it responds shiftly to changes or expectations in private consumption/investment. The equation (7&11) detach the immediate influence of policy shock on private consumption/ investment and repo rate on bank lending rate, but it acts instantly to the variations in credit to households/private sector. The last equation (8 &12) implies that repo-rate retorts simultaneously to the variations in consumption/private investment and credit to households/private sector, but not to shocks in bank lending rate.

Empirical Results and Discussion

For time series data - the non-stationarity of the variables is tested by using Augmented Dickey Fuller (ADF) and the Philips-Perron (PP) unit root tests. The results of the tests show that, the hypothesis is not rejected for private consumption, private investment, credit to households, credit to private sector, however for the policy repo rate the null hypothesis is rejected in ADF test but not in PP test. The ADF test confirms that except the repo rate, all other variables, were integrated in first order and are stationary in first difference. However, according to the PP test results all variables, were integrated of order one I (1) and are stationary in first difference. The models (1 & 2) estimating the causal association between variables are highly responsive to lag length and the determination of the

appropriate lag length is essential to identify the serial correlation of the residuals. The study chooses the required number of lags for the model based on SIC, AIC and the HQIC. For model 1, the SIC and HQIC choose one lag, while the AIC and likelihood ratio (LR) statistics recommend four lags as optimal lag. Similarly, for model 2, the SIC and HQIC choose one and three lag respectively. However, the AIC and LR statistics choose four as appropriate number of lags, therefore, the study uses four lags based on AIC and LR statistics.

Contemporaneous Coefficients

The study begins with the response of the standard model; the contemporaneous coefficients of the SVAR restrictions are estimated using the OLS method, the table 1 presents the results of both the models. The positive value of private consumption reveals that the monetary authority increases the repo rate when it expects arise in private consumption, tightening the monetary policy. The negative coefficient of private investment indicates that the rise in repo rate lowers the level of investment. The negative value of the estimated coefficient of bank lending reveals strong reduction in lending by banks with the increase in repo rate.

Impulse Response Function

This section explains the impulse response function used to understand the responses of consumption and investment to monetary policy shocks. The size of the shock is an increase of one standard deviation in the interest rate and its impact is assessed for over a period of 20-month period the two dashed lines represents the 95% confidence band limit.

Table 1: Estimated Contemporaneous Coefficients of SVARs

Contemporaneous Coefficients of Consumption Model - (7)			Contemporaneous Coefficients of Investment Model - (8)		
Restriction	Estimate	p	Restriction	Estimate	p
α_{21}	0.170254 (0.539831)	0.7525	α_{21}	-0.042212 (0.056646)	0.4562
α_{32}	0.012159 (0.049279)	0.8051	α_{32}	4.893669 (5.745555)	0.3944
α_{41}	0.116159 (0.161004)	0.4706	α_{41}	-3.807280 (1.315012)	0.0038**
α_{42}	-0.020054 (0.039128)	0.6083	α_{42}	0.230963 (3.033732)	0.9393

Standard errors are in parenthesis, ***p < 0.01, **p < 0.05 and *p <0.1.

Positive Interest Rate Shocks on Consumption

In analyzing the result of impulse response, the relative effectiveness of monetary policy was determined by comparing the size and the speed of the adjustment. Following a positive interest rate shock, it is expected that bank lending rate will increase, the credit to households will decline and private consumption demand will also decline. The model with repo rate as a monetary policy tool presents theoretically consistent results for both household consumption and bank lending to households. The positive repo rate shock increases bank lending rate significantly and a shift in the transmission of rate hike is noticeable.

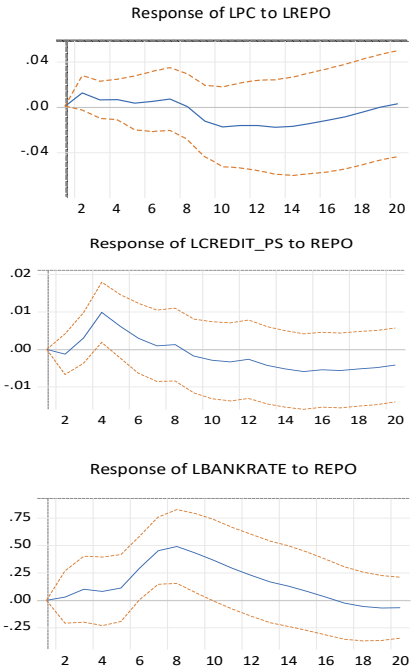
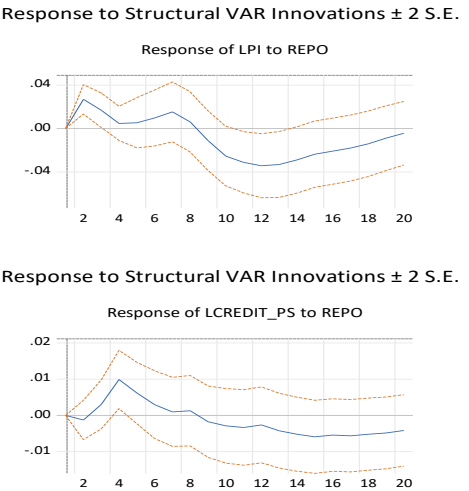


Figure – 1: Policy Rate shock on Household Consumption and Bank lending.

Positive Interest Rate Shocks on Private Investment

The figure 2 - depicts the estimated responses of positive rate shocks on private investment and lending by banks to the private sector. It is clear from the estimate that a rate shock immediately raises the bank lending rate to the private sector. The credit to the private sector for capital formation declines quickly with a positive expectations of interest rate shock and it increases for a short period and thereafter declines gradually for a prolonged period. In parallel to the bank lending rate, the effects of policy rate hike are significant for private investment and as theoretically reasoned, the effects are not immediate due to lags in transmission process



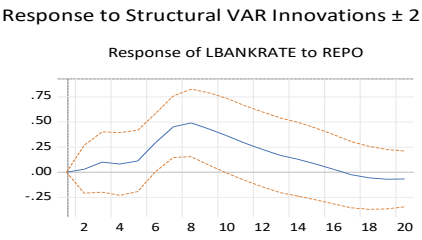


Figure – 2: Policy Rate shock on Private Investment and Bank lending.

Conclusion

The study using structural vector autoregression (SVAR) model evaluate the responsiveness of monetary policy shocks on private consumption and private investment in India. The study results suggest that a positive interest rate shock have a downward influence on private consumption. The effects of policy shock are not instantaneous due to lags in the transmission process; the aspect is noticeable wherein the rate shock affects consumption from the second period. Regarding private investment, it is clear from the estimates that interest rate shock immediately raises the loan rate to the private sector. The effectiveness of transmission operates from the sensitivity of lending rates exerting control on aggregate demand. However, in recent years due to advancement in financial technology, the extent and volume of interest rate pass-through has seen a considerable change with strong implications on the policy shock transmission process. The diffusion of policy rate changes to deposit and lending rates are strongly responsive to liquidity conditions. The results of the study highlight the existence of strong microeconomic effects for change in macroeconomic policy.

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REGULATORY AUTHORITIES OR AGENCIES TO PREVENT BLACK MONEY AND LAUNDERING

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Abstract

This paper unravels the intricate web of diverse regulatory authorities and government agencies grappling with the complex and issue of black money and the government's efforts to combat money laundering. Black money, the root of money laundering, poses significant challenges.

Keywords:

Black Money, Money Laundering (ML), Anti-money Laundering, (AML) Prevention of Money Laundering Act (PMLA), Regulatory Authorities

Introduction;

Black money is a severe problem all over the world. The dictionary meaning of **black money** is **"***income earned surreptitiously or illegally***,** *usually in cash, and not reported to the government to avoid paying taxes on it*[1]*.*"

According to the Oxford Dictionary, *"money that is earned illegally or on which the necessary tax is not paid is considered illegal.*"[2]

According to Cambridge Dictionary – *"Black money that is made from illegal trade or criminal activity.*"[3]

"There is no single definition of black money in literature. Various terms are often used, such as 'unaccounted income,' 'dirty money,' 'parallel economy,' These terms generally express income on which government has not received taxes. This money may come from legitimate sources or illegal activities. like smuggling, illicit trade, counterfeit currency, arms trafficking, terrorism, and corruption. For this document, 'black money' can be explained as assets or resources that have neither been reported to the government at any point of time during their possession."

"*The black money also includes legal income that is hidden from public authorities to evade any taxes like vat, goods and service tax, income tax, and stamp duty, etc, to evade payment to other statutory authorities, under the provisions of industrial labour laws. It means Black money can be generated through:*

- Illicit occupations like crime, drug trade, terrorism and corruption or
- Evasion to pay dues to the public exchequer in one form or another by manipulating financial records.
- Business might be legal, but the person may knowingly have misreported the income generated to avoid paying tax.

In broader terms, black money denotes earnings through any activity, either legal or illegal income, **which is undisclosed for tax purposes.** Cash transactions are made to keep the same unrecorded and to hide from the government. Recipients of black money either hide it, or attempt to show it as legitimate money by hiding the origin of illegal money through **money laundering.** The reason for generating black money is higher taxation imposed by the government, typical compliances and sources available to earn illicit money through various sources such as real estate, jewellery business, trafficking of drugs, immoral trafficking of humans, prostitution, casinos, gambling, horse races, cryptocurrencies and cybercrimes. It can be said that black money is the mother of money laundering. The government has enacted several laws and established several regulatory authorities to fight with black money to deter money laundering and counter-terrorism financing.

Objective: the main objective of this paper is to bring to notice the web net of government agencies and authorities to deal with the generation of black money and its sources and money laundering thereof. There are various agencies and regulatory authorities that deal with detecting sources of black money and money laundering and take steps to prevent earning black money and laundering. The ultimate responsibility of dealing with the black

money menace and money laundering lies with various authorities and government agencies. Various revenue departments and law agencies are empowered to secure implementation regulations of different economic laws. This will be analysed to determine how the agencies successfully punish or prosecute the culprits.

Enforcement and regulatory agencies operate within various ministries. These agencies are directly or indirectly involved in preventing the accumulation of illicit funds and money laundering. Although their primary responsibility is to regulate specific transactions or entities to curb unlawful activities, they also play a vital role in averting the generation of illicit funds. The revenue departments coordinate among enforcement agencies to correlate efforts in combating the proliferation of illegal funds, tax evasion, and money laundering but still needs better coordination. Some of the major regulatory authorities and agencies are mentioned here under:

Functions of Different Government Agencies

1. Central Board of Direct Taxes (CBDT)

CBDT functions under the revenue department of the Finance Ministry. The CBDT manages the Income Tax Department, which plays a vital role in combating the generation, collection and use of black money and to avert money laundering. It is primarily responsible for assessing individuals through scrutiny. The Investigation Wing conducts operations, such as surveys and searches, to gather evidence of tax evasion. The department actively collaborates with foreign tax authorities under information exchange instruments agreements. In one of our survey report the CBDT has disclosed under the measures to prevent black money that

- 648 Disclosures involving Undisclosed Foreign Assets worth Rs. 4164 crores were made. In the VDIS which was closed on 30th, September, 2015, the amount collected by way of tax and penalty in such cases was about Rs. 2476 crores.
- As on 31.03.24, assessments have been completed in **652** cases raising tax demand of over Rs. **17162** crores approximately and prosecutions have been launched in **163** cases.

2. Enforcement Directorate (ED)

Firstly, The ED[4] was formed to deal with foreign exchange matters. The ED investigates money laundering matters and the attachment and confiscation of proceeds of crime under the PMLA. Money laundering is an offence of acquiring property directly or indirectly from violation of activity mentioned in the schedule of PMLA,2002. ED covers the Predicate crimes for money laundering committed in other countries and that will be treated as an offence domestically, such as drug trafficking, terrorism and human trafficking. It investigates suspected money laundering cases. It attaches and confiscates the assets derived from scheduled offences and proceeds to prosecute offenders in a court of law. The ED starts proceedings only after any agency registers a case for any offence listed in the Act's Schedule.

3. The Financial Intelligence Unit of India (FIU-IND)

This unit[5] functions under the Ministry of Finance and plays a vital role in coordinating and strengthening national and international intelligence efforts to avert money laundering. This underscores the unit's importance in the global fight against financial crimes. FIU-IND is empowered to enforce AML/CTF regulations and consider measures for implementing by reporting entities.

FIU-IND receives, processes, analyses and disseminates relevant information. FIU-IND reports to the Economic Intelligence Council and oversees the functioning of various enforcement authorities.

Under the rules issued under the PMLA, reporting entities are required to submit various types of reports to FIU-IND, such as cash transactions, counterfeit currency, suspicious transactions and

Non-Profit Organizations transaction reports. These reports are submitted within the prescribed time when a transaction exceeds certain limits.

4. Central Board of Indirect Taxes and Customs (CBIC)

CBIC[6] falls under the Revenue department of the Finance ministry. It implements the policies in connection with Good and Service tax and FEMA matters. It also averts trafficking of narcotics drugs.

5 Directorate General of Revenue Intelligence (DGRI)

Directorate General of Revenue Intelligence[7] is a specialised intelligence agency for combating smuggling and other customs-related offences, including cases involving the evasion of customs duties and money laundering.

The DGRI focuses on preventing and combating smuggling activities, including illegally importing and exporting goods, contraband, and restricted items. It gathers intelligence, conducts investigations, and coordinates with other law enforcement agencies to disrupt smuggling networks and apprehend offenders. The DGRI investigates cases of customs duty evasion, including under-invoicing, misdeclaration, and fraudulent import-export practices aimed at circumventing customs duties.

The DGRI also investigates cases involving money laundering linked to smuggling activities. It identifies and traces financial transactions associated with smuggling operations to prevent the laundering of illicit proceeds and prosecute offenders under PMLA. The DGRI collaborates with other law enforcement agencies, such as customs authorities, police departments, and financial intelligence units, to share intelligence, coordinate operations, and exchange expertise in combating smuggling, customs duty evasion, and money laundering.

6. Central Economic Intelligence Bureau (CEIB)

India. Standard Operating Procedure: CBIC As the apex intelligence agency under Ministry of Finance, the CEIB holds a pivotal role. Its primary mandate is to coordinate and strengthen intelligence gathering and dissemination mechanisms concerning economic offences and financial crimes.

The CEIB is a comprehensive central

repository of intelligence related to various economic offences, including tax evasion, money laundering, smuggling, and other financial crimes. It collects information from multiple sources, including domestic and international agencies, financial institutions, law enforcement agencies, and other government departments.

One of the CEIB's key roles is to analyse and assess the gathered intelligence to identify patterns, trends, and emerging threats related to economic offences. The CEIB's analysis provides strategic guidance and actionable intelligence to relevant enforcement agencies for investigation and prosecution, instilling confidence in the effectiveness of the bureau's guidance.

The CEIB coordinates and facilitates inter-agency cooperation and collaboration in combating economic offences. It is a central point for sharing intelligence and coordinating joint operations among agencies enforcing economic laws and regulations. The Central Economic Intelligence Bureau (CEIB) is committed to combating economic offences, including cases related to the PMLA

7. Narcotics Control Board (NCB).

The Narcotics Control Bureau[8] (NCB) operates under the Ministry of Home Affairs. It is governed by the Narcotic Drugs and Psychotropic Substances (NDPS) Act of 1985, the Customs Act, and the Drugs and Cosmetics Act. It combats illicit drug trafficking by international conventions and protocols. The Central Bureau of Narcotics (CBN) oversees the cultivation of opium poppy in India and issues licenses for the manufacture, export and import of narcotic drugs and psychotropic substances. Both agencies are committed to fight black money and money laundering.

8. Serious Fraud Investigation Office (SFIO)

SFIO[9], an entity under the Ministry of Corporate Affairs aims to probe complex fraud cases with cross-departmental and interdisciplinary implications and significant public interest. These cases, which may involve financial misappropriation or affect many individuals, underscore the SFIO's commitment to serving the community. Moreover, the SFIO is often called upon to handle cases that have the potential to bring about substantial improvements in systems, legislation, or procedures through their investigations.

9. Registrar of Companies (ROC)

ROC falls under the Corporate Affairs Ministry and supervises the affairs of companies and limited liability firms. The ROC is empowered for reviewing filed forms and checking of financial statements by the corporates and duties assigned by Companies ACT,

10. Registrar of Societies (ROS)

The Registrar of Societies (ROS) oversees the registration of non-profit societies under the jurisdiction of state governments. Although the Society Registration Act is a central Act, many states have adopted and modified it to register non-profit societies under their respective Acts. ROS offices act as repositories of data on these societies and function as their regulatory bodies.

11. Bureau of Immigration (BOI)
The BOI conducts immigration checks at Indian Immigration Check Posts (ICPs) for all passengers, including Indian and foreign nationals, upon arrival and departure. It is mandatory for all passengers arriving in or departing from India to complete Disembarkation and Embarkation Cards upon arrival and departure, respectively.

12. The Economic Intelligence Council (EIC)
The Finance Minister heads the EIC which includes high-ranking officials, the RBI Governor, and the SEBI Chairman. It calls a meeting annually to deliberate and determine new concepts in financial crimes and policy for sharing the information and reciprocity. The Working Group oversees the execution of decisions made by the EIC on the Intelligence Apparatus, which is established within the EIC for this purpose.

13. Inter-Ministerial Coordination Committee (IMCC)
IMCC stands for **Combating Financing of Terrorism and Prevention of Money Laundering**. Its primary objective is to ensure effective coordination among all competent authorities and to enhance Bharats's national magnitude for enforcing AML/CFT measures that align with international standards.

14. National Crime Records Bureau (NCRB)
The NCRB[10] was established to equip Indian law enforcement agencies with information technology and criminal intelligence to enhance their capacity for effective law enforcement. The bureau manages a secure database on culprits, unlawful acts, assets, and organized gangs. It processes and shares fingerprint records of culprits, including foreigners, to facilitate the establishment of their identities.

15. National Investigation Agency (NIA)
The NIA[11] is an investigative unit established under the National Investigation Agency Act. It is entrusted with the mandate to examine scheduled offences, particularly those falling under the Unlawful Activities (Prevention) Act. It investigates the cases of Terrorism Financing. It gives the central government the authority to investigate terrorist incidents nationwide. NIA is empowered with responsibilities akin to those of police officers about offence investigations.
The NIA Act outlines provisions for establishing special courts and mandates for daily trials. Under the NIA Act, the agency is authorised to investigate offences stipulated in the Schedule to the NIA Act, which includes various other laws related to India's sovereignty.

16. Central Bureau of Investigation (CBI)
CBI[12] is India's primary investigative law enforcement agency under the Department of Personnel within the Ministry of Personnel, Pension and Public Grievances. It is empowered to investigate criminal cases involving corruption and fraud by public officials, economic offences, as well as specific crimes such as terrorism, bombings, high-profile homicides, kidnappings, and organised crime. The CBI

also play an essential role in international cooperation concerning mutual legal assistance and extradition.

17. Economic Offences Wing (EOW)

The Economic Offences Wing (EOW) operates under the police administration of the states or provinces and is tasked with investigating severe economic offences. It plays an important role in providing support, guidance, and assistance to district police in financial crimes, reinforcing collaborative efforts to prevent and detect money laundering. The EOW's divisions in states are comprehensive, each addressing a specific type of fraud, ensuring a thorough and effective approach to combating economic offences. These divisions are;

A. The Fraud and Cheating Prevention Section,
B. Land and Building Integrity Section,
C. Forgery Prevention Section,
D. Criminal Breach of Trust Prevention Section,
E. Intellectual Property Rights (IPR) and Trademark Protection Section,
F. Cyber Crime Prevention Section,

Lokpal and Lokayuktas Act, 2013

Firstly, the concept of an ombudsman originated in Sweden in 1809. The Lokpal and Lokayuktas Act, 2013[13] established the Lokpal at the Union and Lokayukta at the State levels. The Act was effective from sixteenth, January 2014 after receiving assent from the President[12].

Its purpose is to investigate allegations of corruption involving key public officials, including the Prime Minister, Cabinet ministers, Members of Parliament, and Group A officials of the central government. Additionally, it aims to prevent corruption within both central and state government offices. These institutions operate as statutory bodies (without constitutional status) and act as ombudsmen, examining allegations of corruption against designated public functionaries and related issues.

REPORT CARD OF ENFORCEMENT AGENCY (ED):

One of the major agency namely ED working for preventing money laundering ,the minister of state for finance of the Indian government produced report card in Loksabha "*that ED has filed over 5,400 money laundering cases since the enactment of the criminal law over 17 years ago, and only 23 individuals have been convicted. This significant gap, as detailed in the government's report to Parliament, underscores the need for more effective enforcement.*

As of 31 March 2022, the ED had recorded 5,422 cases under the PMLA, attached proceeds of Crime of Rs. 1,04,702 crore (approximately), and filed prosecution complaints (charge sheets) in 992 cases, resulting in the confiscation of Rs 869.31 crore and conviction of 23 accused.

Notably, the ED registered the highest number of money laundering and foreign exchange violation cases in the 2021-22 financial year, with 1,180 and 5,313 complaints respectively. This surge in cases underscores the increasing prevalence of money laundering.

During the financial years between 2012-13 to 2021-22, the federal probe agency filed

a total of 3,985 criminal complaints under the PMLA, 2002 and 24,893 under the civil law of the Foreign Exchange Management Act (FEMA).

Conclusion:

After reviewing the responsibilities and work of the different regulatory authorities and government agencies, it appears there are sufficient authorities to deal with black money and money laundering matters but offenders are being acquitted. The main reason may be, either the agency did not follow the procedure or get satisfactory evidence to prosecute the persons or the willingness of the agencies in the court of law and unreasonable time taken by the courts. This may be done by enhanced cooperation among agencies at national and international levels. By educating the public on the effects of black money and the risk of money laundering by bringing whistleblower and protection policy under PMLA. Information technology and AI may be used more effectively. Also, the training of investigators, prosecutors, and judges is essential. Money laundering and terrorism financing require a multifaceted approach involving legal reforms and enhanced international cooperation. However, the FATF has appreciated the efforts and compliance with AML and counter money laundering and terrorist financing. There is a meagre success rate in punishing and prosecuting offenders. While challenges will remain, continued efforts can improve the effectiveness of AML regimes worldwide.

Acknowledgement: we acknowledge the government that brought white paper on black money in 2012.

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STRUCTURAL ECONOMIC REFORMS AND COLLECTIVE SOCIAL ENTREPRENEURSHIP TO PULL THE SMALL INDIAN FARMERS OUT OF POVERTY - POLICIES, PROCESSES AND PROGRAMS

Girish Jakhotiya

Abstract

Around eighty percent of Indian farmers are small in terms of their land holding. On an average each small farmer holds two to three acres of land which is neither properly cultivable nor saleable. Small farmers are socially divided, economically illiterate and technologically very backward. As they are not united and guided well, they could not take any considerable advantage of globalization and the opportunities offered by the trade mechanism of the WTO. This paper presents a detailed account of the four-stage reform process along with the relevant changes in Indian agro policy framework and programs of change awareness.

Keywords:

Economic Reforms Social Entrepreneurship, Perpetual Poverty, Collective Social Entrepreneurship(CSE) Model, Small Indian Farmers

I. Introduction

Small Indian farmers are the backbone of India's economy as they generate around 20% of country's GDP and create 55% of total employment. Yet they have been suffering from perpetual poverty on account of absence of scale & efficacy of operations, economic illiteracy, inadequate scientific temperament and lack of collective social entrepreneurship[1]. Indian politicians and bureaucrats do not visualize this important sector of the economy in an integrated manner[2]. Hence, although India boasts to be a net exporter of agriculture produce, most of its farmers are hovering around the poverty line. Last three decades of globalization rewarded the upper 20% of India's population handsomely, but the remaining 80% which include 55% from the agriculture sector have proven to be 'net losers'. Indian economy is today viewed to be the engine of global economic growth, but the functioning of this engine will not be sustainable if the small farmers are not made equal partners in the economic prosperity. Indian farmers are economically weak, socially backward, politically misguided and technologically naive. This is mainly because they lack collective social entrepreneurship. If the small Indian farmers are to be made equal partners in India's growth story, they should be enabled to work on their own structural economic reforms.

The main objective of this paper is to broadly present a model of collective social entrepreneurship of the small farmers, based on the holistic reforms in the present agricultural policy framework and the relevant processes & programs. The scope also includes (i) a holistic evaluation of the present state of affairs of the poor Indian farmers (ii) connecting the socioeconomic backwardness of the small farmers with the sociocultural legacies of Indian agriculture (iii) suggesting structural reforms to pull out the farmers from poverty (iv) designing a model of collective social entrepreneurship which would eventually offer sustainable and equitable economic prosperity to all the small farmers.

II. Methodology

The methodology consisted of the following major components:

- Detailed reference to the historical and contemporary legacies of Indian farmers which have been causing the social injustice and the economic pain.
- Study of the present design of the agricultural policies and processes impacting the farmers' livelihood.
- Personal interaction with five hundred farmers, their twelve agro product selling committees and the members of the administrative bodies.
- Interaction with ten consumers groups and agro product traders (The author

1 HR Sharma & Shakir Hussain Malik (2021). Land Distribution Structure, Marginalisation of Holdings and Dimensions of Viability Crisis in Indian Agriculture: A State Level Analysis, Indian Journal of Agricultural Economics 76(2):207-224

2 National Commission on Farmers, Ministry of Agriculture, Government of India, New Delhi (2005). Saving Farmers & Saving Farming – From Crisis to Confidence - Second Report

is an active president of a consumers association based in Mumbai which directly deals with select farmers).

- Designing of a four-stage reform process to build up collective social entrepreneurship among the small farmers.
- Designing a curriculum for farmers' awareness of such entrepreneurship for their economic upbringing.

them face serious poverty[3]. The rich and big farmers exploit most of the subsidies given by the federal and state governments and also control most of the economic resources by using their political clout. Fig. 1 displays the major factors and their consequences which have put the small farmers into a perpetual cycle of poverty.

A The Present Pathetic Reality of the Indian Small Farmers

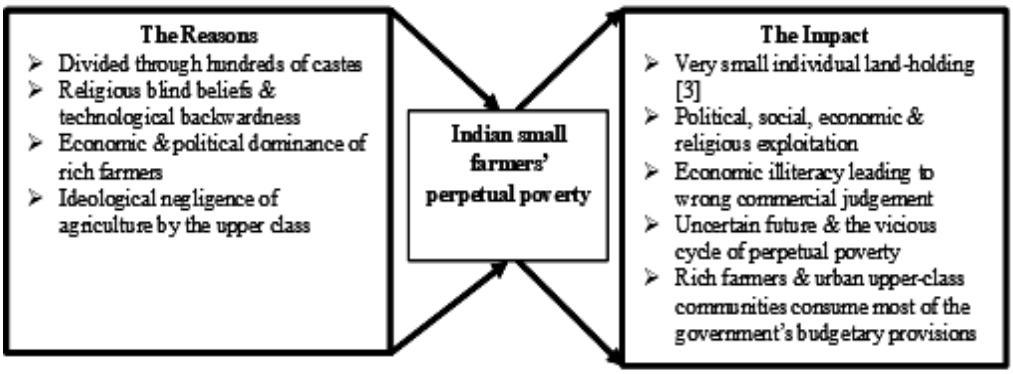

Figure 1. Perpetual Cycle of Poverty of A Small Farmer

III. The Socioeconomic Factors And Indian Farmers' Perpetual Poverty

For thousands of years the Indian economy has been mainly 'agrarian', with today's huge population of around eight hundred million people depending mainly on agro-based livelihood. Agriculture sector offers 55% of Indian employment, with very poor wages and poor skillset. Collectively the Indian farmers are presently producing enough foodgrain for India's 1420 million population, but 80% of

The Present Pathetic Reality of the Indian Small Farmers is as follows:

i) 30% of the small farmers are below the poverty line and 70% belong to the lower income class. At today's price level, the average monthly income of a farmer's family should be INR 30,000 (around USD 333), to pull him above the poverty line. But it is a paltry income of INR 12,000. Obviously, a farmer cannot afford to spend on

3 National Commission on Farmers, Ministry of Agriculture, Government of India, New Delhi (2004). Saving Farmers & Saving Farming – First Report

children's education and good food.

ii) At all the local agro product sales points (i.e. Krushi Bazar Samiti), the farmers are exploited by the merchants and administrative staff. This is simply because farmers lack financial literacy and unity. Very recently farmers have been allowed to sell their produce in open markets. Hardly one percent of them could do so for want of logistical and marketing support.

iii) Farmers do not enjoy any effective insurance coverage or benefit at the time of bad monsoon or very low market price for their produce due to oversupply. As most of the elected members from the government do not really bother about agriculture, the export-import policy related to agro products is often detrimental to the farmers' interest.

iv) The caste system and the political class do not really allow the farmers to come together and conduct large size collective or cooperative farming, which deprive farmers the benefits of the economy of scale. As a result, farmers are unable to invest in the mechanization and modernization of farming. Lack of unity also exposes them to the financial exploitation often done by the big traders, market agents, government bureaucracy and other political & social elements.

v) The caste system and the religious backwardness of most of the farmers compel them to indulge in very damaging social and religious rituals which cause them huge loss of financial resources, time and energy[4]. Farmers blame their own destiny for economic pain and do not really think about a constructive change in the present socioeconomic system.

vi) The government (both federal and state) lacks long-term vision for the structural agro reforms[5]. Instead, it uses piecemeal and tactical approach which doesn't offer any sustainable relief to the farmers. The government has almost failed in exploiting the international market to bring export-based economic prosperity to the small farmers. This is a direct result of absence of an integrated agricultural planning at the national level. The policy framework being ad hoc, the farmers do not really get any reasonable clue about the markets, seasons, pricing and investment.

vii) As a result of economic instability, most of the farmers get indebted constantly and pay exorbitantly high interest on their borrowings from the markets. Both public sector and private banks are reluctant to lend to the small farmers as loan recovery becomes challenging[6]. As a result of this financial mess, the private lenders often loot

4 A History of India: Volume 1 – Prof. Romila Thapar, Penguin, India (Year 1966)

5 S. Mahendra Dev (2012). Small Farmers in India: Challenges and Opportunities, Indira Gandhi Institute of Development Research, Mumbai

6 Ramesh Chand (2022). Agricultural Challenges and Policies for the 21st Century, National Bank for Agriculture and Rural Development

the innocent farmers. A government committee under the chairmanship of Prof. Swaminathan described certain formulae for the costing & pricing of agro produce, but small farmers seldom get any reasonable price[7].

viii) Rich and big farmers manipulate the government policies in their favour. Therefore, the small farmers always become a target to be attacked by both, the government agencies and the urban educated people. Historically the upper Indian castes have been practicing an ideology that is anti-farmers and anti-villagers.

ix) Recently with the support of the present government, a few corporate houses attempted to hijack the entire agro business through an enactment of some new laws. Showing a rare attempt of unity, the farmers vehemently opposed these laws. Crony capitalists will keep on attempting to corporatize the farm sector against the genuine interest of the small farmers.

x) The Indian education system doesn't really add any value to the betterment of the agriculture sector. Children of the small farmers get degrees which are neither useful in farming nor suitable in the manufacturing sector. As a result, the effective rate of urban and rural unemployment is around 28%, which is very alarming. (This percentage includes the youth working on temporary jobs with paltry salaries.) Nearly 60% of India's population is young that needs creation of at least 20 million jobs every year. With a shrinkage of the manufacturing sector and a saturation of the service sector, the load of creating employment gets levied on the agriculture sector. Sadly, the farming activity, therefore carries a lot of disguised unemployment.

B. Revisiting the 'Agriculture Ideology' and correcting the relevant Policy Framework

The small Indian farmers need an integrated approach to conduct all of their farming activities, based on 'Collective Social Entrepreneurship' (CSE). Fig.2 exhibits major segments of CSE.

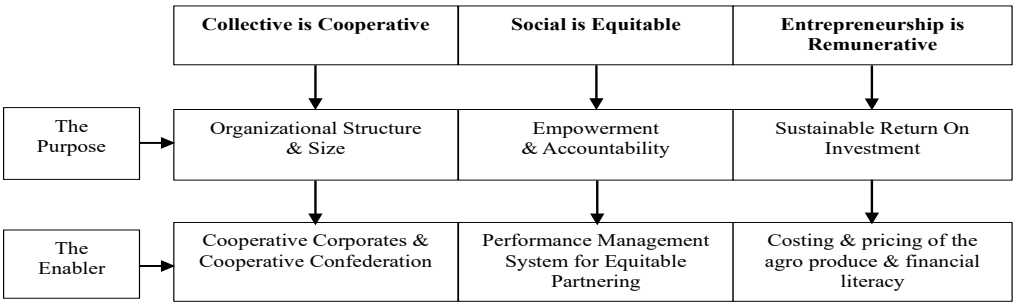

Figure 2. Collective Social Entrepreneurship (CSE)

7 Kaushiki Sanyal (2006). Swaminathan Report: National Commission on Farmers

The CSE will have to be attained through four progressive stages of empowerment and accountability, keeping in mind the social background, professional competence and present economic status of the small farmers. These stages may be briefly narrated as follows:

Stage 1: Gaining Confidence through Cooperation. —

The Indian farmers respect their agriculture land a lot and emotionally treat it as their mother. Therefore, they hesitate to share it with others even though the sharing could be economically very beneficial. Hence in Stage 1, they should come together through a loose structure of association which should facilitate the conduct of major farming processes collectively to gain economy of scale and reduce the cost of farming. One major hurdle here is the 'caste barrier'. Farmers will have to be socially enlightened to overcome this barrier through an awareness program. They will have to be reminded of their ancient heritage of humanity and an irrelevance of the damaging caste system which was imposed on them later. This loose association should make them understand each other and establish a bondage of trust, affection and cooperation. They would also understand the application of machination and process modernization, if they work on economy of scale.

Stage 2: Consolidation through a Formal Structure. —

Based on the experience of the first stage of collective activity, the farmers should be technically, socially and emotionally ready to work together through a formal structure. This structure may be called 'Cooperative Corporate'[8]. This would require a policy-related change in India. This organizational structure should combine the advantages of cooperative equality through the principle of 'one head - one vote' and the 'limited liability principle' of a joint stock company. In other words, this organic structure should avoid the danger of crony capitalism and gain the advantage of corporate professionalism & entrepreneurship. The farmers will surrender their individual land-holding to the new organization and they shall hold shares in the ratio of their land size. If fifty small farmers holding two acres of land each come together, then the total land holding shall be one hundred acres. If they cultivate five different crops (each in 20 acres of land), the techno-commercial risk-diversion would be possible. Collectively the farmers will be able to face the market uncertainty and share the profits & losses in an equitable manner. There are multiple advantages of cultivating different crops such as reduction in market risks of supply-demand imbalance & falling prices, management of natural environment & soil productivity, maximum use of cultivable land, better negotiations with merchants & consumer groups, bigger strength of balance sheet & better support from the lenders, managing the individual uncertainties of farmers through cooperation & collaboration and higher valuation of agriculture land &

8 Dr. Saroj Kumar Singh (2016). Problems and Prospects of the Cooperative Movement in India under the Globalization Regime, The International Journal of Indian Psychology

better return on investment.

This entire arrangement will require a pragmatic 'performance management system' which should ensure the individual performances of the farmers and their balanced rewards. If an exit route is made available, the farmers will be psychologically ready to work on Stage 2.

A strong 'cooperative corporate' of fifty farmers should be able to transact directly with the cooperative societies of the consumers and associations of the small grocery shops. This relationship should avoid the middlemen who are presently exploiting all these three groups viz. farmers, consumers and grocery shops. The triangular direct network of the three stakeholders should create a homogeneous economic group which should eventually enjoy a social synergy. Fig.4 exhibits the correlation between these three stakeholders.

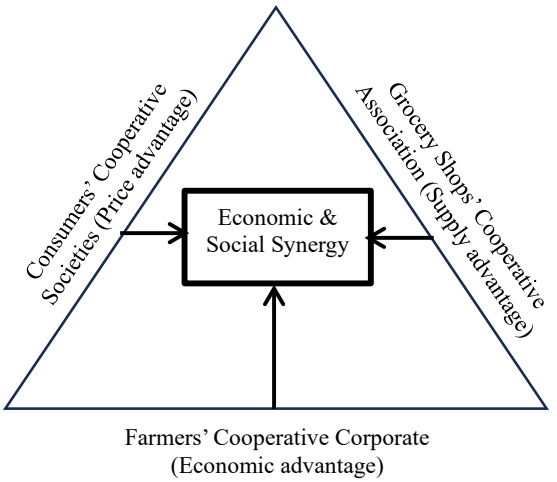

Figure 3. Direct Network Of Three Stakeholders

Stage 3: Value Added Enhancement. — This third stage is very important because it would not only consolidate the economic position of the farmers but it should also enhance their professional and social scope of networking. Farmers should process their agriculture output into 'higher value products'[9]. For example, mangos are an input for mango pulp. Fig. 5 exhibits the complete agro value-chain comprising of all the three sectors of economy.

9 Lakshmi Kantha Reddy & Prof S. Rathna Kumari (2014), Performance of Agro-Based Industries in India: A Critical Analysis, IOSR Journal of Economics and Finance (IOSR-JEF)

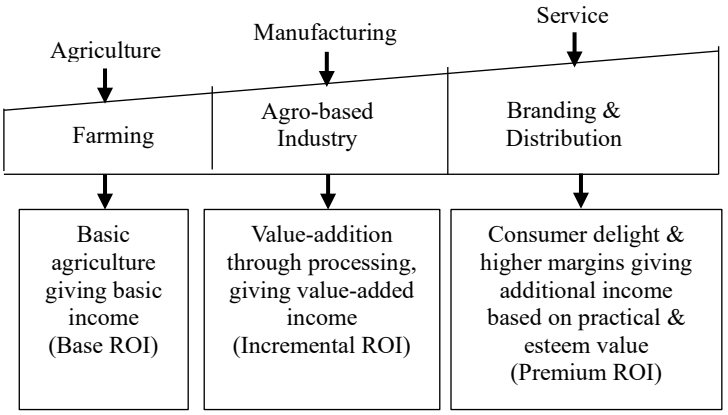

Figure 4. Complete Agro Value Chain Comprising of All The Three Sectors of Economy

Processed products should get better price giving better profit, should get access to bigger export market etc. Agro-based industry should create greater and skill-based employment for the farmers' children, ancillary businesses for local people and finance the creation of local infrastructure. Stage 3 will expose the farmers to real and bigger collective entrepreneurship as it would involve marketing, branding, financing of capital assets, management of new technology, handling of foreign markets, training of younger generation and networking with the ancillary businesses. Farmers and their next generation shall be exposed to the entrepreneurial management of capital & other resources, ultimately to guide them towards the destination of 'wealth enhancement & higher contribution to nation's GDP'. Two biggest advantages of this stage should be, farmers becoming a collective dominant force to influence the government and face the competition from the big corporate groups. As the local ancillaries and infrastructure would be developed, the local economy shall be expanded. Eventually this should reduce the present mad rush of the villagers to the congested cities. 90% of the Indian cities are overcrowded with inadequate and inefficient public infrastructure. Stage 3 should become a solid platform for building up a self- sufficient and progressive civilization in Stage 4.

Stage 4: Building a Progressive Civilization. —

As mentioned earlier, the Indian farmers enjoyed a very rich civilization before the imposition of the caste system and ridiculous religious rituals. They were deprived of any global exposure. As a result, they remained backward technologically and also economically. Obviously, agriculture became an activity of uncertainty, perpetual financial losses and an unending poverty. If farmers collectively enrich their

professional knowledge and enhance their economic base through the Stage 3, they would certainly have a solid foundation to create, nurture and expand a new & mature civilization. This self- supported design of civilization should be based on farmers' own social infrastructure of education, medication, transportation, housing, water & energy management, research & development of new agriculture products & processes, state of the art storage & distribution facility and well developed physical & online markets. Thus, farmers should be collectively very strong to negotiate with the global distribution chains like Amazon and Walmart.

The social dimension of Stage 4 should be bigger and better than its economic dimension. The new civilization should reinforce the original liberal and equitable value-system of the Indian agrarian society which was paralyzed by the caste system. Scientific temperament, technological & economic innovation and ethical business & social practices should be the doctrines of this mature civilization. Such a civilization of the millions of small farmers and their families is a must if the economic growth of India is to sustain in the long run. This should also create a balance between the urban and rural habitats.

IV. The Policy Reforms

If the 'Collective Social Entrepreneurship' (CSE) model of the small farmers is to succeed, it needs a solid support through the policy reforms. The micro and macro details of these reforms were quite evident through the off line interactions with the small farmers. These reforms can be broadly classified into five groups viz. Growth & development of agriculture business, Cost Management (Cost Control & Reduction), Development of farmers' skills, knowledge and team working, Improvisation in agriculture technology, logistics and value-adding processes and Management of financial resources to ensure a reasonable livelihood for the farmers based on an appropriate ROI on their farm land. The scope and implementation of these reforms shall enhance with each progressive stage of farmers' CSE. A few major micro details of these policy reforms may be summarized as follows:

A Business-related Reforms

- Government should declare a three years plan and an annual integrated agriculture plan for various crops along with its subsidies and other administrative support. This should reduce the confusion about market regulation and uncertainty.
- A liberal export policy to fetch better price for the agriculture produce
- A supportive legislation to facilitate the hybrid structure of 'cooperative corporate' of the farmers and a formal network with the consumer groups and grocers' associations
- Provisioning of physical and online markets for the agriculture produce
- Implementation of the costing and pricing formulae suggested by the Prof. Swaminathan's report, after due improvisation in these formulae
- A proactive communication about the WTO related norms and India's formal response to these norms should be done

regularly to the farmers in a very simple language[10].

B Reforms for Cost Control & Reduction

- For the execution of stage 1, which should offer economy of scale and a corresponding cost advantage, farmers should be allowed to come together informally and conduct the agricultural processes.
- Government must use the 'target-based approach' to rationalize the prices of agricultural inputs like fertilizers, insecticides, crop insurance, seeds, equipment, transportation and storage etc.
- Small farmers should be administratively supported to understand and regulate the prices offered by the merchants at the agro products sale centers.
- Farmers pay an exorbitant interest cost of their market borrowings. This should be stringently regulated.
- Government should factor the inflationary impact into the costing of agro produce procured from the farmers for the public distribution of food grains.
- A 'Cost Fluctuation Fund' should be built up to compensate the farmers who get badly affected by natural calamities and sociopolitical events. This fund may be financed through a tax levied on the incremental income of the rich and big farmers.

C Reforms for the Development of Farmers' Skills

- Farmers mainly need commercial and technical skills. Government should provide a separate budget and administrative facility to conduct these skill development workshops.
- Farmers should get small and simple monographs made in local language, on the macro and micro aspects of managing their farms in an entrepreneurial manner.
- Extensive but simple mobile apps should be developed to communicate to the farmers on a regular basis about market prices, weather, government regulations & schemes, new experimentations in agriculture etc.
- Farmers' children should be offered subsidized technical training suitable for their immediate livelihood to support their parents economically. They should be offered short duration diploma programs on agro-based industry.
- Almost 95% of the small farmers are ignorant about managing their family investment. They spend heavily on social events using personal loans and remain indebted perpetually. They should be made aware of financial planning.
- Team building is a critical skill which the Indian farmers lack, except for the political events. They should know the strategic, operational and behavioural aspects of team building and team performance.

10 Dr. Pratap S. Birthal & Dr. Malavika Dadlani (2021). WTO & Indian Agriculture – Issues, Concerns and Possible Solutions, National Academy of Agricultural Sciences

D Improvisation in Agriculture Technology

- Right from the Stage 1 of the CSE, farmers should be financially and technically supported to mechanize their farming, without affecting the relevant need of creating jobs in the rural economy.
- Agricultural logistic in India is pathetic, which results in wasting almost 25% of agricultural produce. Government will have to make special budgetary provision for improvising the present logistic.
- The distribution & storage processes of agriculture produce need a thorough reform, with an equal partnering by the consumer groups and associations of small grocers.
- Many intelligent small and young farmers indulge in technological research using their farm land but they lack institutional support. As a result, the useful ideas die before they are copyrighted or patented.
- Barring a few, the agriculture universities are not professionally equipped to collaborate with industry and foreign universities for useful research and education. Government initiative is needed here.
- Almost all the advanced research projects of taking the value-chain of the agriculture business to next level are unknown to 90% of the small farmers. Young generation of farmers is hungry about such knowledge. Special institutional initiatives are required to promote the knowledge sharing efforts.

E Management of Financial Resources

- Farmers should be guided and supported in the process of monetization of their farm land and farming experience.
- Farmers should be guided for the long-term strategic planning of agriculture management during all the four stages of CSE.
- Agriculture Finance and its management need thorough reform, so that small farmers are professionally enabled to benefit from the various financial schemes. Cooperative Agriculture Banks (CABs) should be constituted at grass root level, so that farmers' savings are better channelized locally.
- A separate financial regulation model will have to be developed to execute the hybrid structure of 'cooperative corporate'. This model should support the performance management system, in terms of financial measurement of the individual farming performances of the members.
- Government can use the Public Private Partnership (PPP) Model to ensure a responsible financial involvement of the small farmers in the funding of public infrastructure.
- A lot of innovation is possible in developing the agricultural mortgages to suit the long-term financial needs of the farmers. They should be made aware of the financial technology that matches the long-term farm earnings with the short-term need of working capital.

V. The Process Reforms

All policy reforms can be successfully executed if the process reforms are in place. Processes of managing the Indian agriculture for the small farmers have been improvised during the last two decades, using the well-known Indian expertise of information technology. Yet a lot more needs to be done in terms of their integration, simplification and adaptation. The process reforms become difficult because Indian farmers are divided into multiple languages, cultures, farm land specifications and political leanings. Fig. 6 exhibits the scope of integration of processes.

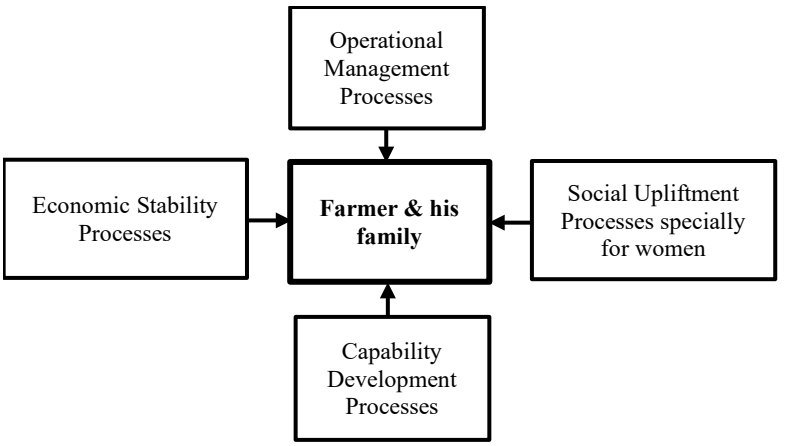

Figure 5. Process Integration

The components of process reforms may be summarized as follows:

A Operational Management Processes

- Enlargement of farm holding
- Scope of machination
- Technological adaptation by farmers
- Process integration to build a smooth & complete value chain (logistical process)

B Economic Stability Processes

- Right subsidies in the right hands at right time
- Financing and valuation of farm land and crops
- Cost and Price Benchmarking
- Market Intelligence & Monitoring Processes

C Capability Development Processes

- Managing a huge number of participants
- Management of training centers
- Multiple training inputs, languages and learning capabilities
- Conversion of new capabilities into good employment especially during the third stage of the CSE.

D Social Upliftment Processes

- Social homogeneity through the

removal of caste barriers
- Inviting investors to finance the social upliftment processes
- Process to define the socially backward farmer communities
- Process to separate the social issues from the political preferences.

VI. The Program Reforms

As mentioned earlier, the three major stakeholders of the agriculture reforms are the small farmers, consumers of agriculture produce and small grocery shops. These three stakeholders also constitute almost 90% of the local economy of a village or small city (taluka). The consumers include workers, service providers, government employees, teachers and all other small professionals. Naturally the programs of reforms will have to be conducted simultaneously for all the three groups, with an integrated approach. Civil societies, NGOs, retired teachers, bankers, bureaucrats, young independent volunteers etc. will have to be involved in carrying out these programs effectively with available limited financial resources. Four major 'Change Programs' will have to be regularly conducted apart from the school & college curriculum and government regime. The government will not be able to finance these programs. Rather for political reasons, it may disallow some of these initiatives. The four programs may be briefly described as follows:

A Social Awareness Programs
- Ancient rich social legacies and agricultural excellence
- Futility of the caste system

B Technological Awareness Programs
- Scientific temperament
- Technological benchmarking

C Awareness Program of Macro Economics
- Global and national economic events & their impact
- Agriculture Budget announced by the government from time to time

D Entrepreneurial Awareness Program
- Entrepreneurial mindset & tactics
- Special case studies on agriculture entrepreneurial successes.

VII. Conclusion

Pulling the small Indian farmers out of perpetual poverty is certainly a herculean task, especially when the political class is not very enthusiastic about it. Therefore, the small farmers will have to apply the 'doctrine of self-help'. This doctrine can be well executed through the comprehensive model of "Collective Social Entrepreneurship" (CSE), supported by the policy & process reforms and programs of reform awareness. Since independence of India, all the governments carried out a piecemeal approach towards the economic upliftment of small farmers. Obviously, this approach could not result into any sustainable impact. Small Indian farmers continue to suffer from perpetual poverty. To get rid of this poverty, they should collectively work on real entrepreneurship with social equality. Therefore, this paper suggests a comprehensive model of 'Collective Social Entrepreneurship'(CSE), which can be implemented through four progressive stages. A hybrid structure which

combines the benefit of social equality from the principle of cooperation and the limited liability benefit of a corporate body is suggested here for a sustainable implementation of the CSE Model.

While working on the economic model of CSE, the farmers will have to recognize their original roots and legacies of social equality, scientific temperament and entrepreneurial prudence. They will have to free themselves from the heinous caste system and ridiculous rituals which impacted their socioeconomic status very badly. Indian small farmers will have to collectively cross all the hurdles and start working on the first stage of the CSE Model. The successful completion of this first stage shall automatically convince them about the validity of the remaining three stages. Small Indian farmers can rebuild their mature civilization which was badly damaged by certain ill elements. This paper outlines a strategic journey for them.

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INDEX

Aggregate demand components	1,16,125
Anti-money laundering (AML)	127
Black money	32,126-128,130,133
Corporate Social Responsibility	39,46,83-86, 88-91,105,114
Cryptocurrency	1-7, 21-23
Cutting-edge technology	92
El Nino	49, 50-61
Environmental, Social and Governance (ESG)	25,34,35
Financial Market	61, 64
Fintech	92-100
Global Wars	63 - 68,71,79-81
Global Economic Impacts	63
Granger Causalty	1,8,16-19
Green Hydrogen	36,40-42,48
Hierarchical Regression	101,108, 111
Inclusive Growth	83,84,89
Insurance Claim	101,105,106,108, 112-114
Managerial Accounting	92, 97-99
Monetary Policy	6,21,26,33,50,51,117-123
Money laundering (ML)	35,126-133
Net-Zero Goal	45
Perpetual Poverty	135, 136,146
Policyholders	101-103,105-108,110,112,113
Prevention of Money Laundering Act (PMLA)	127
Shock Transmission	1,17,123
Small Indian Farmers	13,41,35,13,81,46,147
Social Impact Assessment	83

Sustainability	24,25,35,39,41,44,83-86,88-90,96
Sustainable Development Goal (SDG)	24-26
Sustainable Finance	24
SVAR Model	11,61,18,11,91,20,123

Digital Object Identifier (DOI)- Vol. 50 Nos. I & II, April & July 2024

Name of the Article	Author's Name	Vol.	Nos.	Issue	Page Nos.	DOI Number
Analysis of Shock Transmission and Volatility Spillover: An Empirical Study Between Cryptocurrency and Bank Nifty During and Post Covid-19 Period	Dipanwita Majumder, Sonali Sardar, Rajashik Sen	50	I & II	April & July, 2024	1 to 23	10.33516/ rb.v50i1-2.1-23p
CBDC and ESG Principles in India - A Synergetic Framework for Sustainable Finance	Jyothi G.H.	50	I & II	April & July, 2024	24 to 35	10.33516/ rb.v50i1-2.24-35p
Critical Review of Select Energy CPSUs Under India's Energy Transition	Padmanabhan Satyes Kumar	50	I & II	April & July, 2024	36 to 48	10.33516/ rb.v50i1-2.36-48p
El Nino and the Indian Financial Market - An Analysis of Nifty and USD-INR	Gangadhara B, Bheemanagouda	50	I & II	April & July, 2024	49 to 62	10.33516/ rb.v50i1-2.49-62p
Emerging Global Economic Scenario: Impact on India's Financial Landscape	Sivakumar.A, Haritha Ravi	50	I & II	April & July, 2024	63 to 82	10.33516/ rb.v50i1-2.63-82p
Empowering Approach to Socio-Economic Transformation: A Case Study of Zoho's Impact in Tenkasi	Sunil Shivaji Khandbahale, Sachin Raghunath Pachorkar	50	I & II	April & July, 2024	83 to 91	10.33516/ rb.v50i1-2.83-91p
Fintech Landscape: Inclusivity, Innovations And Impact on Managerial Accounting	Talsaniya Gauravkumar Kanaiyalal Kunal Sinha	50	I & II	April & July, 2024	92 to 100	10.33516/ rb.v50i1-2.92-100p
Identifying Significant Predictors of Policyholder's Satisfaction: A Hierarchical Regression Model	Jyothilinga V, Gautam B M	50	I & II	April & July, 2024	101 to 115	10.33516/ rb.v50i1-2.101-115p
Policy Changes and Behavior of Private Consumption and Private Investment in India	Niranjan R	50	I & II	April & July, 2024	116 to 125	10.33516/ rb.v50i1-2.116-125p
Regulatory Authorities or Agencies to prevent black Money and Laundering	Pramod Kumar Narula, Kuldeep Kumar	50	I & II	April & July, 2024	126 to 133	10.33516/ rb.v50i1-2.126-133p
Structural Economic Reforms and Collective Social Entrepreneurship to Pull the Small Indian Farmers Out of Poverty - Policies, Processes and Programs	Girish Jakhotiya	50	I & II	April & July, 2024	134 to 147	10.33516/ rb.v50i1-2.134-147p

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