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Rabindra Bharati University Journal of Economics is a UGC CARE listed peer-reviewed Journal published annually in the Department of Economics, Rabindra Bharati University. Initially, the research articles were published in the journal under the title 'Occasional Papers' and fourteen such volumes of this journal were published earlier. Presently the articles relating to research papers in Economics and allied subjects have been considered for publication in the journal.

The present volume contains 19 (nineteen) research articles of the eminent Scholars of different Universities/ Institutes. This volume is remarkable for the on-going Golden Jubilee celebration(2023) of the Department of Economics.

We are grateful to the contributors and all others who have helped in one way or other in the preparation of this volume. The Advisory Board and the Editorial Board will not be responsible for the views expressed by the authors in their articles.

At the end, I would like to extend my whole-hearted thanks to the Advisory Board and the Editorial Board and especially to 'The Saraswati Printing Works' for bringing out the present volume despite of many constraints.

December, 2024

Prankrishna Pal
Editor

Contents

The Influence of RBI Monetary Policy on Indian Stock Market and Macroeconomic Indicators: A Granger Causality Approach

Riancy Mascarenhas[1], Jitendra Rabada[2] , Helic Mario Barretto[3]

Abstract

This paper evaluates the impact of RBI monetary policy changes from 2001 to 2020 on Indian stock market performance indicators, focusing on the effects of five key rates. It also examines whether changes in monetary policy rates influence other macroeconomic indicators. The study utilizes annually averaged data, which is analyzed through the Granger Causality test to examine the directional relationships between variables. The study highlights the significant role of CRR and interest rates in influencing stock market performance, demonstrating the broader impact of monetary policy on the economy. The findings suggest that the monetary policy framework set by the Reserve Bank of India (RBI) has a moderate effect on the macroeconomic indicators.

Keywords: *Monetary Policy, Performance Indicators, Stock Market, Granger Causality*

JEL Classification: E4, G1, E44 and C5

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1. Introduction

The Reserve Bank of India (RBI) plays a vital role in shaping and implementing the monetary policy in India which has a significant impact on the stock market. Monetary policy aims to maintain price stability and macroeconomic equilibrium by controlling credit supply and cost. The BSE Sensex 30 and the Nifty 50 serve as key benchmark indicators of stock market performance in India, representing the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE), respectively. There are many factors which affect the stock market like global economic conditions, political stability and government policies. The key economic indicators, such as GDP, inflation and unemployment, exhibit a strong correlation with stock market performance, as supported by studies like Ioannidis and Kontonikas (2008), which highlight monetary policy's impact on stock returns and Caraiani and Cãlin (2020), which discuss potential negative impacts of such relationships during financial bubbles. However, other studies, such as Galí and Gambetti (2015), suggest that these relationships can vary over time or under different economic conditions. Robust GDP growth attracts investors, while inflation and unemployment rates affect consumer spending and corporate earnings, impacting the stock market. A thriving stock market signifies a strong economy and investor confidence. The research paper aims at analyzing the influence of the RBI's monetary policy on the stock market performance and macroeconomic indicators over a period of two decades, from 2001 to 2020.

2. Literature Review

Numerous studies have explored the impact of monetary policy on stock markets globally, including India, providing significant insights into this dynamic relationship. Studies such as Singh (2014) and Praptiningsih (2010) specifically investigate the effect of Reserve Bank of India's monetary policy instruments on Indian stock market indices like BSE Sensex and Nifty 50. These studies found that repo rates, reverse repo rates and CRR have a significant impact on stock price movements in India. Shikh Albaity and Albaity (2011) analyzed the influence of monetary policy on the liquidity of the Indian stock market, highlighting its critical role in stabilizing market fluctuations.

Ioannidis and Kontonikas (2008) examined the influence of monetary policy on stock returns in OECD countries and found that changes in monetary policy affect stock returns, supporting the idea of monetary policy transmission through the stock market. Galí and Gambetti (2015) studied the response of stock prices to monetary policy shocks and

identified periods when stock values rose steadily despite tightening monetary policy. Kurov (2010) explored how investor sentiment and market conditions interact with monetary policy decisions, showing that investor psychology plays a role in stock market reactions to monetary news. Fernández-Amador et al. (2013) focused on stock market liquidity and found that expansionary monetary policy increases liquidity, particularly for smaller stocks.

Jansen and Tsai (2010) investigated the asymmetric impact of monetary policy shocks on stock returns in bear and bull markets, highlighting the differences in their effects on firms' stock returns and external financing. Fischbacher et al. (2013) conducted experimental research and observed the impact of active monetary policy on stock market bubbles and trading behavior. Tang et al. (2013) examined the effects of monetary policy changes on the currency and stock markets in China, revealing the influence of policy shifts on market dynamics. Nwakoby (2016) analyzed the link between monetary policies and stock market performance in Nigeria, finding a long-term connection between the two. Suhaibu et al. (2017) investigated the dynamic relationship between monetary policy and stock markets in African countries, showing that the effects vary across nations. Hojat (2015) explored the impact of monetary policy on expected rates of return for publicly listed firms, revealing the moderating effects of various monetary policy variables. Caraiani and Cãlin (2020) examined the effect of monetary policy on stock market bubbles using a time-varying BVAR framework and found that the likelihood of negative impacts increases with a country's financial development. These studies, along with others, contribute to our understanding of the complex relationship between monetary policy and the stock market, providing insights into the transmission channels and effects of monetary policy decisions on stock market dynamics.

3. Research Gap

The existing literature on the relationship between monetary policy and stock market performance exhibits certain limitations, particularly in the Indian context. While numerous global studies have explored the linkage between monetary policy and stock market dynamics, the findings often lack specificity to India, where unique macroeconomic conditions and regulatory frameworks play a critical role.

Firstly, previous research has not adequately focused on Indian Stock Market Benchmark Indices such as the BSE Sensex 30 and NSE 50. These indices are widely regarded as key

indicators of market performance (Groww, n.d.) capturing the behavior of the top-performing companies. However, their exact responses to various monetary policy tools, such as the repo rate, reverse repo rate and CRR, have not been thoroughly investigated.

Secondly, most existing studies on India analyze relatively short time periods, limiting their ability to provide a comprehensive understanding of long-term trends and patterns. This lack of broader temporal analysis restricts insights into how monetary policy influences stock market performance across varying economic cycles and market conditions.

Lastly, there is a crucial gap in the existing literature. While global research has explored the individual effects of monetary policy tools, such as interest rates and reserves, on macroeconomic indicators like GDP, inflation, and unemployment, the combined impact of these factors on stock market performance in India remains underexplored. Additionally, the inclusion of the Business Confidence Index (BCI) in the context of Indian financial markets is relatively scarce, despite its significant role in measuring economic sentiment and forecasting future economic performance (Bielova et al., 2021). While global studies have addressed these aspects, their application to Indian markets remains insufficient.

Therefore, this study aims to fill these gaps by analyzing the influence of the Reserve Bank of India's monetary policy on the stock market performance and macroeconomic indicators over a period of two decades, from 2001 to 2020.

4. Objectives of the Study

To investigate how monetary policy rates, influence key stock market performance indicators (e.g., BSE Sensex, Nifty 50) and macroeconomic variables (e.g., GDP, Inflation Rate, Consumer Price Index, Industrial Price Index, unemployment rate and Business Confidence Index) in India.

5. Data and Variables

The variables selected for this study are grounded in their theoretical relevance and empirical support in the literature, as well as their ability to capture the relationship between monetary policy and stock market performance. Each variable is chosen for its potential to influence or be influenced by the monetary policy measures of the Reserve Bank of India (RBI) and

its role in reflecting the overall economic environment. Monetary policy data, including CRR, SLR, Interest Rate, Repo Rate, and Reverse Repo Rate, were sourced from the Reserve Bank of India (RBI) website. Stock market data, specifically the BSE Sensex and NSE Nifty, were obtained from the official NSE and BSE websites. Macroeconomic data, such as GDP, Unemployment Rate, Inflation Rate, CPI, IPI, and BCI, were retrieved from reliable databases, including Macrotrends for long-term historical data. While government sources like MOSPI and RBI are typically used, Macrotrends provides an accessible and well-organized dataset that is cross-verified for accuracy.

5.1 Monetary Policy Variables

a) Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) are tools used by the RBI to control liquidity and inflation in the banking system. According to Mishkin (2007), these ratios are key instruments for regulating the money supply and ensuring financial stability.

b) Repo Rate and Reverse Repo Rate are central to the transmission of monetary policy. Mohanty (2011) highlights the repo rate as a dominant monetary policy tool in India's liquidity adjustment framework, affecting short-term borrowing costs and financial market conditions. Das (2015) emphasizes that reverse repo rates help stabilize short-term interest rates and align them with the central bank's monetary policy stance.

c) Interest Rate: The general interest rate in the economy, as a key determinant of the cost of borrowing, is closely tied to stock market performance. Fama (1990) and Campbell (1991) found that higher interest rates lead to lower stock prices due to increased borrowing costs for companies and reduced future cash flows.

5.2 Stock Market Performance Indicators

BSE Sensex and NSE Nifty are widely accepted as the benchmark indices that represent the overall performance of the Indian stock market. Sultana and Pardhasaradhi (2012) highlights BSE Sensex and NSE Nifty as representatives of the Indian stock market. It notes their widespread use as benchmarks for analyzing market trends and macroeconomic impacts.

5.3 Macroeconomic Indicators

a) GDP Growth Rate: GDP is a primary indicator of the overall health of the economy and its growth is positively correlated with stock market performance. Barro (1990) suggested that higher GDP growth increases business profits, which drives stock prices up.

b) Unemployment Rate: The unemployment rate serves as a lagging indicator of economic performance and a potential driver of consumer sentiment. Chen (2007) explores the relationship between various macroeconomic indicators, including unemployment and stock market performance. Rising unemployment generally signals economic distress, leading to reduced consumer spending and consequently, negatively affecting stock market performance.

c) Inflation Rate and Consumer Price Index (CPI): Both these variables measure price level changes and their relationship with stock market performance has been widely discussed in the literature. While the Inflation Rate reflects the overall rise in prices across the economy, the CPI specifically measures the cost of a basket of goods and services purchased by consumers. According to Chen (2007), inflation erodes the purchasing power of consumers and can reduce future corporate earnings, leading to lower stock prices. The CPI is often used as a direct measure of inflation's impact on the economy, especially on consumers' cost of living.

d) Industrial Price Index (IPI): The IPI is a broader measure of price changes in the manufacturing sector, which is sensitive to changes in monetary policy, particularly interest rates. Dornbusch and Fisher (1990) highlighted the importance of industrial prices in understanding the inflationary pressures in the economy that affect stock market returns.

e) Business Confidence Index (BCI): BCI measures the expectations of businesses regarding the economic outlook, including investment, sales, and profits. Collins D (2015) examines how business confidence surveys influence stock market performance, highlighting the connection between business sentiment and market movements.

6. Methodology

The study employs **EViews software** for data analysis. To ensure the validity and robustness of the Granger Causality test, several pre-tests are conducted, as outlined below:

a) **Unit Root Tests**: Unit root tests determine if a time series is stationary, ensuring that the model's results are not misleading. Non-stationary data can distort regression results, leading to inaccurate conclusions. The **Augmented Dickey-Fuller (ADF)** test is used in this study to test for stationarity. A p-value less than 0.05 indicates that the data is stationary, while a p-value greater than 0.05 suggests non-stationarity.

b) **Autocorrelation Test**: This test checks whether the residuals of the model are correlated over time. Autocorrelation can bias estimates and lead to inaccurate predictions. The **Durbin-Watson test** is typically used to identify this correlation.

c) **Lag Length Criteria**: The number of lags in the VAR model is determined using information criteria such as the **Akaike Information Criterion (AIC)** and **Schwarz Bayesian Criterion (SBC)**. Since this study uses **annual data**, a lag length of 1 is determined, which helps ensure that the model appropriately captures the relationships without overfitting.

d) **Granger Causality Test**: The Granger causality test is employed to assess whether past values of one variable can predict future values of another. This test helps to identify causal relationships between variables. It estimates two regression models for each variable and compares their error term variances. A p-value less than 0.05 indicates that one variable **Granger causes** the other, suggesting a directional influence.

Rule of decision in Granger causality test: if p value is:

< 0.05 = "X" Granger causes "Y" at the 5% significance level.

> 0.05 = "X" does not Granger cause "Y" at the 5% significance level.

7. Data Analysis and Interpretation

7.1 Unit Root Test

Unit root tests determine whether a time series data is stationary or not. The test employed for this study for testing stationarity of variables is the Augmented Dickey-Fuller (ADF) test.

H0: There is no stationarity in the data

Table 1: Unit root tests: - Augmented Dickey-Fuller (ADF) test

Sample: 2000 - 2020				
Method			**Statistic**	**Prob.****
ADF - Fisher Chi-square			130.664	0.0000
ADF - Choi Z-stat			-8.05408	0.0000
Series	**Prob.**	**Lag**	**Max Lag**	**Obs**
D (BCI)	0.0002	0	4	19
D (BSE_SENSEX_30)	0.0001	0	4	19
D (CPI)	0.0009	1	4	18
D (CRR)	0.0027	0	4	19
D (GDP)	0.0058	0	4	19
D (IIP)	0.0030	0	4	19
D (INFLATION_RATE)	0.0404	0	4	19
D (INTEREST_RATE)	0.0018	0	4	19
D (NSE_NIFTY50)	0.0009	1	4	18
D (REPO_RATE)	0.0156	1	4	18
D (REVERSE_REPO_RATE)	0.0060	1	4	18
D (SLR)	0.0032	0	4	19
D (UNEMPLOYMENT_RATE)	0.0095	0	4	19
Total number of observations				243

Source: Authors Compilation

As per the above results of the test it provides p-values of all the variables to be less than 0.05 by which we reject the null hypothesis and conclude that the data is stationary for running further analysis. Also, to mention that initially data was not stationary but was converted to stationary with the help of first difference Augmented Dickey Fuller test.

7.2 Autocorrelation test

Alternatively known as Serial correlation tests. Autocorrelation can impact a time series model's accuracy and dependability.

H0: No Auto-correlation is present

Table 2: Test for Auto-Correlation

Sample (2001-2020)					
Variables	AC (p-value)	Null Hypothesis	Variables	AC (p-value)	Null Hypothesis
CRR	0.123	Accept	NIFTY 50	0.557	Accept
SLR	0.276	Accept	GDP	0.16	Accept
Repo rate	0.281	Accept	Inflation	0.194	Accept
Reverse-Repo rate	0.314	Accept	Unemployment	0.213	Accept
Interest rate	0.376	Accept	BCI	0.244	Accept
BSE SENSEX 30	0.486	Accept	IIP	0.267	Accept
CPI	0.236	Accept			

Source: Authors Compilation

The study of the variables at their level form, with all values exceeding 0.05, leads to the rejection of the alternative hypothesis and acceptance of the null hypothesis, indicating no autocorrelation present in the data.

7.3 Granger Causality Test

Time series analysis uses the Granger causality test to uncover causal linkages between variables, which can help predict future values or comprehend system changes. The following is the framework of performed Granger causality test with a significance level of 0.05, the hypothesis framed is:

H0: Changes in monetary policy rates do not Granger-cause changes in stock market performance indicators and the macroeconomic indicators.

Table 3: Granger Causality Test for CRR

CRR			
Variables	**F-Statistic**	**P-Value**	**Null Hypothesis**
BSE SENSEX 30	8.85184	0.0085	Reject
NIFTY 50	8.96385	0.0082	Reject
GDP	0.58026	0.4567	Accept
Inflation	3.5357	0.0037	Reject
Unemployment	0.7968	0.0691	Accept
BCI	11.4074	0.0036	Reject
IIP	0.9274	0.0856	Accept
CPI	2.84609	0.0109	Reject

Source: Authors Compilation

Granger Causality analysis for the Cash Reserve Ratio (CRR) against various variables. The results from Table 3 indicate the following:

- **BSE Sensex 30:** The F-statistic is 8.85 with a p-value of 0.0085, leading to the rejection of the null hypothesis (H01), indicating a significant causal relationship between CRR and the BSE Sensex.
- **Nifty 50:** The F-statistic is 8.96 with a p-value of 0.0082, also leading to the rejection of the null hypothesis, suggesting a causal relationship between CRR and the Nifty 50.
- **GDP:** The F-statistic is 0.58 with a p-value of 0.4567, so we accept the null hypothesis, implying no causal relationship between CRR and GDP.
- **Inflation:** The F-statistic is 3.54 with a p-value of 0.0037, leading to the rejection of the null hypothesis, showing a significant relationship between CRR and inflation.
- **Unemployment:** The F-statistic is 0.80 with a p-value of 0.0691, leading to the acceptance of the null hypothesis, implying no causality between CRR and unemployment.

- **Business Confidence Index (BCI):** The F-statistic is 11.41 with a p-value of 0.0036, rejecting the null hypothesis, indicating a causal relationship between CRR and BCI.
- **Industrial Production Index (IIP):** The F-statistic is 0.93 with a p-value of 0.0856, so the null hypothesis is accepted, suggesting no causality between CRR and IIP.
- **Consumer Price Index (CPI):** The F-statistic is 2.85 with a p-value of 0.0109, leading to the rejection of the null hypothesis, indicating a significant causal relationship between CRR and CPI.

These results suggest that CRR has a significant causal relationship with stock market performance indicators like the BSE Sensex, Nifty 50, and some macroeconomic variables such as inflation, BCI, and CPI, while other variables like GDP, unemployment, and IIP show no causality with CRR.

Table 4: Granger Causality Test for SLR

SLR			
Variables	**F-Statistic**	**P-Value**	**Null Hypothesis**
BSE SENSEX 30	0.42439	0.5235	Accept
NIFTY 50	0.31518	0.5818	Accept
GDP	6.80098	0.0184	Reject
Inflation	0.7243	0.0128	Reject
Unemployment	0.68483	0.0419	Reject
BCI	0.27891	0.6042	Accept
IIP	4.4601	0.0498	Reject
CPI	0.71795	0.4086	Accept

Source: Authors Compilation

The results from **Table 4:** Granger causality test for the **Statutory Liquidity Ratio (SLR)** indicate the following:

- **BSE Sensex 30:** The F-statistic is 0.42 with a p-value of 0.5235, leading to the acceptance of the null hypothesis. This suggests no causality between SLR and the BSE Sensex 30.

- **Nifty 50:** The F-statistic is 0.32 with a p-value of 0.5818, which also leads to the acceptance of the null hypothesis, indicating no causal relationship between SLR and Nifty 50.
- **GDP:** The F-statistic is 6.80 with a p-value of 0.0184, leading to the rejection of the null hypothesis, suggesting a causal relationship between SLR and GDP.
- **Inflation:** The F-statistic is 0.72 with a p-value of 0.0128, leading to the rejection of the null hypothesis, indicating a significant relationship between SLR and inflation.
- **Unemployment:** The F-statistic is 0.68 with a p-value of 0.0419, leading to the rejection of the null hypothesis, suggesting a causality between SLR and unemployment.
- **Business Confidence Index (BCI):** The F-statistic is 0.28 with a p-value of 0.6042, leading to the acceptance of the null hypothesis, showing no causality between SLR and BCI.
- **Industrial Production Index (IIP):** The F-statistic is 4.46 with a p-value of 0.0498, leading to the rejection of the null hypothesis, indicating a causal relationship between SLR and IIP.
- **Consumer Price Index (CPI):** The F-statistic is 0.72 with a p-value of 0.4086, leading to the acceptance of the null hypothesis, suggesting no causal relationship between SLR and CPI.

Table 5: Granger Causality Test for Repo Rate

REPO RATE			
Variables	**F-Statistic**	**P-Value**	**Null Hypothesis**
BSE SENSEX 30	0.18012	0.6766	Accept
NIFTY 50	1.99564	0.1758	Accept
GDP	1.3356	0.2638	Accept
Inflation	2.67282	0.1205	Accept
Unemployment	1.171821	0.2074	Accept
BCI	0.8665	0.02912	Reject
IIP	0.984	0.0042	Reject
CPI	1.7413	0.2045	Reject

Source: Authors Compilation

The results from **Table 5:** Granger causality test for **Repo Rate** indicate the following:

- **BSE Sensex 30:** The F-statistic is 0.18 with a p-value of 0.6766, leading to the acceptance of the null hypothesis, suggesting no causal relationship between the Repo Rate and the BSE Sensex.
- **Nifty 50:** The F-statistic is 1.99 with a p-value of 0.1758, leading to the acceptance of the null hypothesis, indicating no causality between the Repo Rate and the Nifty 50.
- **GDP:** The F-statistic is 1.34 with a p-value of 0.2638, leading to the acceptance of the null hypothesis, implying no causal relationship between the Repo Rate and GDP.
- **Inflation:** The F-statistic is 2.67 with a p-value of 0.1205, leading to the acceptance of the null hypothesis, suggesting no causality between the Repo Rate and inflation.
- **Unemployment:** The F-statistic is 1.17 with a p-value of 0.2074, leading to the acceptance of the null hypothesis, indicating no causal relationship between the Repo Rate and unemployment.
- **Business Confidence Index (BCI):** The F-statistic is 0.87 with a p-value of 0.0291, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Repo Rate and BCI.
- **Industrial Production Index (IIP):** The F-statistic is 0.98 with a p-value of 0.0042, leading to the rejection of the null hypothesis, indicating a significant relationship between the Repo Rate and IIP.
- **Consumer Price Index (CPI):** The F-statistic is 1.74 with a p-value of 0.2045, leading to the rejection of the null hypothesis, indicating no causality between the Repo Rate and CPI.

Table 6: Granger Causality Test for Reverse Repo Rate

REVERSE REPO RATE			
Variables	**F-Statistic**	**P-Value**	**Null Hypothesis**
BSE SENSEX 30	0.18012	0.6766	Accept
NIFTY 50	0.11563	0.738	Accept
GDP	0.8637	0.03037	Reject
Inflation	2.21139	0.1553	Accept
Unemployment	3.71136	0.0709	Accept
BCI	0.10259	0.00145	Reject
IIP	0.12295	0.7302	Accept
CPI	5.99891	0.0255	Reject

Source: Authors Compilation

The results from **Table 6:** Granger causality test for **Reverse Repo Rate** indicate the following:

- **BSE Sensex 30:** The F-statistic is 0.18 with a p-value of 0.6766, leading to the acceptance of the null hypothesis, indicating no causal relationship between Reverse Repo Rate and the BSE Sensex 30.
- **Nifty 50:** The F-statistic is 0.12 with a p-value of 0.738, which also leads to the acceptance of the null hypothesis, suggesting no causality between Reverse Repo Rate and Nifty 50.
- **GDP:** The F-statistic is 0.86 with a p-value of 0.03037, leading to the rejection of the null hypothesis, suggesting a causal relationship between Reverse Repo Rate and GDP.
- **Inflation:** The F-statistic is 2.21 with a p-value of 0.1553, leading to the acceptance of the null hypothesis, indicating no causality between Reverse Repo Rate and inflation.
- **Unemployment:** The F-statistic is 3.71 with a p-value of 0.0709, leading to the acceptance of the null hypothesis, suggesting no causality between Reverse Repo Rate and unemployment.

- **Business Confidence Index (BCI):** The F-statistic is 0.10 with a p-value of 0.00145, leading to the rejection of the null hypothesis, indicating a causal relationship between Reverse Repo Rate and BCI.
- **Industrial Production Index (IIP):** The F-statistic is 0.12 with a p-value of 0.7302, leading to the acceptance of the null hypothesis, suggesting no causality between Reverse Repo Rate and IIP.
- **Consumer Price Index (CPI):** The F-statistic is 5.99 with a p-value of 0.0255, leading to the rejection of the null hypothesis, suggesting a causal relationship between Reverse Repo Rate and CPI.

Table 7: Granger Causality Test for Interest Rate

INTEREST RATE			
Variables	**F-Statistic**	**P-Value**	**Null Hypothesis**
BSE SENSEX 30	0.30274	0.05893	Reject
NIFTY 50	0.34027	0.05673	Reject
GDP	0.12889	0.0247	Reject
Inflation	0.81595	0.0379	Reject
Unemployment	1.22789	0.02833	Reject
BCI	0.9835	0.1705	Accept
IIP	0.8321	0.04632	Reject
CPI	0.3388	0.476	Accept

Source: Authors Compilation

The results from **Table 7:** Granger causality test for **Interest Rate** indicate the following:

- **BSE Sensex 30:** The F-statistic is 0.30 with a p-value of 0.05893, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and BSE Sensex 30.
- **Nifty 50:** The F-statistic is 0.34 with a p-value of 0.05673, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and Nifty 50.

- **GDP:** The F-statistic is 0.13 with a p-value of 0.0247, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and GDP.
- **Inflation:** The F-statistic is 0.82 with a p-value of 0.0379, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and inflation.
- **Unemployment:** The F-statistic is 1.23 with a p-value of 0.02833, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and unemployment.
- **Business Confidence Index (BCI):** The F-statistic is 0.98 with a p-value of 0.1705, leading to the acceptance of the null hypothesis, indicating no causal relationship between the Interest Rate and BCI.
- **Industrial Production Index (IIP):** The F-statistic is 0.83 with a p-value of 0.04632, leading to the rejection of the null hypothesis, suggesting a causal relationship between the Interest Rate and IIP.
- **Consumer Price Index (CPI):** The F-statistic is 0.34 with a p-value of 0.476, leading to the acceptance of the null hypothesis, suggesting no causality between the Interest Rate and CPI.

8. Findings

The results from Tables 3 to 7 present the influence of the Reserve Bank of India's monetary policy have an interdependent link with a number of performance measures. By evaluating the outcomes of the Granger causality test, findings imply that:

- The CRR and interest rate have an effect on both the BSE SENSEX 30 and the NIFTY 50.
- The SLR, the Reverse repo rate, and interest rates all have an effect on GDP.
- The SLR, the CRR, and the interest rate all have an effect on inflation.
- Both the SLR and interest rate have an effect on the unemployment rate.
- The CRR, the repo rate, and the Reverse repo rate all have an effect on the BCI.
- The SLR, the repo rate, and the interest rate all have an effect on IIP.
- The CRR, the repo rate, and the reverse repo rate all have an effect on the CPI.

9. Conclusions

The findings suggest that the CRR and interest rates significantly influence both the BSE SENSEX 30 and the NIFTY 50, underscoring the impact of these variables on stock market performance. Moreover, the study indicates that the SLR, Reverse Repo Rate, and interest rates play pivotal roles in shaping GDP, emphasizing the intricate linkages between monetary policy and overall economic growth. Furthermore, the study highlights the multifaceted impact of monetary policy on inflation, as evidenced by the influence of SLR, CRR, and interest rates on inflationary pressures.

Additionally, the unemployment rate is found to be sensitive to changes in SLR and interest rates, underscoring the broader implications of monetary policy on labor market dynamics. Notably, the study extends its analysis to financial health indicators, revealing that the CRR, Repo Rate, and Reverse Repo Rate collectively influence the BCI. The SLR, Repo Rate, and interest rates also emerge as significant factors impacting the IIP. The findings underscore the significant impact of monetary policy tools like the Cash Reserve Ratio (CRR) and Repo Rate on both stock market indicators and broader economic conditions, aligning with existing research on the interconnectedness between monetary policy and financial markets (Mishkin, 2007). The Business Confidence Index (BCI) shows a significant causality with several macroeconomic and stock market variables, including CRR, Repo Rate, and Reverse Repo Rate, suggesting its relevance in assessing economic sentiment. However, it does not exhibit a consistent relationship with all variables, such as GDP or unemployment, highlighting its selective influence on economic indicators

By examining these dynamics, the study offers valuable insights for investors in developing informed investment strategies and assists policymakers in formulating policies that maintain economic stability or stimulate growth (Taylor, 1993).

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Efficacy of Monetary Policy Transmission Channels in India

Nawab Hussain*

Abstract

This paper examines the efficacy of various channels of monetary policy transmission in India. Three channels of monetary policy transmission, namely, the exchange rate channel, credit channel and asset channel are empirically analyzed in this chapter. The paper uses VAR models on monthly data from 2016(M6) to 2020(M3). We find that the exchange rate channel is significant in determining fluctuations in prices and insignificant in explaining fluctuations in output. The credit channel is found to be significant in explaining fluctuations in prices while accounting for little significance in explaining fluctuations in output. While the asset channel is found to be significant in influencing prices and output. From impulse response, we find that prices react negatively to a positive shock in the exchange rate. A one standard deviation shock on credit tends to be followed by an increase in prices and output. However, the intensity of impact on output is less than on prices. In the case of the asset channel, a positive shock in stock prices brings a positive impact on both output and prices. Furthermore, we find that the pass-through from policy rates to credit and exchange rates is slow and muted.

Our paper makes a significant contribution to the literature on the monetary policy transmission channels. First, while most of the studies on the topic use quarterly data and annual time series data, our findings are based on monthly time series data and hence capture a more intensive picture of these variables. Second, our study uses the variance decomposition method to aid the interpretation of results obtained from VAR models. Third, our study provides new insights by finding empirical evidence about the efficacy of the asset channel. Previous studies have ignored the asset channel in the context of the Indian economy. We argue that while formulating monetary policy decisions, the bullish and the bearish tendencies of the stock market should be considered.

Keywords: *Monetary Policy Transmission, Vector Auto Regression (VAR), Inflation Targeting, Impulse Response Function (IRF)*

JEL Classification: E52

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1. Introduction

Monetary policy transmission is the process through which monetary policy variables impact prices and output in an economy. However, the transmission process is one of the perplexing subjects in the monetary policy discourse. Bernanke and Gertler (1995) use the phrase "black box" while describing complexities in various channels of the monetary transmission mechanism. Very little research is undertaken in deciphering the efficacy of channels of monetary policy transmission. However, their results are often contradictory. Studies by Al-Mashat (2003), and Patnaik et al. (2011) find the relevance of the exchange rate channel while Khudkpam and Jain (2012) find that the exchange rate channel is less effective. Similarly, studies by Hung and Pfau (2008), and Mukhtar and Tran (2018) give importance to the credit channel while Ogun and Akinto (2010) find insignificance in the credit channel. Furthermore, most of the existing studies use annual and quarterly time-series data.

Three channels of monetary policy transmission, namely, the exchange rate channel, the credit channel and the asset channel are empirically analyzed in this chapter. The chapter uses VAR models and uses monthly data on the Indian economy from 2016(M6) to 2020(M3). The VAR framework was pioneered by Sims (1980) and is a widely accepted technique for capturing the relationship between multiple variables as they change over time. Our result suggests that the exchange rate channel is significant in determining fluctuations in prices and insignificant in explaining fluctuations in output. The credit channel is found to be significant in explaining fluctuations in prices while accounting for little significance in explaining fluctuations in output. The asset channel is found to be significant in influencing prices and output. Furthermore, from impulse response, we find that prices react negatively to a positive shock in the exchange rate. A one-standard-deviation shock on credit tends to be followed by an increase in prices and output. However, the impact intensity of impact on output is less than on prices. In the case of the asset channel, a positive shock in stock prices brings a positive impact on both output and prices. Furthermore, we find that the pass-through from policy rates to credit and exchange rates is slow and muted. The study finds certain reasons behind the incomplete transmission of monetary policy. Firstly, there exists a wide range of interest rate differentials in the money market. On one side, there is the presence of large informal credit institutions that charge an exorbitantly high interest rate on advances, and on the other side are the small saving schemes of the government and the RBI. This leads to a huge interest rate differential in

the money market. Secondly, there are major impediments to monetary policy transmission due to the presence of double financial repression, accumulation of non-performing assets, fall in credit and deposit growth, higher returns on small saving schemes, and a depreciating rupee.

The study makes a significant contribution to the literature on the study of monetary policy transmission channels. First, while most of the studies on the topic use quarterly data and annual time series data, our findings are based on monthly time series data and hence capture a more intensive picture of these variables Second, our study uses the variance decomposition method to aid the interpretation of results obtained from VAR models. Third, our study finds that the asset channel is the most effective transmission channel. Hence, we argue that while formulating monetary policy decisions, the bullish and bearish tendency of the stock market should be taken into account.

The rest of the chapter is organized as follows. Section 2 describes monetary policy transmission and different channels of transmission of monetary policy. A review of the empirical studies on this subject is presented in section 3. Section 4 describes the data and methodology. Empirical results and discussion are presented in section 5. In section 6, discussions of stability and residual testing are presented. The conclusion of the chapter is presented in section 7. The appendix of the paper presents data definitions and sources, descriptive statistics, and VAR lag order selection criteria.

2. Monetary Policy Transmission

Monetary policy transmission refers to the complex process through which monetary policy variables impact the ultimate objective of price stability in particular and macroeconomic stability in general. The immediate impact of a change in repo rate is on short-term money market rates (such as call money rate, interest rates on certificates of deposits, commercial papers, and treasury bills). This further impacts key financial markets (like exchange rate, equity prices, and credit market) and finally output and prices in the economy. As per the IS-LM framework, an increase in the money supply caused by an expansionary monetary policy by a central bank leads to a reduction in interest rates in the money market. The reduction in interest rates leads to an increase in investment, which eventually increases output in the product market, in the presence of excess capacity and unemployment. Though the impact is exhibited via different channels, the present chapter studies the efficacy of three channels, viz., exchange rate channel, credit channel, and asset channel.

Under the exchange rate channel, an expansionary monetary policy action leads to a decrease in interest rates. This is further associated with the depreciation of the domestic currency, which eventually increases net exports and eventually, increases aggregate demand, and GDP. Conversely, a contractionary monetary policy action causes an appreciation of the domestic currency and a reduction in net exports. The reduction in net exports causes a reduction in aggregate demand and GDP.

The monetary transmission via the credit channel operates via two components, namely, the balance sheet channel and the bank lending channel (Mishkin,1995). As per the credit channel, an expansionary monetary policy action causes a reduction in short-term interest rates. A reduction in short-term interest rates leads to a reduction in lending rates offered by commercial banks thereby easing liquidity. Since the objective of banks is to optimize their portfolio, they increase loans which eventually pick up investment and consumption demand in the economy.

Asset channel can be better understood through Tobin's q theory. The theory explains how the mechanism of monetary policy affects the valuation of equities. Tobin defines q as the market value of a firm divided by the replacement cost of capital (Tobin,1969). In the standard Keynesian framework, an expansionary monetary policy causes a reduction in interest rates in the money market. The reduction in interest rates makes bonds less attractive in comparison to equities. This increases the price of equities in the stock market. Higher equity prices increase the market value of firms and thus, q. This is an increase in earnings per share (EP) of the stream of dividends. Firms find investing by issuing equity beneficial and this leads to an increase in investment, and eventually aggregate demand.

3. Review of Empirical Studies

Luvingson et. al (2001) examine the monetary transmission mechanism through the wealth channel for the USA using the VAR technique. Their study employs quarterly data for two time periods, viz., 1966(Q1) to 1979(Q1) and 1979(Q2) to 2000(Q3). The study finds that federal funds responded in a better manner to shock in prices in the second period than in the first. A shock in prices reduces income, real consumption, and wealth in both periods. Bayoumi and Morsink (2001) study the transmission of monetary policy in Japan using quarterly data from 1981(Q1) to 2001(Q4). Their study concludes that commercial banks play an important role in transmitting monetary shocks to economic activity. In the case of Vietnam, Hung and Pfau (2008) study monetary transmission channels using quarterly data from 1996(Q2) to 2005(Q4). They find that the exchange rate and credit channels

were more effective than the interest rate channel. Tran (2018) studies the efficacy of credit and exchange rate channels in the Vietnamese economy. The study uses monthly data from December 2012 to December 2015. The study concludes that inflation is sensitive to the credit channel and insensitive to the exchange rate. Ogun and Akinto (2010) use quarterly data from 1986(Q1) to 2006(Q4) and employ the structural vector autoregressive technique while studying the efficacy of bank credit channels in Nigeria. They find that bank advances, deposits, and security holdings respond slowly to monetary policy shock. A study of monetary transmission channels in Pakistan by Mukhtar and Younas (2019) finds the effectiveness of the credit channel in transmitting its effect on inflation and output. The study also finds that the interest rate channel is ineffective in influencing domestic price levels. The study employs the structural vector autoregressive technique on monthly data from 2007(M7) to 2016(M12).

In the context of India, Al-Mashat (2003) uses the vector error correction method to study the transmission mechanisms. The study is based on quarterly data from the first quarter of 1980 to the fourth quarter of 2002. The study finds that the exchange rate channel and interest rate channel were relevant, while the credit channel was weak in explaining monetary policy transmission. In the empirical study by Khundrakpam and Jain (2012), the exchange rate channel is found less effective in the Indian context. The study uses the structural vector autoregression method on quarterly data from 1996 (Q1) to 2011(Q1). However, the empirical study by Patnaik et al. (2011) finds the opposite result. They suggest that for an emerging market like India, the exchange rate channel is the most effective mechanism through which monetary policy impacts inflation.

4. Data and Methodology

In our empirical study, the monetary transmission mechanism under three channels, namely, the exchange rate channel, credit channel, and asset channel is presented. Our study employs the vector autoregression (VAR) technique popularized by Sims (1980). Our study uses monthly time series data from 2016(M6) to 2020(M3). The empirical results are based on the impulse response function and variance decomposition method. The impulse response function measures the responsiveness of the dependent variable in VAR when a one positive standard deviation shock is applied to the error term. Variance decomposition displays how much of the variability in the dependent variable is explained by its shock and shock in other variables in the system. In our study, output {measured in the Index of Industrial Production (IIP)}, CPI, the real effective exchange rate (REER), credit (credit to the

commercial sector), and asset price (BSE100) are used as endogenous variables. In their original form, all variables displayed evidence of non-stationarity, thus, they were transformed into monthly percentage changes. Data on all these variables are extracted from different rounds of the Handbook of Statistics on Indian Economy (RBI). Apart from these variables, the study also uses monthly crude oil price changes in the international market and federal funds rate as exogenous variables. Data on federal funds rate is extracted from the official site of the Federal Reserve of the USA and the data on crude oil is extracted from price BP Statistical Review of World Energy, 2021.

The VAR representation is given by

$$Y_t = P(L)Y_{t-1} + Q(L)Z \qquad (1)$$

Where,

Y_t : Vector of endogenous variables

Z_t : Vector of exogenous variables

The chapter uses three models. The first model studies the transmission mechanism via the exchange rate channel. The vector of endogenous variables for the exchange rate channel is written as

$$Y_t = [\ OUTPUTP, CPIP, REERP, CMRP] \qquad (2)$$

To assess the role of the credit channel in the transmission mechanism, the vector of endogenous variables is presented as

$$Y_t = [\ OUTPUTP, CPIP, CREDITP, CMRP] \qquad (3)$$

In the third model, the transmission mechanism via the asset channel is analyzed. For this model, the vector of endogenous variables is written as

$$Y_t = [\ OUTPUTP, CPIP, BSEP, CMRP] \qquad (4)$$

In all the above models, there is a similar pattern of order. The policy rate defined by CMRP is expected to influence the channel (represented by REERP, CREDITP, and BSEP). The change in the channel variable is expected to influence inflation (CPIP). Output is more sluggish than inflation, so it will be the last to show an impact. The ordering is based on the logic that a change in the call money rate would affect the channel, which in turn, affects inflation and output.

The vector of exogenous variables is given by

$$Z_t = [OILP, FEDR] \qquad (5)$$

Where OILP is the monthly percentage change in world oil prices, and FEDR is the monthly federal funds rate.

5. Empirical Results and Discussion

To determine the stationarity of variables, ADF test and PP test are used. Table 1 presents the results of the unit root tests. It is found that variables stationary at least at a ten-percent level of significance.

Table 1: Results of Unit Root Tests

Variables	ADF Test		PP Test	
	Level		Level	
	C	C and T	C	C and T
OUTPUTP	-13.18 (0.00)*	-13.13 (0.00)*	-9.23 (0.00)*	-9.15 (0.00)*
CPIP	-4.24 (0.00)*	-3.91 (0.00)*	-4.06 (0.00)*	-3.92(0.01)*
CMRP	-2.97 (0.04)*	-6.23 (0.00)*	-6.07 (0.00)*	-6.17 (0.00)*
REERP	-5.60 (0.00)*	-5.59 (0.00)*	-5.43 (0.00)*	-5.36 (0.00)*
CREDITP	-2.47 (0.06)**	-2.39 (0.09)**	-8.97 (0.00)*	-8.93 (0.00)*
BSEP	-2.89 (0.05)*	-3.13 (0.08)**	-2.76 (0.07)**	-3.00 (0.09)**

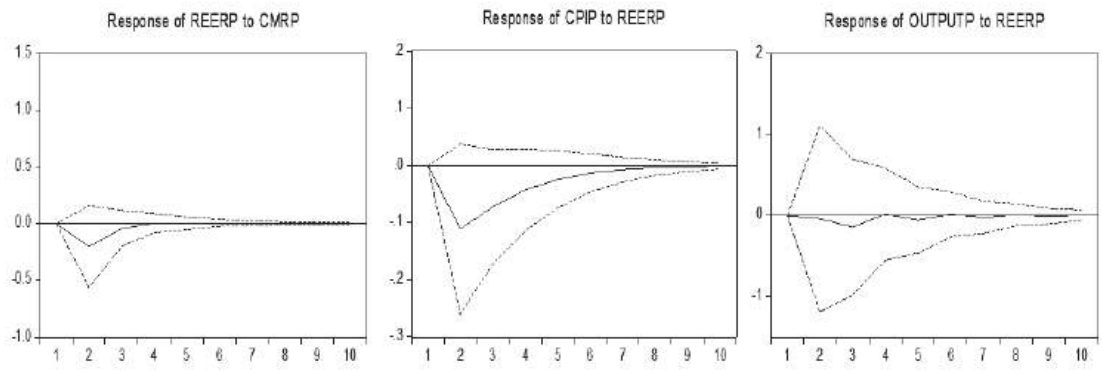
Note: MacKinnon (1996) one-sided p- values are given within brackets. C- Constant and T- Trend,
* represents significance at the five-percent level. ** represents significance at the ten-percent level.

The selection of optimal lag length for each model is based on five tests. They are final prediction error (FPE), Akaike information criterion (AIC), LR test statistic, Schwarz information criterion (SIC), and Hannan-Quinn information criterion (HQ). The selection of optimal lag length is determined by the result of the majority of the five tests. In our study, we selected one as the optimal lag length for each VAR model.

Figure 1 captures the impulse response functions of the exchange rate channel. The figure

presents three impulses. In the first part of the figure, one standard deviation positive shock on CMRP leads to a decrease in REERP which bottoms out by the second month and lasts for three to four months. REERP converges to its original value before reaching the fourth month and remains steady thereafter. The second part of the figure captures the response of CPIP to one positive standard deviation shock on REERP. It is seen that the shock causes negative growth in CPIP which reaches its lowest value in the second month. After the second month, the impact gradually diminishes and CPIP follows its original path from the eighth month onwards. It is seen from the third part of the figure that there is no major response of OUTPUTP to one standard positive shock on REERP.

Figure. 1: *Impulse Response for Exchange Rate Channel*



In Table 2, the variance decomposition of the exchange rate channel is presented. The table presents the variance decomposition in the first, fourth, and eighth months. It is seen that CMRP, REERP, and CPIP have no contemporaneous effect on OUTPUTP in the first month. By the fourth month, variation in OUTPUTP is primarily explained by its value (98.12 percent). Further, CMRP explains a 1.34 percent change in OUTPUTP. By the eighth month, OUTPUTP alone explains 98.08 percent variation in OUTPUTP. Further, CMRP explains a 1.37 percent variation in OUTPUTP followed by CPIP (0.45 percent) and REERP (0.09 percent). From the variance decomposition of CPIP, it is seen that OUTPUTP explains 2.34 percent of the variation in CPIP in the first month. There is no role of REERP and CMRP in explaining variation in CPIP in the first month. By the eighth month, 86.82 percent variation in CPIP is explained by its value, 6.31 percent by REERP, 4.85 percent of the variation by OUTPUTP, and 2 percent variation by CMRP. From the

variance decomposition of REERP, it is inferred that CPIP is the major determinant in the variation of REERP. In its first month, only 75.32 percent of the variation in REERP is explained by its value and 23.65 percent by CPIP. Variance decomposition of CMRP shows that in the first month, 89.21 percent of the variation in CMRP is explained by its value followed by CPIP (10.14 percent) and OUTPUTP (0.58 percent). By the eighth month, the variation in CMRP is 84.89 percent explained by its value, and 11.68 percent by CPIP, 2.52 percent by OUTPUTP and 0.89 percent by REERP

Table 2: Variance Decomposition-Exchange Rate Channel

Variance Decomposition of OUTPUTP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**REERP**	**CMRP**
1	3.708611	100.0000	0.000000	0.000000	0.000000
4	5.218501	98.12710	0.448555	0.082041	1.342301
8	5.365004	98.08398	0.451512	0.091109	1.373396
Variance Decomposition of CPIP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**REERP**	**CMRP**
1	0.477868	2.345510	97.65449	0.000000	0.000000
4	0.565075	4.816541	87.27435	6.108275	1.800837
8	0.567363	4.855840	86.82188	6.318277	2.004003
Variance Decomposition of REERP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**REERP**	**CMRP**
1	1.355893	1.022635	23.65596	75.32140	0.000000
4	1.388483	1.206790	24.72875	71.84358	2.220879
8	1.388959	1.241459	24.73086	71.80431	2.223374
Variance Decomposition of CMRP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**REERP**	**CMRP**
1	1.640282	0.589917	10.14951	0.044722	89.21585
4	1.724293	2.375541	11.68009	0.895286	85.04908
8	1.725906	2.526581	11.68188	0.897636	84.89390

Cholesky Ordering: OUTPUTP CPIP REERP CMRP

In Figure 2, impulse response functions for the credit channel are presented. In the first part, it is seen that one standard deviation positive shock to CMRP leads to an increase in CREDITP. The increase is CREDITP reaches its maximum point by the second month. After the second month, its intensity decreases and converges to its original path by the third month. The second part of the figure presents the response of CPIP to one standard deviation shock in CREDITP. It is seen that one standard deviation increase in the CREDITP causes a positive increase in CPIP which reaches its maximum value by the second month. From the second month onwards, a decrease in CPIP is gradually seen which converges to its original path by the sixth month. As far as OUTPUTP is considered, in the third part of the figure, there is no major deviation in its path due to a one standard deviation shock in the CREDITP.

Figure. 2: *Impulse Response for Credit Channel*

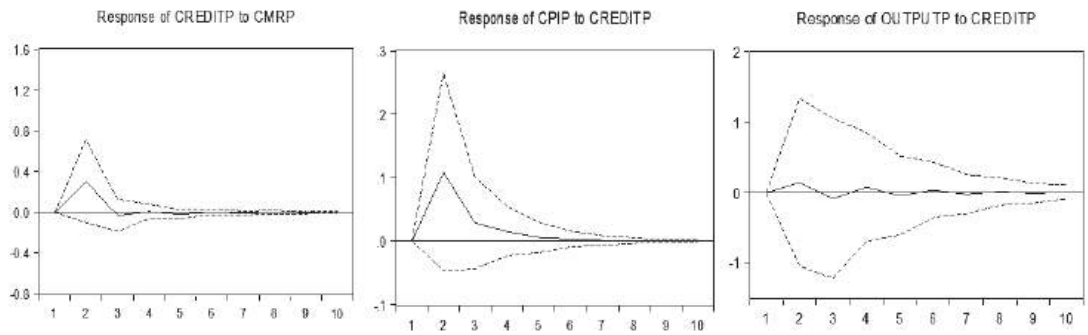


Table 3 presents the variance decomposition of the credit channel. In the case of variance decomposition of OUTPUTP, 100 percent of the variation is explained by its value in the first month. By the eighth month, 98.08 percent of the fluctuations in OUTPUTP are explained by its value and 1.22 percent by CMRP. CREIDTP has only a 0.13 percent role in the explanation of fluctuation in OUTPUTP. From the variance decomposition of CPIP, it is inferred that CREDITP explains 4.03 percent of fluctuations in CPIP in the eighth month, though it has no contemporaneous effect on CPIP in the first month. The role of CMRP in explaining variations in CPIP is zero percent in the first month which increases to 1.907 percent by the eighth month. While OUTPUTP explains 2.3 percent of the variation in CPIP in the first month and 3.21 percent of the variation in the eighth month. From the variance decomposition of CREDITP, it is seen that in the first month, 61.98 percent of the variation in CREDITP is explained by its value and 34.33 percent by OUTPUTP. The

value of variance decomposition of CREDITP is explained by 54.97 percent by its value and 38.09 percent by OUTPUTP. The variance decomposition of CMRP is explained by 90.63 percent by its value, 6.33 percent by CPIP, 2.47 percent by CREDITP, and 0.54 percent by OUTPUTP in the first month. By the eighth month, the variation in CMRP is mainly explained by its value (85.24 percent), CPIP (7.22 percent), and CREDITP (4.44 percent).

Table 3: Variance Decomposition - Credit Channel

Variance Decomposition of OUTPUTP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**CREDITP**	**CMRP**
1	3.708272	100.0000	0.000000	0.000000	0.000000
4	5.208752	98.09719	0.562962	0.124353	1.215499
8	5.357023	98.08031	0.561884	0.132489	1.225316
Variance Decomposition of CPIP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**CREDITP**	**CMRP**
1	0.481396	2.352878	97.64712	0.000000	0.000000
4	0.565915	3.172419	90.95829	4.030061	1.839234
8	0.566910	3.215398	90.84587	4.031121	1.907614
Variance Decomposition of CREDITP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**CREDITP**	**CMRP**
1	1.554853	34.33520	3.680101	61.98470	0.000000
4	1.678138	37.75663	3.586112	55.30006	3.357197
8	1.683159	38.09523	3.579784	54.97370	3.351285
Variance Decomposition of CMRP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**CREDITP**	**CMRP**
1	1.615004	0.546680	6.337351	2.478258	90.63771
4	1.718670	3.004867	7.205328	4.450758	85.33905
8	1.719669	3.080906	7.221528	4.448266	85.24930

Cholesky Ordering: OUTPUTP CPIP CREDITP CMR

Figure 3 presents the impulses for the asset channel. The first impulse is the response of BSESP to one standard deviation positive shock on CMRP. It is seen that the shock causes a small decrease in BSEP that reaches its lowest value by the second month before

converging back to its original path. In the second part of the figure, the impulse response of CPIP to one standard deviation increase in BSEP is depicted. The shock to BSEP leads to a modest increase in CPIP. The value reaches its highest in the second month. From the second month onwards, CPIP gradually starts decreasing and converges with its original path by the sixth month. The third part of the figure presents the impact of one standard deviation positive shock to BSEP on OUTPUTP. It is seen that OUTPUTP oscillates due to the impact. Initially, OUTPUTP increases till the second month and decreases in the third month. The same pattern with smaller intensity is exhibited from the third month to the fifth month.

Figure. 3: *Impulse Response for Asset Channel*

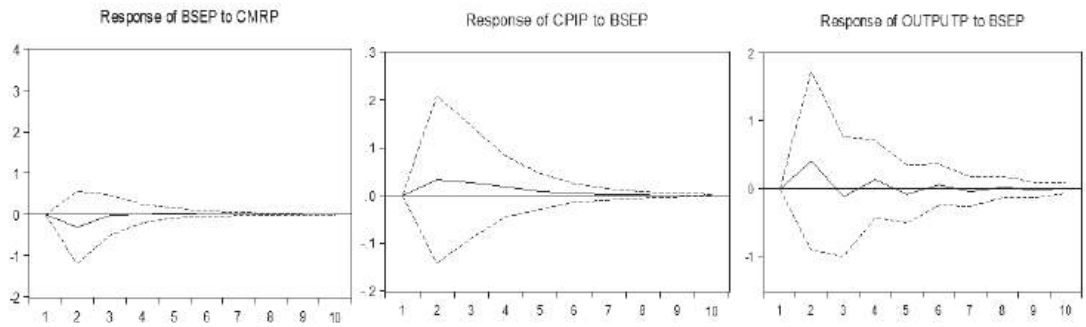


Table 4 presents the variance decomposition of the asset channel. In explaining the variance decomposition of OUTPUTP, CPIP, BSEP, and CMRP have no contemporaneous effect on OUTPUTP in the first month. By the eighth month, 97.26 percent of the variation in OUTPUTP is explained by its value. Only 0.73 percent of the variations in OUTPUTP are explained by BSEP in the eighth month. In the first month, 97.68 percent of the variation in CPIP is explained by its value, and the remaining by OUTPUTP. By the eighth month, 93 percent of the variation in CPIP is explained by its value and 3.97 percent by OUTPUTP. The share of BSESP in explaining the variation in CPIP is 0.68 percent in the eighth month. In the first month, 88.53 percent of the variation in BSEP is explained by its value and 11.45 percent by CPIP. By the eighth month, 81.55 percent of the variation in BSESP is explained by its value, and 16.72 percent of the variation in BSESP is explained by CPIP. CMRP and OUTPUTP have negligible roles in explaining variation in BSESP. As far as variance decomposition of CMRP is concerned, CPIP has a major explanatory role. In the first month, 89.35 percent of the variation is explained by its value and 8.88 percent by CPIP. However, by the eighth month, 4.19 percent of the variation in CMRP is explained by BSEP.

Table 4: Variance Decomposition–Asset Channel

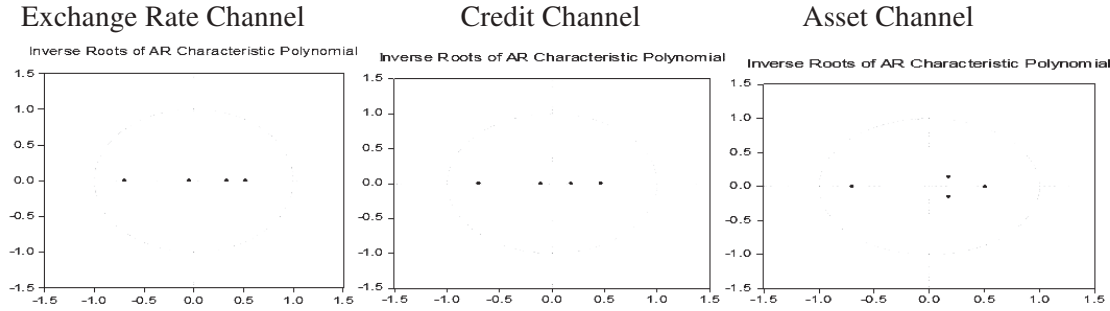
Variance Decomposition of OUTPUTP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**BSEP**	**CMRP**
1	3.693607	100.0000	0.000000	0.000000	0.000000
4	5.231018	97.28072	0.706089	0.739343	1.273849
8	5.385363	97.26098	0.695034	0.739608	1.304378
Variance Decomposition of CPIP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**BSEP**	**CMRP**
1	0.491719	2.312293	97.68771	0.000000	0.000000
4	0.573866	3.967557	93.96739	0.657119	1.407931
8	0.575163	3.975900	93.90760	0.686714	1.429784
Variance Decomposition of BSEP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**BSEP**	**CMRP**
1	3.385630	0.011712	11.45029	88.53800	0.000000
4	3.557484	0.787428	16.65456	81.74671	0.811303
8	3.561720	0.895920	16.72366	81.55944	0.820979
Variance Decomposition of CMRP					
Month	**S.E.**	**OUTPUTP**	**CPIP**	**BSEP**	**CMRP**
1	1.628910	0.823965	8.882544	0.936137	89.35735
4	1.723812	2.649943	9.086841	4.202267	84.06095
8	1.725745	2.849991	9.074213	4.194908	83.88089

Cholesky Ordering: OUTPUTP CPIP BSEP CMRP

6. Stability and Residual Testing

The stability of the VAR system for the three models is checked using inverse roots of AR characteristic polynomial. Figure 4 presents the outcome of inverse roots of AR characteristic polynomial. The rule of thumb is that if all the inverse roots of AR characteristic polynomial have a modulus less than one and lie inside the unit circle, the VAR is stable. Since all unit roots for each of the three models lie inside the unit circle, VAR is stable.

Figure 4: *Inverse Roots of AR Characteristic Polynomial*



To check autocorrelation, the Langrage multiplier (LM) test is used. Table 5 presents the result of the LM test for each model. The null hypothesis states that there is no serial correlation at selected lags. If the p-value is significant, the null hypothesis is rejected. Over here, the p-value is insignificant for each model, and the null hypothesis is selected for each model. Thus, all three VAR are free from serial correlation at selected lag.

Table 5: Autocorrelation LM Test

Lags	Exchange Rate Channel		Credit Channel		Asset Channel	
	LM-Stat	P-Value	LM-Stat	P-Value	LM-Stat	P-Value
1	13.05320	0.6689	19.22224	0.2573	13.64275	0.6253
2	19.43396	0.2468	24.01776	0.0891	33.37583	0.0066
3	20.40635	0.2025	13.47930	0.6374	13.66934	0.6233
4	17.63898	0.3455	17.95588	0.3265	17.89366	0.3302

7. Conclusions

This chapter examines the efficacy of monetary policy transmission through three channels, namely, the exchange rate channel, credit channel, and asset channel. VAR models on monthly data from 2016(M6) to 2020(M3) are used in the chapter. The empirical results are based on impulse response functions and variance decomposition methods. While studying the exchange rate channel, we find that CPIP responds negatively to a positive shock in REERP. The impact reaches its bottom in the second month and slowly converges to its original path thereafter. The impact of OUTPUTP on shock in REERP is negative but small. This shows that an increase in REER leads to an increase in prices and a loss in trade competitiveness. Further, from the variance decomposition of the exchange rate

channel, we find that by the eighth month, REERP explains 6.8 percent of the variance in CPIP and only 0.09 percent of the variance in output. Thus, the exchange rate channel has a significant impact on prices but an insignificant impact on output. While examining the credit channel, we find that CREDITP responds positively to shock in CMRP. Due to one positive standard deviation shock in CREDITP, CPIP increases drastically and then slowly converges to its original path. When OUTPUTP is considered, the impact of a positive shock in CREDITP is positive but modest. The variance decomposition of the credit channel shows that by the eighth month, CREDITP explains 0.13 percent of the variation in OUTPUTP and 4.03 percent of the variation in CPIP. Thus, the exchange rate channel has a significant impact on prices and a modest impact on output. In the case of the asset channel, we find that a positive shock in BSEP leads to an increase in both CPIP and OUTPUTP, making it the most significant channel in our study. Furthermore, we find that the pass-through from policy rates to credit and exchange rates is slow and muted.

Appendix

Table 6: Definition of Variables and Sources of Data

Variable	Definition	Source
OUTPUTP	Monthly percentage change in index of industrial production (IIP), calculated after splicing.	Author's calculation from the RBI's database.
CPIP	Monthly percentage change in consumer price index (CPI), calculated after splicing.	Author's calculation from the RBI's database.
CMRP	Monthly change in call money rate (CMR) in percentage.	Author's calculation from RBI's database.
REERP	Monthly percentage change in real effective exchange rate (REER), calculated after splicing.	Author's calculation from RBI's database.
CREDITP	Monthly percentage change in credit to commercial sector.	Author's calculation from RBI's database.
BSEP	Monthly percentage change in the stock value of Bombay Stock Exchange (BSE100).	Author's calculation from RBI's database.

(continued)

OILGP	OILGP represents the monthly percentage change in international crude oil price.	Calculated from BP Statistical Review of World Energy, 2021.
FEDR	Monthly average of federal fund's rate of USA Federal	Extracted from US Reserve's website.

Table 7: Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Max	Min
OUTPUTP	0.11	0.81	5.76	12.93	-12.66
CPIP	0.29	0.35	5054	1.66	-0.73
CMRP	-0.71	-0.50	1.93	3.24	-7.42
REERP	0.07	0.01	1.36	2.75	-4.10
CREDITP	0.78	0.73	1.56	4.88	-3.13
BSEP	0.40	1.53	5.47	5.47	-21

(Source: Author's compilation)

Table 8: VAR Lag Order Selection Criteria for Exchange Rate Channel

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-299.2908	NA	46.26837	15.18492	15.68645	15.36755
1	-265.8894	55.39745*	20.04681*	14.33607	15.50631*	14.76221*
2	-250.7707	22.12495	21.78877	14.37906	16.21801	15.04871
3	-233.1566	22.33982	21.99920	14.30032*	16.80799	15.21348
4	-220.5779	13.49914	30.61827	14.46721	17.64359	15.62388

Note: * represents lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

Table 9: VAR Lag Order Selection Criteria for Credit Channel

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-297.9365	NA	43.31053	15.11886	15.62039	15.30149
1	-265.3065	54.11809*	19.48481	14.30764	15.47788*	14.73377*
2	-251.1211	20.75914	22.16439	14.39615	16.23511	15.06580
3	-230.6498	25.96363	19.46701	14.17804	16.68570	15.09119
4	-207.3950	24.95639	16.09530*	13.82414*	17.00052	14.98081

Note: * represents lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

Table 10: VAR Lag Order Selection Criteria for Asset Channel

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-338.6801	NA	316.0456	17.10635	17.60788	17.28898
1	-307.8980	51.05333*	155.5965	16.38527	17.55551*	16.81140*
2	-292.1735	23.01136	164.1932	16.39871	18.23766	17.06835
3	-271.4455	26.28924	142.4163*	16.16807*	18.67574	17.08123
4	-256.6566	15.87103	177.9553	16.22715	19.40353	17.38381

Note: * represents lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

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Industry Specific Analysis of FPI Volatility in India

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Abstract

The present paper is an attempt to estimate the trend and pattern of the volatility of FPI inflows to select industries in India for the period (Feb test 2012 to Jul 2020). For that purpose, the study uses different volatility models, such as ARCH, GARCH, EGARCH, TGARCH, and PGARCH in five selected Indian industries. To check the existence of the ARCH effect of the FPI inflows, the heteroscedasticity ARCH test has been employed. The finding reports that there is an asymmetry in the volatility of FPI inflows along with volatility clustering. The change in the pattern of volatility and the irregular behavior of FPI inflows in the Indian capital markets is a result of asymmetric information which can be captured through the GARCH family models. The results show that for the automobile and auto components, banking, and construction industries, the symmetric impact on FPI inflows persists for many periods, but such symmetric impact is not applicable for the consumer durable goods and healthcare services industry. Also, there is a significant leverage effect of FPI inflows in all other select industries, except the banking industry. The results obtained on different aspects of FPI volatility can be a guide for investors, journalists, policymakers, and researchers.

Keywords: *Foreign Portfolio Investment (FPI), International Finance, Foreign Direct Investments (FDI)*

JEL Classification: B26, B27, F37, F47, F65, E44

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1. Introduction

According to Lucas (1990), the flow of foreign investment from one nation to another is a requisite to boost the host countries' economic productivity and development. The neoclassical economist argues that "capital should flow from developed countries with relatively high capital-labor ratios to developing and underdeveloped countries with relatively low capital-output ratios, because in the developing and underdeveloped countries productivity of capital is very high". The mobilization of capital from capital-abundant countries to capital-scarce countries in the form of FDI, FPI, workers' remittances, official development assistance (ODA), or a combination of all these enhances the efficiency of capital. In recent years, the idea of foreign portfolio investment has extensively gained popularity among several economists and policymakers and has become a vital source of finance for both developed and developing nations to promote economic growth and development (Michael et al., 2014).

Financial liberalization provides opportunities to the portfolio investors for the efficient allocation of savings and channelizing these financial resources across countries to earn better returns on their investment, but this requires appropriate guardrails. Portfolio investors invest during prosperous times with an expectation of making more profits than interest-earning alone. But during the recession, the investors withdraw their capital to cut down the risk associated with it. Foreign portfolio investors are 'fair-weather friends', as they invest in host countries' economies to earn lucrative profits during the favorable investment environment but any flimsy disturbance in investment climate forces them to exit from destination countries' market (P.K. Prasanna, 2008).

Foreign Portfolio Investment (FPI) has a significant positive influence on the Indian economy by having non-debt creating foreign investments, skilled development with new job opportunities, advancements in financial technology and an increase in allocative efficiency. The Indian government's attitude towards foreign portfolio investment witnessed a phenomenal change since 1991's BOP crisis. Consequently, the Indian economy was opened to foreign portfolio investors progressively which was an intended to step towards liberalization in the post-1992s. FPI inflows are either directly or indirectly associated with the financial market, and foreign exchange market (FEM). Therefore, the host nations need to ensure steady FPI inflows into the financial sector to accelerate economic growth and development depending upon their capacity to absorb this capital inflow.

The volatile nature of FPI increases the uncertainty among foreign portfolio investors. The FPI inflows to the Indian capital market have raises from 6 billion US$ in 1990-91 to 36,137 million US$ in 2020-21 (Source: RBI website). Compared to other emerging markets, Indian markets have offered better returns to portfolio investors on their investments. India has become one of the most significant foreign portfolio investment hubs in recent years. During the financial years of 2020-2021, the FPI inflows to the Indian equity markets witnessed an all-time high as it got pumped to Rs 274032 crore (source: NSDL). With the global financial crisis of 2008-2009 and the Chinese stock market crash of 2015, the volatility of FPI inflows to Asian countries including India, shows an upward trend indicating its vulnerability to a reversal.

This article is organized as follows. Section 2 presents evidence from the literature that identifies the research gap and supports the research agenda. Section 3 explains the relevant data sources. Section 4 emphasizes on the methodology used in this paper. The result and discussion of the estimation are presented in Section 5 and finally the article followed by the conclusion in Section 6.

2. Literature Review

The volatility of FPI has major contributions to the domestic financial market, risk and return on investments, optimal portfolio selection, the profitability of the firm, and finally macroeconomic stability of the economy. It is difficult for foreign investors to predict capital market risk when the domestic macroeconomic environment is highly volatile, hence they need to form a diversified portfolio in order to minimize the risk, hence international portfolio diversification is needed (Grubel, 1968). The domestic as well as international determinants have a significant influence on India's portfolio investment flows and it is very sensitive to policy changes (Gupta, 2003). The volatility of the FPI inflows is affected by macroeconomic factors such as interest rates, inflation, exchange rates, market capitalization rates, GDP, etc (Hussain, M., & Goswami, B. (2022). The FPI flows essentially interact with the real economy via the stock market, and the effect of the stock market on the country's economic development has not been realized in India (Parthapratim Pal, 2006).

According to C. Rangarajan, (2000), net portfolio investment is another crucial component of funding for emerging countries, the trends of foreign direct investment and portfolio investment inflows point towards the existence of volatility. Macroeconomic indicators in

developing nations seem to be more volatile than those in developed nations which is revealed by the empirical findings of Pami Dua and Partha Sen (2013). In a less developed (immature) financial economy like India, volatility of capital flow is a matter of concern as they pass through the phase of integrating with the global economy. The macroeconomic conditions of the host nation are the most important determinants of FPI inflows. Waqas et al. (2015) suggest that in China, Pakistan, India, and Sri Lanka, there is a significant association between macroeconomic variables (interest rate, FDI, exchange rate, inflation, and GDP growth rate) and the volatility of foreign portfolio investments. Agarwal (1997) found the inflation rate and exchange rate have a negative correlation with foreign portfolio investment. The finding of Broner and Rigobon (2004) point out that economic growth is a good predictor for knowing volatility of capital flows, which turns out to have an enormous effect on FPI volatility. According to Rai and Bhanumurthy (2004), FIIs inflows have a significant long-run relationship with inflation.

An information asymmetric leads to markets failure as supported by the work of Brennan, M.J., & Cao, H.H. (1997) where they examined the disparities of informational endowments among investors between host and home countries, in addition, international portfolio investment flows from the home countries to host countries leading to increased volatility in portfolio investment flows. In developed and developing countries, interest rate differential (IRD), trade openness (TO), host country stock market performance, and stock market returns (US) have dynamic and significant effects on FPI flows (Monica Singhania and Neha Saini, 2017). Macroeconomic uncertainty contributes a major role in FPI inflow. T. Moses Karimo and D. B. Tobi's (2013) findings suggest that in Nigeria, for steady FPI inflow and control of the volatility of FPI inflow, some degrees of macroeconomic stability, as well as a conducive macroeconomic environment are required. Many studies empirically examined how institutional investment inflows in India affected the host countries' stock market, (e.g., Chakrabarti, 2002; and Mukherjee et al., 2002;). The researchers (Gordon and Gupta, 2003; Saxena, 2011) have predominantly focused on causal relationship between the portfolio investment flows and volatility in Indian equity markets. Lipscy (1999) points out that FPI, commonly referred to as "hot money" and it's more volatile than FDI. N. Sethi's (2007) study shows that FPI inflows have indirect associations with economic growth. W. Kim and S.J. Wei, (2002) argue that the behavior of international portfolio investors in emerging markets before and during the financial crisis are different.

The emerging worries in the context of the global financial crisis are the effect of significant

portfolio flow reversals and more crucially, how to control the rising volatility of portfolio flows. Hence, the management of macroeconomic stability becomes challenging for policymakers with the rise in the volatility of FPI inflows. The volatility issues related to foreign capital flows, such as FPI inflows, have been well documented in previous studies, but there is hardly any study that has been carried out on industry-specific FPI inflows in the Indian context. More specifically, the industry-specific trend and pattern of the volatility in the FPI flows to Indian capital markets have been ignored in the existing literatures. The recent change in FPI inflows to India increases the importance of the study. In this context, the present study aims at filling the gap in the existing literatures.

3. Data Sources

For this study, we have selected 5 (five) Industries as Automobiles and auto components, Banking, Construction Materials, Consumer Durables, and Healthcare services. This choice of industries is prompted by twofold reasons, namely; (a) the availability of data and (b) the presence of volatility clustering. The required data on FPI inflows have been taken from the official website of central depository services (India) Limited. We have used fortnight FPI inflows data to analyze the period from Feb, 2012 to Jul 2020.

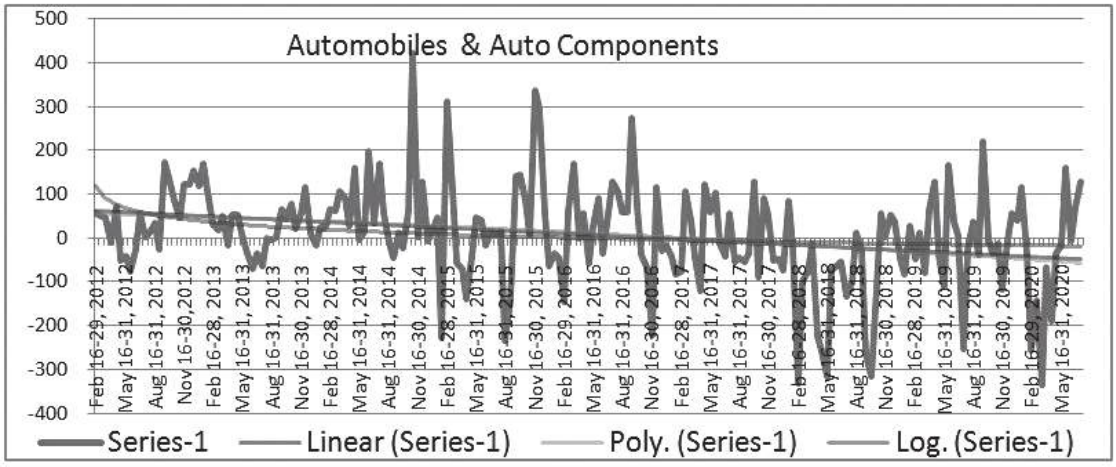
4. Methodology

We analyze Descriptive statistics of the variables, to gain insights into their key characteristics. Stationarity in FPI inflows is checked using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, with the latter providing nonparametric corrections for serial correlation, heteroscedasticity, and stationarity is established when the absolute τ-statistic surpasses critical values. Heteroscedasticity, indicating unequal error variance, is examined using the ARCH-LM test, which identifies volatility clustering, while the GARCH model extends this analysis by capturing time-varying variance and modeling volatility clustering effectively. Advanced volatility models include the EGARCH model, which addresses asymmetric volatility or leverage effects where negative shocks disproportionately impact volatility, the TGARCH model, which evaluates the differential impact of positive and negative shocks using dummy variables, and the PGARCH model, which introduces flexibility in estimating leverage effects and the power of volatility for a comprehensive understanding of FPI inflow dynamics.

5. Results and Discussion

India ranked as the fourth-largest automobile market globally in 2021 (source: www.oica.net), with its automobile and auto components industry competing fiercely with developed nations. Despite its vast market share, FPI inflows to the industry show a slightly negative trend over time (Figure 6.1). Global investors remain focused on this sector, leading to highly volatile FPI inflows. This volatility is closely tied to the industry's dynamic growth. Notably, the ACMAI reported a remarkable milestone in 2021-22, as the Indian auto components industry achieved a trade surplus of $700 million—the first such surplus in its history, reflecting its growing global competitiveness.

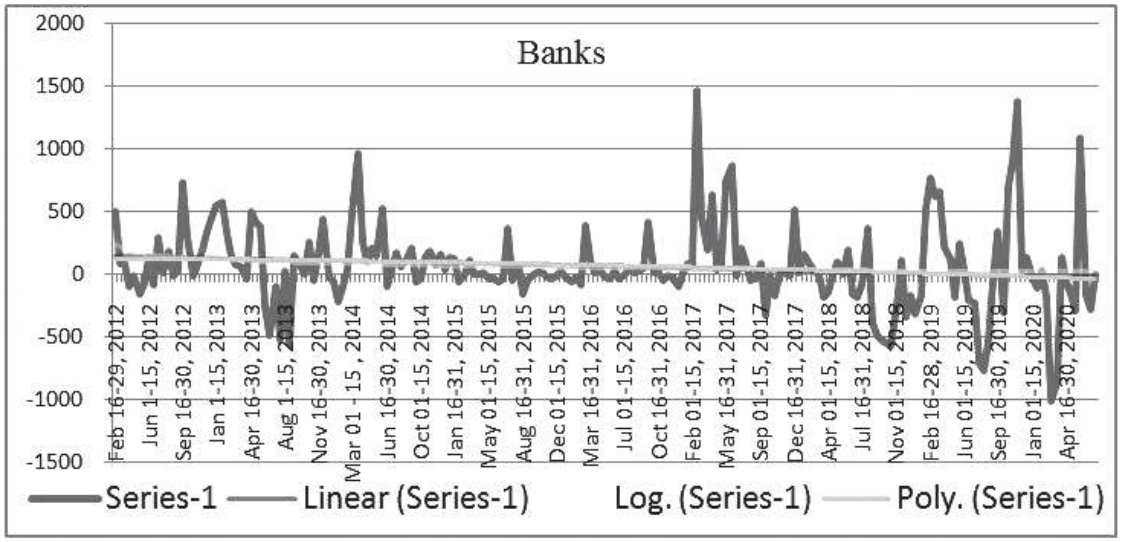
Figure-1: The trend of FPI inflows to the automobile and auto components industry in India



Source: CDSL websites and Author own calculation

The banking industry's performance is closely tied to other industries, as poor industrial performance increases non-performing assets, impacting banks. FPI inflows to the banking sector show a negative trend. Demonetization in November 2016 briefly attracted foreign investors, but GST implementation and the economic lockdown discouraged them. India's economic growth slowed from 7.8% in 2018-19 to 4.2% in 2019-20 (MoSPI), and this decline is reflected in reduced FPI inflows to the banking sector.

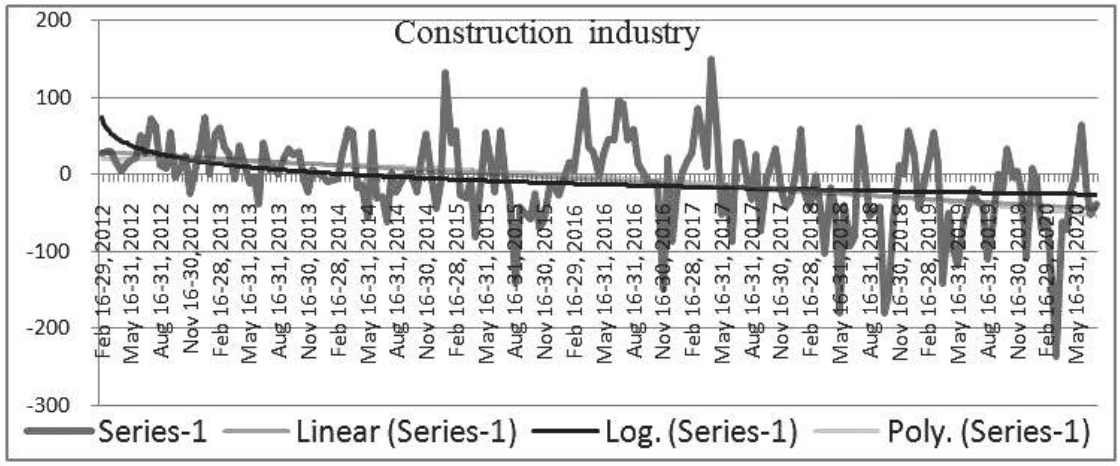
Figure-2: The trend of FPI inflows to the Banking industry in India



Source: CDSL websites and Author own calculation

The trend of FPI inflows to construction materials industries is negative as shown in figure-6.3. In budget 2015, the finance minister announced some new mega projects related to in construction Industries like four crore houses for urban and two crore houses for rural people and 100 smart cities, etc. These mega projects created a positive stimulus, which attracted FPI inflows to construction industry. But in the same financial year, June 2015, these was a crash in the Chinese stock market, From in the graph, we observed that this stock market crash had a very bad impact on FPI inflows to the Indian construction industry. From the graph, we can observed that the impact of demonetization, covid-19 pandemic and economic lockdown on FPI inflows to the construction industry.

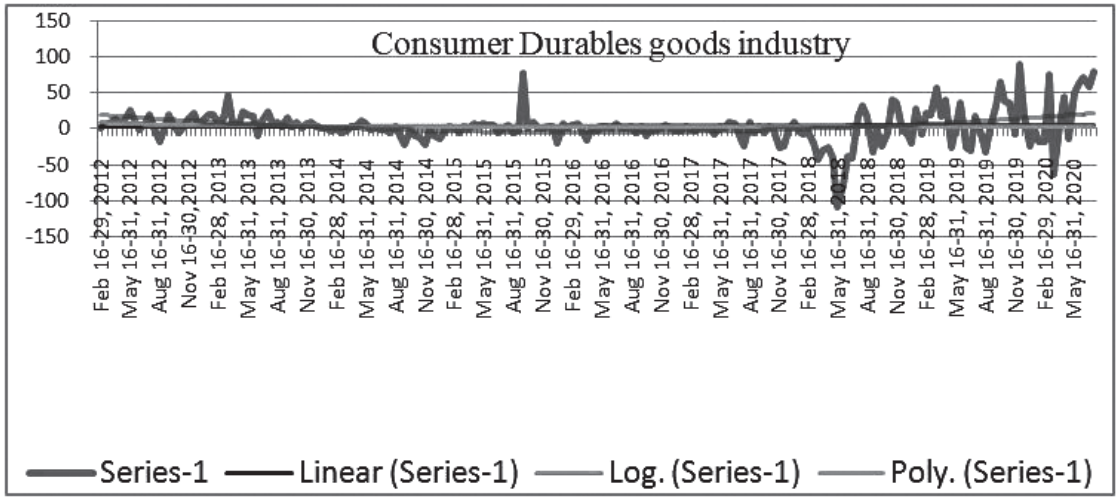
Figure-3: The trend of FPI inflows to the construction industry in India



Source: CDSL websites and Author own calculation

In general, FPI inflows into the consumer durables sector are trending upward. According to a July 2015 report by the Boston Consulting Group, consumer durables had an annualised total shareholder return (TSR) of 21%. Foreign investors made significant investments in this industry after the June 2015 stock market turmoil in China, which resulted in a dramatic increase in inflows until profit booking led to withdrawals. Although demonetisation had little effect, the adoption of the GST, the economic downturn, COVID-19, and decreased IIP growth in 2018 greatly worsened the unpredictability of FPI inflows in this sector.

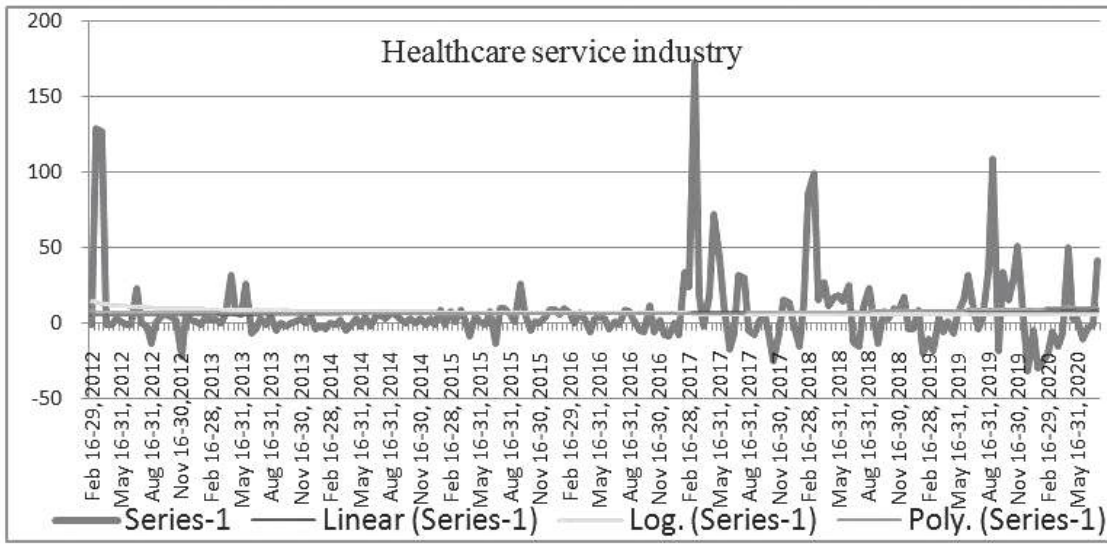
Figure-4: The trend of FPI inflows to the consumer durables goods industry in India



Source: CDSL websites and Author own calculation

The abundance of highly qualified medical practitioners in India is its competitive advantages. In comparison to its competitors in Asia and Western countries, India is also cost-competitive in healthcare services which attract foreign investors. The trend of FPI inflows to the healthcare services industry is slightly positive. But, maybe due to economic and other healthcare policy changes and evolving capital risk, the volatility of FPI inflows to the healthcare services industry increased after 2017. The introduction of the universal healthcare scheme e.g Ayushman Bharat, Atal Amrit, etc. is also a motivating factor behind affecting foreign investors in the Indian healthcare service industry.

Figure-5: The trend of FPI inflows to the healthcare service industry in India



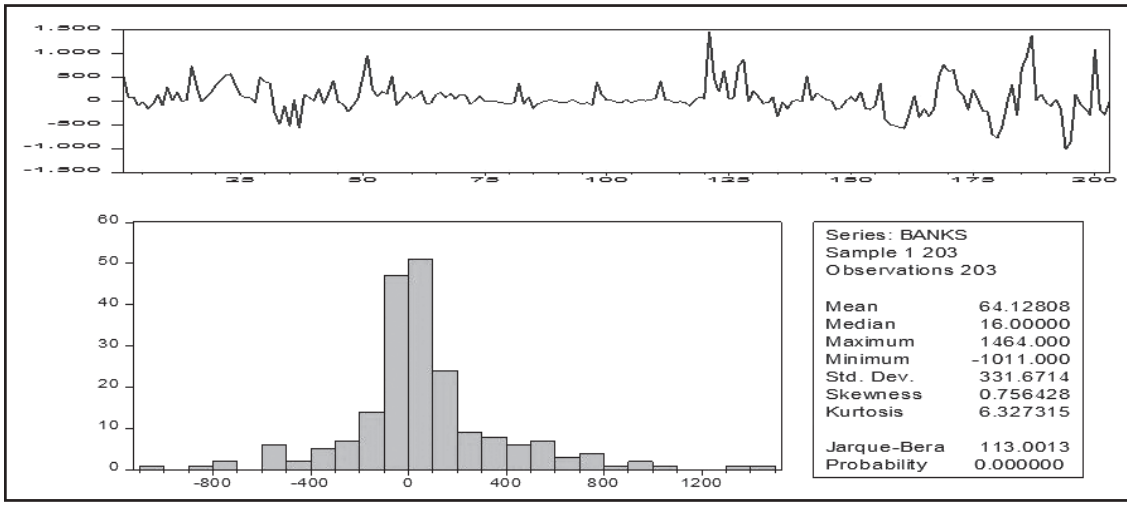
Source: CDSL websites and Author own calculation

Descriptive Statistics

The descriptive statistics on the FPI inflow series are summarized here:

FPI inflows to Banking industry

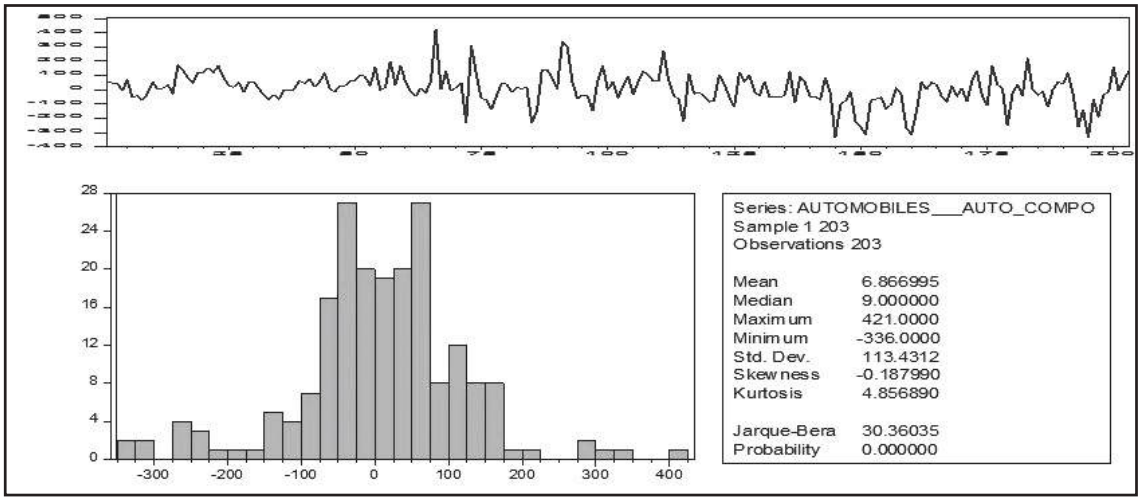
Figure-6: Fortnight FPI inflows series graph and Simple statistics for Banking Industry



The volatility clustering is clear from the fortnight FPI inflows series graph for Banking Industries. It is seen from the descriptive statistics that the average fortnight an FPI inflow to Banking Industries is 64.12 million US dollars for the study period Feb 2012 to Jul 2020. The minimum fortnight an FPI inflow to Banking Industries is -1011.00 and maximum FPI inflows are 1464.00. The volatility of the average return for the period was very high and approx 331%. The distribution of FPI inflow to banking Industries is positively skewed and the distribution is leptokurtic. The JB test is highly significant at 1% level of significance and the residuals are not normally distributed.

FPI inflows to Automobiles and auto components industry

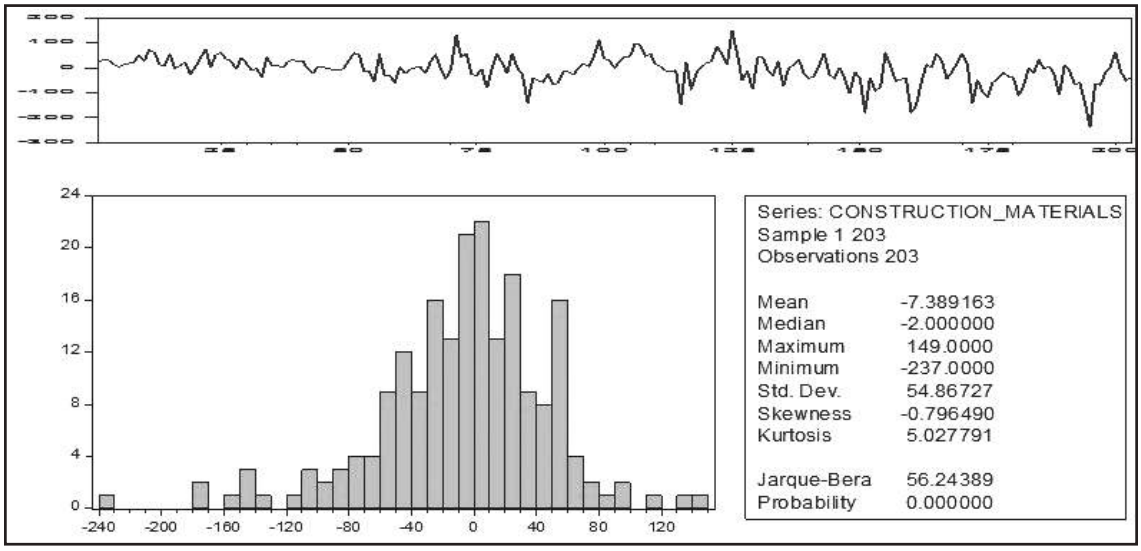
Figure-7: Fortnight FPI inflows series graph and Simple statistics for automobile and auto components



The fortnightly FPI inflow series for the automobile and auto components industries shows clear volatility clustering. During the study period (Feb 2012 to Jul 2020), the average fortnightly FPI inflow was $6.86 million, with a minimum of -$336 million and a maximum of $421 million. Volatility was notably high, averaging around 113%. The FPI inflow distribution is negatively skewed and leptokurtic, indicating occasional extreme values and a sharper peak compared to a normal distribution, reflecting the industry's susceptibility to abrupt market fluctuations.

FPI inflows to construction industry

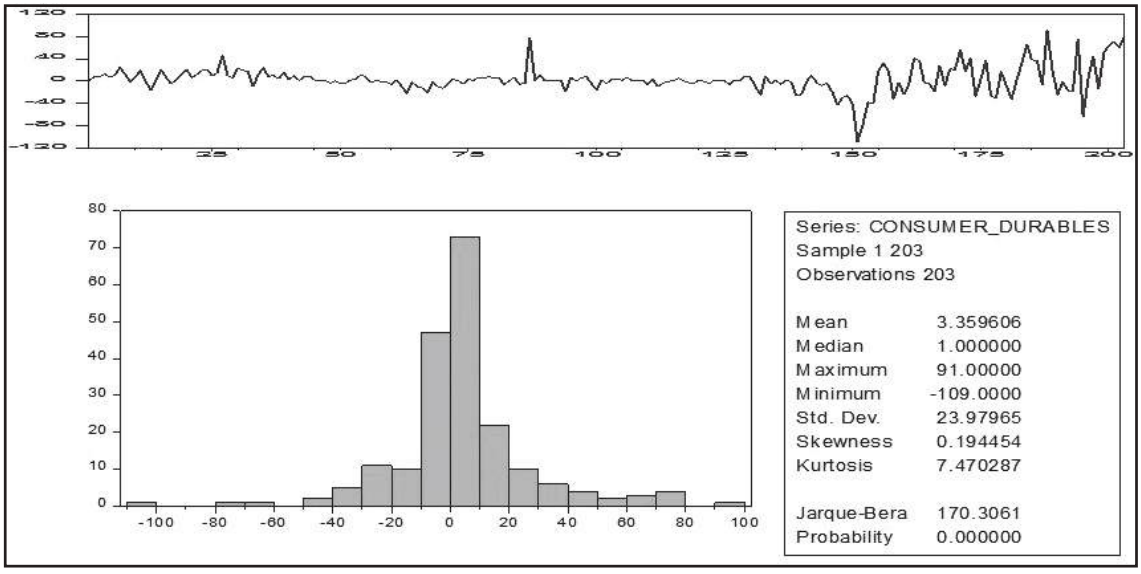
Figure-8: Fortnight FPI inflows series graph and Simple statistics for construction industries



The FPI inflows to construction materials industries exhibit clear volatility clustering. From February 2012 to July 2020, the average fortnightly inflow was -$7.38 million, with a minimum of $2 million and a maximum of $149 million. Volatility was relatively high at 54%, surpassing other industries. The inflow distribution is negatively skewed and leptokurtic, reflecting extreme values and a sharp peak. The JB statistic is significant at 1%, indicating that residuals are not normally distributed, underscoring the irregular and volatile nature of FPI inflows in this sector.

FPI inflows to consumer durable goods industry

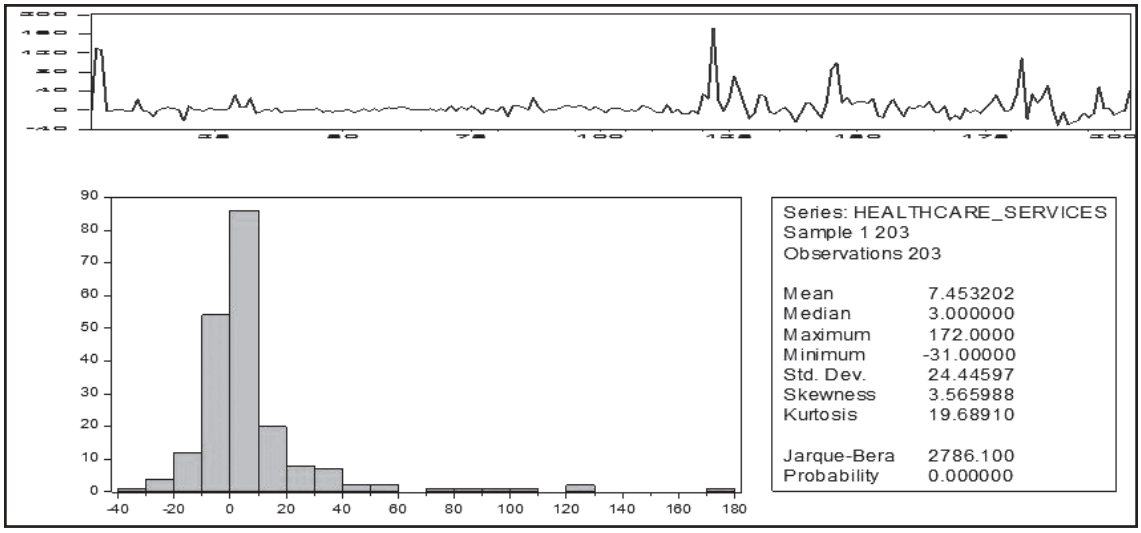
Figure-9: Fortnight FPI inflows series graph and Simple statistics for consumer durable Industries



The FPI inflows to consumer durable goods industries display clear volatility clustering. Between February 2012 and July 2020, the average fortnightly inflow was $3.35 million, ranging from a minimum of -$109 million to a maximum of $91 million. The inflow distribution is positively skewed and leptokurtic, indicating frequent extreme values and a sharp peak. The JB statistic is significantly high at 1% level, confirming that the residuals are not normally distributed, reflecting the volatile and irregular nature of FPI inflows in this sector.

Health care Services

Figure-10: Fortnight FPI inflows series graph and Simple statistics for healthcare services



Industries

The FPI inflows to healthcare services industries exhibit clear volatility clustering. From February 2012 to July 2020, the average fortnightly inflow was $7.45 million, with a minimum of $3 million and a maximum of $172 million. Volatility was moderate at 24%, lower compared to other industries. The inflow distribution is positively skewed and leptokurtic, suggesting frequent extreme values and a sharp peak. The JB statistic is significantly high at 1% level, confirming that the residuals are not normally distributed, reflecting the sector's unique volatility patterns.

To investigate the serial correlation in residuals, we have employed the correlogram test in our study. We observe that there is no serial correlation in the residuals of FPI inflows up to 24 lags for automobile auto components, Banking, constructions, consumer durable goods, and healthcare services industries.

Table No. 1: Correlogram Test (up to 24 lags)

Industry	Automobile and Auto Components	Banks	Construction Materials	Consumer Durables	Healthcare services
Residuals are serially correlated	No	No	No	No	No

Source: Authors' Own's calculation E-view 10

Stationary Test

To investigate the stationarity of the variables, we applied the ADF and PP test. The stationary test results of FPI equity inflows to selected industries are presented in Table-2. From the estimated results of the ADF and PP test, it is observed that the value of computed test statistics varies from -4.11 to -10.00 with a probability value of less than one percent. Hence, we reject the null hypothesis, (the FPI inflow series are non-stationary). The findings confirm that FPI equity inflows to the selected industries are stationary with I(0) order of integration at 1%, 5%, and 10% levels of significance.

Table-2: Estimated value of the unit root test

Industries	Automobiles Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
ADF Test Statistics	-9.7968	-9.0369	-8.4974	-4.1168	-9.9972
Prob*	0	0	0	0.0011	0
Phillips-Peron Test Statistics	-9.8435	-9.1646	-8.6421	-9.6959	-10.005
Prob*	0	0	0	0	0
critical values:					
1% level	-3.4627	-3.4627	-3.4627	-3.4631	-3.4627
5% level	-2.8757	-2.8757	-2.8757	-2.8758	-2.8757
10% level	-2.5744	-2.5744	-2.5744	-2.5745	-2.5744

Source: Authors' Own's calculation E-view 10

The heteroscedasticity test shown in Table 3 verifies that the existence of ARCH effect in FPI inflow series for all the selected industries' FPI inflows series. The estimated Observe R-square as presented in the above table is 5.14 for Automobiles and Auto Components Industries, 12.40 for Banking Industries, 4.95 for Construction material Industries, 36.42 Consumer Durables Industries, and 6.13 for healthcare services Industries with probability value less than 5%. Therefore, we find evidence that ARCH (1) effect prevails in the series of FPI inflows for the selected industries and rejects the null hypothesis of homoskedasticity.

Table-3: Estimated results of ARCH effects

Automobiles Auto Components			
F-statistic	5.22923	Prob. F(1,200)	0.0233
Obs*R-squared	5.14695	Prob. Chi-Square(1)	0.0233
Banks			
F-statistic	13.0878	Prob. F(1,200)	0.0004
Obs*R-squared	12.4068	Prob. Chi-Square(1)	0.0004
Construction materials			
F-statistic	5.02541	Prob. F(1,200)	0.0261
Obs*R-squared	4.95126	Prob. Chi-Square(1)	0.0261
Consumer Durables			
F-statistic	44.0047	Prob. F(1,200)	0
Obs*R-squared	36.4294	Prob. Chi-Square(1)	0
Healthcare Services			
F-statistic	6.26817	Prob. F(1,200)	0.0131
Obs*R-squared	6.13847	Prob. Chi-Square(1)	0.0132

Source: Authors' own's calculation E-views 10

Table 4 reports the estimated value of the ARCH(1) model for FPI inflows to selected industries in India. From the variance equation of the ARCH model, it is observed that lagged square residuals are highly significant at 1% level for all the selected industries'. So the conditional variance of FPI inflows to selected industries depends on lagged square residuals. To checked the presence of the ARCH effects in the portfolio investment inflows, we used the ARCH LM test (Engle 1982) for our estimation. We found that ARCH LM test statistics are insignificant at 1%, 5%, and 10 levels which indicate no further ARCH effect in the series

Table-4: Estimated reports of ARCH (1) model, for FPI in the selected Industries

	Automobiles Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
Mean Equation					
c (constant)	14.03122**	68.7088*	-4.26188	5.279331*	4.241367*
Variance Equation					
á0(constant)	10855.39*	57385.38*	2445.12*	131.2409*	165.4498*
á1	0.32775	0.573184*	0.185422*	1.482912*	2.650415*
log likely hood	-1232.75	-1445.83	-1096.63	-889.774	-901.821
Akaike info criterion	12.18473	14.27423	10.83374	8.795803	8.914491
Schwarz criterion	12.25002	14.32319	10.88271	8.844767	8.963454
*1% level of significance **5%level of significance ***10% level of significance					

Source: Authors' own's calculation E-views 10

The estimated results of the GARCH (1,1) model for FPI inflows to the selected Industries FPI inflows are reported in table 5. It is clear from the estimation model of the GARCH (1,1) variance equation that from the previous fortnight FPI inflows can forecast 85% for automobile and auto component Industries, 78% for Banking Industries, 18% for Construction Materials Industries, 46% for Consumer Durables goods Industries and 47% for healthcare services Industries. The sum of lagged square residual (α) and lagged conditional variance sum (β), which are indicators of persistent volatility in the FPI inflows

to the selected Industries, are very close to unity for all the selected industries. To measure the volatility clustering the GARCH (1,1) model is estimated. After estimating the GARCH (1, 1) model, the ARCH LM test statistics results are not significant, confirming that the variance equation for the chosen industries has been successfully established.

Table-5: Estimated reports of GARCH (1,1) model for FPI in the selected Industries

	Automobiles and Auto Components	Banks	Construction Materials	Consumer Durables	Healthcare Services
Mean Equation					
c (constant)	18.11605*	77.95514*	-3.2524	3.842164*	1.07758*
Variance Equation					
á0(constant)	935.329	9560.823*	1891.559***	25.40599*	8.122684*
á1 (ARCH effect)	0.09033	0.138794*	0.185403*	0.792944*	1.181182*
â (GARCH effect)	0.857974*	0.781899*	0.1872	0.461599*	0.472584*
á1+â	0.948304	0.920693	0 .372603	1.254543	1.653766
log likely hood	-1232.4	-1449.8	-1069.4	-869.65	-850.81
Akaike info criterion	12.1907	14.3235	10.8411	8.60743	8.42177
Schwarz criterion	12.2723	14.3887	10.9064	8.67272	8.48705
Heteroscedasticity Test: ARCH-LM					
Obs*R-squared	0.05561	0.11242	0.00463	0.26424	0.09626
Prob. Chi-Square(1)	0.8136	0.7362	0.9457	0.6072	0.7564
*1% , **5%, and ***10% level of significance					

Source: Authors' own's calculation E-views 10

To capture the asymmetries in the volatility of FPI inflows to selected industries, the following three models EGARCH (1, 1), TGARCH (1, 1) and PGARCH (1,1) have been used.

Table-6: Estimated reports of EGARCH (1,1) model for FPI in the selected Industries

	Automobiles and Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
Mean Equation					
c (constant)	18.78451**	64.12808***	1.06632	2.981314*	2.738136*
Variance Equation					
$\alpha 0$(constant)	6.908141*	11.6034	4.337367***	0.0513	0.241783**
$\alpha 1$	0.202915***	0.01	0.287421***	0.790377*	0.762431*
β	-0.264391*	0.01	-0.237542**	-0.174975**	0.33433*
$\alpha 1+\beta$	-0.061496	0.02	0.049879	0.615402	1.096761
γ	0.24708	0.01	0.42416	0.896994*	0.860529*
log likelihood	-1241.2	-1466.1	-1092.4	-866.85	-845.16
Akaike info criterion	12.2779	14.4935	10.8115	8.58961	8.37596
Schwarz criterion	12.3595	14.5751	10.8931	8.67122	8.45757
Heteroscedasticity Test: ARC					
Obs*Rsquared	0.45025	12.0467	0.09519	0.24953	0.3563
Prob. ChiSquare(1)	0.5022	0.0005	0.7577	0.6174	0.5506
*1% , **5% and ***10% level of significance					

Source: Authors' owns calculation E-views 10

Estimated results of the EGARCH (1,1) model are reported in Table-6. The analysis reveals that the sum of ARCH and GARCH effect coefficients is greater than one in the case of healthcare services industries. The β coefficient for FPI inflows to automobiles and auto components, Construction industries and consumer durables industries is negative, and the mean coefficient is not significant. On the other hand β coefficient for healthcare services is positive and significant. The leverage effect is also taken into account mostly by the EGARCH model and past and future volatility of assets has a negative correlation with the leverage effect. We also know that a higher leverage effect means greater riskier assets so investors always focused on it before investing. The leverage coefficient (γ) for consumer

durables and healthcare industries is positive and significant at 1%, indicating asymmetric impacts. This suggests that rising volatility boosts FPI inflows as investors anticipate future asset price increases in these sectors, reflecting optimistic market expectations. The ARCH-LM (Engle, 1982) test evaluates the robustness of the EGARCH (1,1) model and checks for residual ARCH effects. Results reveal that model is a good fit, except for the banking sector; the model effectively captures time-varying volatility in FPI inflows for consumer durables and healthcare industries, with no serial dependence in squared residuals. However, for banking, significant LM test statistics at 5% and 10% levels indicate the model's limitations in this sector.

To test the asymmetric volatility of FPI inflows to selected industries, we use an alternative model, that is, the TGARCH model.

Table-7: Estimated reports of TGARCH (1,1) model for FPI in the selected Industries

	Automobiles and Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
Mean Equation					
c (constant)	14.09772***	78.11669*	5.382653***	3.33642*	1.495577*
Variance Equation					
$\alpha 0$(constant)	9880.344*	6869.674*	15.45664*	19.57754**	9.527034*
$\alpha 1$	0.01592*	0.045089***	-0.038829*	0.574519*	1.38237
γ	0.348287**	0.16823	-0.0045	0.45616	-0.591542**
β	0.02336	0.831309*	1.045895*	0.486564*	0.468799*
$\alpha 1+\beta$					
log likelihood	-1241	-1446.7	-1077.1	-868.3	-849.99
Akaike info criterion	12.2758	14.3026	10.6713	8.60395	8.42357
Schwarz criterion	12.3574	14.3842	10.7693	8.68556	8.50517
Heteroscedasticity Test: ARCH-LM					
Obs*Rsquared	0.00209	0.23443	2.2594	0.37144	0.19394
Prob. ChiSquare(1)	0.9636	0.6283	0.1328	0.5422	0.6597

Source: Authors' owns calculation E-views 10

Estimated results of the TGARCH (1, 1) model are presented in table-7. The leverage co-efficient is not significant in Banking, Construction materials, and Consumer Durable goods industries. But the leverage co-efficient for the Automobiles and Auto components industry is a significant and positive while significant and negative for the healthcare industry at 1% and 5% levels. The bad news has the largest impact on the volatility of Automobiles and Auto components. The results of TGARCH clearly show that (Positive shock) good news has less impact compared to the bad news (negative shock) on the conditional variance. The ARCH LM test statistics for the TGARCH model don't suggest any additional ARCH effects in FPI inflows for these selected industries'.

Table-8: Estimated result of PGARCH (1,1) model for FPI in the selected Industries

	Automobiles and Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
Mean Equation					
c (constant)	20.82449**	79.13195*	-6.25E-07	3.304297*	3.000005/*
Variance Equation					
á0(constant)	24.82546	1.91E+08	1.969522	0.114288	0.608698**
á1	0.160838*	0.049813	0.160053*	0.262564*	0.456019*
â	0.999999*	0.411267*	0.737571*	0.203334	-0.377296*
ã	-0.01134	0.822784*	0.309113	0.663625*	0.614446*
d	0.705319**	3.843065	0.314152	0.08499	0.639645*
log likelihood	-1240.76	-1446.15	-1090.61	-857.253	-845.644
Akaike info criterion	12.28335	14.3069	10.80405	8.504957	8.390578
Schwarz criterion	12.38128	14.40483	10.90198	8.602884	8.488505
Heteroscedasticity Test: ARCH LM					
Obs*Rsquared	0.225865	0.271077	0.113977	0.303057	0.038233
Prob. ChiSquare(1)	0.6346	0.6026	0.7357	0.582	0.845
*1%, **5% and ***10% level of significance					

Source: Authors' own's calculation E-views 10

Table-8 shows the result of the PGARCH (1, 1) model for FPI inflows to selected industries. It is seen in the above table, that the estimated value of PGARCH (1,1) is significant and

positive exponent is 0.70 for the Automobiles and Auto components industry, and for the healthcare services industry is 0.63 at 1% level. The coefficient of leverage effectis a positive for Banking, Consumer Durable goods, and health care service industries at 1% level of significance. This in turn implies non-symmetricity of volatility for the periods February 2012 to 2020 July. The PGARCH (1,1) estimates are inferred to be slightly sensitive to outliers, since the value of positive exponent (d) for the automobile and auto component industry 0.70 and healthcare services industry (0.63) is less than 2, with 1% and 5% level of significance. We have also seen in the table, that ARCH-LM test statistics are insignificant for the selected industries' FPI inflows. So, the ARCH-LM test estimation recommends the coefficients of variance equation of the PGARCH estimate model for FPI inflows to selected industries are best fitted.

The best fitted GARCH family model for FPI inflows to selected Industries:

Table-9 reports the value of log likelihood (LR), (AIC), and (SIC) of the estimated model GARCH (1,1), EGARCH (1,1), TGARCH (1,1) and PGARCH (1,1) for the selected industries FPI inflows.

Table-9: Comparison of different volatility models for different Industries

	GARCH(1,1)	TARCH(1,1)	EGARCH(1,1)	PGARCH(1,1)
Automobiles and Auto Components				
log likeli hood (LR)	-1232.36	-1241	-1241.2	-1240.76
Akaike info criterion (AIC)	12.1907	12.27579	12.27785	12.28335
Schwarz criterion (SIC)	12.2723	12.35739	12.35946	12.38128
Banks				
log likelihood (LR)	-1449.83	-1446.7	-1466.1	-1446.15
Akaike info criterion (AIC)	14.32345	14.30259	14.49346	14.3069
Schwarz criterion (SIC)	14.38873	14.3842	14.57507	14.40483
Construction materials				
log likeli hood (LR)	-1069.37	-1077.1	-1092.4	-1090.61
Akaike info criterion (AIC)	10.61226	10.67133	10.81152	10.80405
Schwarz criterion (SIC)	10.69387	10.76925	10.89313	10.90198
Consumer Durables				

(Contd...)

Table 9 (Contd...)

log likely hood (LR)	-869.655	-868.3	-866.85	-857.253
Akaike info criterion (AIC)	8.607434	8.60395	8.589613	8.504957
Schwarz criterion (SIC)	8.672718	8.685556	8.671219	8.602884
Healthcare Services				
log likely hood (LR)	-850.809	-849.99	-845.16	-845.644
Akaike info criterion (AIC)	8.421765	8.423567	8.375961	8.390578
Schwarz criterion (SIC)	8.48705	8.505173	8.457567	8.488505

Source: Authors' own's calculation E-views 10

Among the GARCH family model, we select the best model of FPI inflows to different industries' based on their highest LR and minimum AIC and SIC values. Table-9 shows that in automobile and auto components, and construction materials industries GARCH (1,1) models have the highest LR, and minimum AIC and SIC value. For Banking industries, TGARCH (1,1), consumer durable goods industries PGARCH (1,1), and healthcare services industries EGARCH (1,1) model has minimum AIS and SIC and highest LR values respectively.

The best-fitted models are selected for FPI inflows to selected industries are based on minimum (AIC) and (SIC) value and the highest log likelihood value.

Table-10: Best fitted GARCH family model

Industry	Automobiles and Auto Components	Banks	Construction materials	Consumer Durables	Healthcare Services
Type of GARCH model	GARCH (3,2)	TGARCH (3,2)	GARCH (1,1)	PGARCH (2,2)	EGARCH (4,3)
Log-likelihood	-1221.15	-1437.51	-1073.42	-846.64	-805.196
Akaike info. criterion	12.10987	14.24144	10.62481	8.429955	8.031484
Schwarz info. criterion	12.24044	14.37201	10.70642	8.576846	8.194696
Residual Diagnostics for Best Fitted GARCH family model: ARCH-LM(1) test					
Obs*R-squared	0.107917	0.011373	2.481845	0.128473	0.000688
Prob. Chi-Square(1)	0.7425	0.9151	0.1152	0.72	0.9791

Source: Authors' own's calculation E-views 10

The above table-10 depicts that GARCH (3, 2) model fits well for automobile and auto components industries FPI inflows. TGARCH (3, 2) is best-fitted volatility model for FPI inflows in the banking industries. On the other hand, for the Construction materials and Consumer durables industries FPI inflows, best-fitted volatility model is GARCH (1, 1), and PGARCH (2, 2) respectively. For Health care services Industries, EGARCH (2, 3) is a good fit for its FPI inflows. Therefore, the current volatility of FPI inflows for the Automobile and auto component, and construction materials industries in India is influenced by past volatility. On the other hand, for other industries like Banking, consumer durables, and healthcare services the current volatility is influenced not only by its previous volatility but also by past volatilities of other time series. In this analysis, the diagnostic test for the best fitted GARCH model is performed to know whether the residuals are normally distributed. From the above table-10 we have observed that estimated results of ARCH LM test statistics doesn't show presence of any additional ARCH effects in the residuals. This indicates that variance equation is good fit or well specified for the FPI inflows of the selected industries.

6. Conclusions

The issue related to the volatility of FPI inflows to five selected industries is the major focus of this article. The graphical analysis of FPI inflows reveals volatility clustering across industries, except for construction industries. The degree and magnitude of volatility vary due to industry-specific characteristics. Descriptive statistics of fortnightly FPI inflows further highlight the data's nature, aiding in effective volatility modeling. The results heteroscedasticity test found the presence of ARCH effects in the FPI inflows residual series, as the test statistics are significant at 1%, 5%, and 10% levels. However, in the case of construction industries, we find a negligible amount of volatility clustering in fortnightly FPI inflows. The impact of symmetric and asymmetric information is estimated using the GARCH family model. To estimate the symmetric impact, we proceed with the GARCH (1,1) model where the coefficients like constant (á0), ARCH term (á1), and GARCH term (â) are significant at 1%, 5%, and 10% level. Moreover, the sum of the coefficient (á+â) for automobile and auto components, banking, and construction industries are close to unity, which indicates that the symmetric impact on FPI inflows persists for many periods. But, in the case of consumer durable goods and healthcare services industry, the sum of (á+â) is greater than the unity. The GARCH effects on the construction industry are positive but insignificant. To check the leverage effects on FPI inflows we estimate EGARCH(1,1),

TGARCH(1,1) and PGARCH(1,1). From EGARCH estimates it is clear that the volatility of FPI inflows to selected industries is skewed over time. This may be due to the Chinese stock market crash, demonetizations and implementation of goods and service tax (GST). From estimates of TGARCH(1,1), we have observed that the effect of bad news is high in the Automobile and auto components and healthcare services industries. The ARCH LM test suggests that for the banking industry EGARCH estimate is not completely specified.

We have also examined the best-fitted GARCH family model for each selected industry. For each industry we first estimated the ARCH (1), GARCH(1,1), TGARCH(1,1), EGARCH(1,1), and PGARCH(1,1) model, then based on the high log-likelihood and minimum AIC and SIC value we have selected the suitable model for each industries. From our estimation, we found that GARCH (1,1) is suitable for Construction industry and automobile & auto components Industries. For Banking, consumer durables, and healthcare services industries the suitable model are TGARCH (1, 1), PGARCH (1, 1), and EGARCH (1, 1) respectively. Best fitted model is also selected based on the highest log likelihood (LL) and minimum AIC, and SIC values. Here we have seen that GARCH (3, 2) model is the best-fitted model for FPI inflows to the automobile and auto component industry. The TGARCH (3, 2), model is the best-fitted volatility model for FPI inflows to the Banking industries. The GARCH (1, 1), model is best fitted for construction industries while the PGARCH (2, 2), is the best-fitted model for FPI inflows to consumer durables good industries. Best fitted volatility model for healthcare services industries is EGARCH(4,3) model. From the volatility clustering we observed that, there is a poor leverage effect for the banking industry FPI inflows. The banking industry FPI inflow largely depends on the global markets economic situation as well as performance of other industries.

Naturally, the FPI inflows to Indian in the selected industries are affected by the spillover effects of global volatility. On the other hand, macroeconomic factor (like inflation, exchange rate, interest rate, IIP, economic growth) have its impact on FPI inflows in Indian capital market and there by explains its volatility Hussain, M., & Goswami, B. (2022). The analysis of FPI inflow volatility for the chosen industries is crucial since it may have consequences for investors, journalists, policymakers, and researchers.

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Determinants of Dividend Policy: Evidence from National Stock Exchange Listed Companies

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Abstract

Dividend policy is a controversial topic in finance. The organization's financial management is crucial in identifying the various variables that could have an impact on the dividend payment decision of a concern. The timing and the size of the dividend payments to the shareholders must be determined by the management. Dividend policy is a vital policy of a concern around which all other policies rotate. Many scholars have studied about the dividend policy, primarily from wealthy nations, and little research has been done on the emerging nations' dividend policies. So, in this paper, efforts have been made to study the dividend policy of the top 100 NSE-listed companies that are paying regular dividends from 2010 to 2022. Secondary data has been gathered for this purpose from the NSE website and the annual reports of the chosen companies. Panel data regression models, specifically the fixed effect model and the random effect model, have been used to evaluate the data. Furthermore, the Random Effect model is more appropriate than the Fixed Effect model, according to the Hausman test, which has been used to determine the proper model. The study discovered a positive correlation between a firm's size and price-to-earnings (P/E) ratio and the dividend payout ratio (DPR), and a substantial negative correlation between firms' leverage and profitability and the dividend payout ratio (DPR). It has also been discovered that the dividend payout ratio (DPR) and liquidity have a negative relationship.

Keywords: *Dividend policy, Determinants, Panel Regression, National Stock Exchange (NSE)*

JEL Classification- G3 Corporate finance and governance – G35 – Payout policy

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1. Introduction

One of the most crucial business financial decisions is whether to pay dividends or not. The dividend policy is a central policy that serves as the focal point for all other policies. A dividend is a return to the shareholders for taking the risk and making the investment in a firm. For a firm, it is also important as the firm has to determine how much of its income to provide as dividends to shareholders and how much to set aside as retained earnings for potential future growth. If a company has an opportunity to invest its earnings in a growing project and expects higher returns then it will go for that investment and not for dividend distribution. So the decision about the dividend is crucial because it directly influences the shareholders. Apart from earning maximum profits, a firm also focuses on and tries to increase its shareholders' wealth **(Sari & Matusin, 2019)**. A suitable dividend policy gives stockholders the chance to get the best possible investment returns. **(Wilburn & Wilburn, 2014)**. In corporate finance dividend policy is treated as an unsolved issue and many scholars **(Anwar & Kumar, 2022; Bahrudin et al., 2021; Salah & Amar, 2022)** have studied the dividend policy with diligence. However, the findings of every study are conflicting and equivocal. **Brealey (2002)** has listed dividends among the top ten most outstanding challenges. **Black (1976)** concluded dividend policy as a puzzle in his study. In financial literature, it is an issue of interest. A decision regarding dividend policy is not an independent decision. Various factors have to be considered while framing dividend policy. Thus, this research paper's objective is to investigate the various factors that impact the dividend policies of the top 100 Nifty-500 firms that pay dividends on a regular basis between 2010 and 2022.

2. Theories of Dividend Policy

There is a school of thought which considered dividend as irrelevant and having no effect on shareholders' wealth (Theory of irrelevance). Modigliani and Miller stated that the market price of the shares is unaffected by decisions on dividends. According to their theory, any increase in the firm's worth brought about by a dividend announcement is counterbalanced by a drop in the share price brought on by outside funding. The overall wealth of the stockholders will therefore remain unchanged. They contend that the firm's investment policy determines its worth. The dividend decision was viewed by the opposing school of thinking as significant and having an impact on the firms' worth (Theory of relevance). Walter and Gorden suggested that dividend is very relevant and affects the value of firm. There are various studies which found positive effect of dividend on market

value **Reddy (2003). Mistry (2012)** also found positive effect of dividend on the growth of firm. The wealth of shareholders is positively impacted by the dividend policy, and the growth rate of the company also positively affects shareholder wealth. **(Iqbal and others, 2014)**.

3. Literature Review

Singla & Samanta (2018) made an effort to investigate the several variables affecting the dividend policy. The analysis discovered a positive correlation between the dividend policy and profitability, life cycle, and size, and a substantial negative correlation between the dividend policy and cash flow, indicating the presence of agency difficulties. **Sharma & Bakshi (2019)** attempted to determine the different elements influencing the 125 Indian real estate businesses' dividend policies. The study discovered liquidity, business size, risk, and the dividend paid out in the previous year as the main factors influencing the dividend policy. **Anwar & Kumar (2022)** made an effort to understand the numerous factors influencing the dividend policy of Indian companies and found debt to equity, return on asset and size as major determinants of the dividend policy. **Slah & Amar (2022)** attempted to research how dividend policy is affected by corporate social responsibility (CSR). According to the report, investors would rather put their money into companies that practice corporate social responsibility (CSR) than into those that don't. Corporate social responsibility (CSR) initiatives encourage a business to distribute dividends to shareholders. Consequently, the study found a favorable correlation between the dividend policy and corporate social responsibility (CSR). **Hartono & Matusin (2020)** sought to investigate the different elements affecting the dividend policy of the real estate, structures, and properties listed on the IDX. The key determinants of the dividend policy were found to be the size and dividend for the previous year. **Bahrudin et al., (2021**) attempted to investigate how the traits of businesses and the dividend policy in the trading services and consumer product sectors relate to one another. The analysis discovered a strong correlation between dividend policy and profitability and liquidity. **Gangil & Nathani (2018)** examined the factors influencing the FMCG industry's dividend policy in India. Profitability and growth prospects were identified by the study as the two main factors influencing the dividend policy. **Nathani & Gangil (2019)** attempted to investigate the factors that influence the dividend policies of auto and pharmaceutical firms. The study identified retained earnings, sales growth, debt-equity ratio, and profitability as important elements in the pharmaceutical industry, and retained earnings, investment opportunities, tax, and liquidity

as important drivers in the automobile industry. **Bhatia (2021)** investigated the factors that influence Indian corporations' decisions about dividend policies. According to the study, the main factors influencing dividend policy are dividend history, present earnings, and investment prospects. **Benyadiet al. (2022)** conducted study to determine how the dividend policy was affected by firm size, liquidity, profitability, and leverage. The analysis discovered a negligible relationship between dividend policy and leverage and liquidity, but a strong relationship with business size and profitability.

We can infer from the literature mentioned above that there are a number of factors that influence the decisions made regarding the dividend payout. The explanatory variables in this study are as follows: risk, size, profitability, liquidity, and leverage.

3.1 Risk: The risk to the future profitability of the company is implicitly taken into account by the price-to-earnings (P/E) ratio. Risk and dividend distribution have a substantially inverse relationship (Booth & Cleary et al., 2003; Sharma & Bakshi, 2019). Investors expect higher earnings when the price-to-earnings (P/E) ratio increases (Fame & French 1998). A high price-to-earnings (P/E) ratio may be associated with higher payout ratios and lower risk, whereas a low P/E ratio is associated with lower payout ratios and more risk.

3.2 Size: The theory of trade states that the leverage ratio and the business size are positively correlated. According to Booth and Cleary et al. (2003), larger companies are more likely to pay dividends and have greater access to financial markets.

3.3 Profitability: Profitability is one of the main elements affecting the dividend policy (Gangil & Nathani, 2019). According to the pecking order theory, businesses that are more profitable tend to give out smaller dividends because they fund their operations with internal funds. It might be because issuing new equity comes with a Cost. Thus, this theory also suggests that profitability and leverage have a negative connection (Kester, 1986).

3.4 Liquidity: Businesses with strong cash positions are more likely to distribute dividends to shareholders than those with weak cash positions. Dividends and liquidity have a positive relationship, according to the dividend policy signal theory (Bahrudin et al., 2021).

3.5 Leverage: Leverage is also one of the determinants of dividend policy. Rozeff (1982) found an increasing risk of the firm and transaction cost due to the high leverage ratio. With a high leverage ratio firm has a fixed liability; as a result, the chances of dividends

decrease. Leverage and dividend policy have a negative relationship, according to the agency cost theory of dividend policy.

4. Research Methodology

The study looks into the factors that affect the dividend policies of the top 100 Nifty 500 firms that paid dividends on a regular basis between 2010 and 2022. The PROWESS database, the NSE website, and the corporations' annual reports were the sources of the data. Panel data regression models—the fixed effect model and the random effect model—have been used to examine the data in accordance with its characteristics. Furthermore, the Random Effect model is more appropriate than the Fixed Effect model, according to the Hausman test, which has been used to determine the proper model. The following is the generic equation for panel data:

$$Y_{it} = \alpha_{it} + \beta X_{it} + \varepsilon_{it},$$

Y_{it} is the dependent variable, while the dividend payout ratio (DPR) is the dependent variable in this study.

α = intercept coefficient of the firm I (Constant)

β = independent variable coefficient of slope row vector

ε_{it} = Error term

X_{it} = group of explanatory factors for time t and company i.

The dependent variable, the Dividend Payout Ratio (DPR), is quantified as follows **(Bogna, 2015; Mendis & Wijesinghe , 2021)** :

$$DPR = DPS/EPS$$

- Divdend per share, or DPS
- Earnings per share (EPS)
- X_1 = (Price-to-earnings ratio) A company's future earning risk is calculated as; Price of share/Earnings per share
- X_2 = (SIZE) Capital employed has been taken as an indicator of size (Joshi & Ghosh, 2012) measured as;

Capital employed = Net Fixed Asset + Net Working Capital

X_3 = (ROE) The expression for return on equity is:

- Net profit after interest and tax / Shareholder's funds

X_4 = (LIQ) The current ratio, also known as liquidity, is computed by dividing current assets by current liabilities.

i.e. current assets/ current liabilities

X_5 = (LEV) The leverage ratio is calculated as:

Total debt/total assets

DPR is endogenous variable which represents dividend policy and P/E, SIZE, LIQ, ROE, LEV are exogenous variables (Risk, Size, Liquidity, Profitability, Leverage).

Hypotheses:

- *H1: Risk (P/E Ratio) and DPR have a positive relationship.*
- *H2: Size (SIZE) and DPR have a positive relationship..*
- *H3: Profitability (ROE) and DPR have a negative relationship.*
- *H4: Liquidity (LIQ) and DPR have a positive relationship.*
- *H5: Leverage (LEV) and DPR have a negative relationship.*

5. Empirical Results

5.1 Descriptive Statistics

The study's Table 1 displays descriptive data. The chosen companies' average dividend payout ratio is 24.64, meaning that they typically distribute 24.64% of their profits as dividends. Mean value of the DPR is low as compared to the other studies (Yiadom, 2011; Kuzucu, 2015) which means that high dividends are paid by only few firms and the rest are paying very low dividends. The average risk of the selected companies is 1.81%. Liquidity of the selected companies also varies from 0.16048 and 18.2218 of minimum maximum values. ROE is 2.88% with –1.71% and 15.37% minimum and maximum values respectively. Mean of size and leverage is 28.20 and 86.83 respectively.

Table1 Descriptive Statistics

Variable	Mean	Max	Min	SD
DPR	0.24643	0.73256	0.16112	0.22877
P/E	0.01810	0.12811	0.00022	0.02579
SIZE	0.28200	0.60012	0.01011	0.15038
ROE	0.02886	0.15375	-0.01713	0.04594
LIQ	2.21755	18.2218	.16048	2.28744
LEV	0.86835	2.24177	0.08411	0.44013

The data is longitudinal in nature, and the effect of independent variables on the dependent variable was examined using the panel data regression analysis approach. To estimate the panel regression model, we used both the random effects model and the fixed effects model. A random effect model was shown to be more appropriate than the fixed effects model when a further Hausman test was conducted as P-value (1.524) > 0.05, so, we opted for Random Effect Model. The outcomes of random effects are shown in table 2.

Table2. Panel data analysis results

Variable	Random Effects Model	Hypothesis Testing
C	37.23276***	
	(14.10153)	
P/E	.013854	$H_{1:}$ accepted
	(.053872)	
SIZE	.026154	H2: accepted
	(1.042673)	
ROE	-.435883***	H_3: accepted
	(1.276220)	
LIQ	-.412467	H_4: rejected
	(.096372)	
LEV	-.162158*	H_5: accepted
	(.086078)	
No. of Observations	100	
R^2	.46335	
Adj R^2	.25613	
F- statistics	3.623714***	
DW stat	1.731512	

Notes- ***,**,* Significant at 1%,5% and 10% respectively.

A consistent value of 37.23 is found in the panel data regression test findings utilizing the Random Effect Model. There is no issue with autocorrelation and adaptability in the model because the Durbin-Watson (D-W) statistics, which address the issue of autocorrelation and stationery, have a value of 1.731, which is close to 2. The dependent variable's R^2 value, which specifies the proportion of variation in the dependent variable, is 0.4633. This means that 46.33% of the variation in the dependent variable can be explained by the independent variable, with the remaining amount possibly resulting from the presence of other factors with unpredictable behavior. Significant negative relation between DPR and firms' leverage has been found which indicated that firms with a high leverage ratio are likely to pay less dividends. So, the result supported the hypothesis $\mathbf{H_5}$ and is in line with the dividend policy's agency cost theory. According to the results, profitability and the DPR have a substantial negative relationship, which is in line with the pecking order theory. This shows that sampled companies with high profitability prefer to use retained earnings as financial sources and and probably won't pay as much in dividends. So, results supported hypothesis $\mathbf{H_3}$. As expected, the study found a positive relationship between the **P/E ratio**, the **size of a firm (SIZE**) and the dividend payout ratio (DPR). The negative relation between payout ratio (DPR) and liquidity (LIQ) has also been found (which is consistent with agency cost theory). The findings, however, are not statistically significant.

6. Conclusions

The factors influencing the dividend policies of the top 100 national stock exchange-listed companies that paid regular dividends throughout a thirteen-year period, from 2010 to 2022, are examined in this study. The study found significant negative relation of the Dividend payout ratio with leverage and profitability and a positive relationship between the P/E ratio, the size of a firm and the dividend payout ratio. Outcomes, though, are not statistically significant. The findings showed that selected National Stock Exchange (NSE) listed companies are adhered to the dividend policy parameters recommended by established markets. So, it can be concluded that Risk, SIZE, ROE and LEV have emerged as major determinants of the dividend policy.

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Conflict of Interest

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Economic Determinants' Influence on the Scale Effect of Cross-Border Mergers and Acquisitions: A Comparative Study on Advanced and Developing Economies

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Abstract

This research paper explores the influence of globalisation and increasing economic interdependence on Cross-border mergers and acquisitions (CBM & As) in established and developing markets. It investigates how the economic status of a country impacts the encouragement or discouragement of CBM & As due to international strategic capital market developments. Addressing a research gap, this study empirically assesses the effects of economic growth drivers on CBM & As in advanced and developing nations. By categorising into small and large organisations based on their worth, a panel regression model is employed to examine the influence of GDP, the Employment rate (EMP), Market capitalisation (MC), Net export (X-M) and Inflation (I) on CBM & A agreements from January 2010 to December 2023. The findings indicate that GDP favours CBM & A agreements in large-scale organisations in advanced as well as developing countries. Additionally, MC positively impacts all aspects except small-scale firms in advanced nations. However, the EMP, net exports, and I exhibit unfavorable effects on CBM & As in both advanced and developing nations. These findings have significant implications for potential investors and governments seeking strategic insights into implementing CBM & As.

Keywords: *M&As, Small-Scale Firms, Market Capitalization, GDP, Large-Scale Firms, Employment Rate.*

JEL Classification : O5

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1. Introduction

M&As are crucial strategic agreements and businesses' dynamic strategies. In today's competitive era of business, firms are quick to expose their domestic and international plans and geographical strategies in terms of M&As (Datta et al., 2020). In the wake of the financial crisis, the increase in shareholder activism led to corporations being sold off entirely. Internal controls, organisational cultures, compensation of executives, and risk management practices gained attention due to the financial crisis. Some researchers describe this rise in CBM&As due to globalisation and growing economic integration among the countries (Yang, 2015).

Domestic companies have followed CBM&As to gain synergy, i.e., obtaining and securing a firm's value (Kumar et al., 2023[1]). CBM&As differ from domestic M&A due to institutional distances, cultural differences, lack of knowledge about local institutions, and legal procedures that increase the cost and risk for CBM&As (Yang, 2015). Unfavourable economic conditions, such as recession, depression, or limitations of capital, discourage international strategic changes (Kish & Vasconcellos, 1993). On the other hand, the growing economic conditions, cultural and managerial practices, liberalisation, and positive changes in capital markets enhance CBM&As trends (Vissa & Thenmozhi, 2022).

The impact of CBM&As on smaller-scale organisations can be offset by economic development (Vissa & Thenmozhi, 2022), i.e., institutional restraints relax when the economic development level increases, ultimately decreasing the scale effect of CBM&As and vice versa. The country's National or per capita income, education level, and infrastructure are defined as Economic Development (Meyer & Sinani, 2009). The economy is directly proportional to the level of national income, generating several financial resources for small businesses to pursue acquisition agreements.

Moeller & Schlingemann, (2005) agreed that the value of acquiring shareholders decreased in larger public acquisitions. Later on, Alexandridis et al., (2017) believed that M&As radically decrease the shareholders' value for acquiring a firm more than it is created during deals. However, they found an improvement in acquiring firms' gains in larger M&As after the post-financial crisis period, i.e., post-2009 due to the positive development in the corporate governance structure that also resulted in more excellent reflection of improved M&As quality in larger deals.

[1] Ranju & Mallikarjunappa, 2019; Erel et al, 2012

Several studies are being undertaken on the nexus between CBM&As and economic growth, mainly in advanced nations. However, empirical research on developing nations is still being determined. Previously, it was hypothesised that advanced countries are ahead of developing economies because of their FDIs and the number of M&As (Wan, 2005). Later, developing economies were used to make M&A deals to enter the global market and elevated investment in M&A across the globe (Kukreja et al., 2022). Our study differs significantly from previous studies in that we study how economic development affects the size effect of CBM&As in the host nation, in contrast to advanced and developing economies, particularly for developing firm's investment and competitive decisions (Green & Meyer, 1997). This point is echoed by (Oxelheim et al., 2001), who argue that macroeconomic factors are relevant to the overall cost of capital and should be treated as part of the overall concept of a firm's financial strength. Our study examines corporations from India, a developing country, and the United States of America, an advanced country, to examine how economic growth affects the scale effect of CBM&As in both countries. We choose these nations based on their shifting trade openness.

The use of a location-specific perspective is especially suited for this study. First, in providing the specifics that need to go into the location-specific advantages in the 1990s, (Dunning, 1980) indicated that the importance of macroeconomic variables are much greater now than 20 years ago due to the changing locational patterns, character, and geography of multinational activity.

The remaining paper is arranged as follows. The second section contains theoretical research on the link between determinants of economic development and CBM&As transactions. The third portion includes the linear modelling methodology for accounting for macroeconomic results on CBM&As. The fourth portion reviews the modelling techniques used and summarises the findings of the study, and the last portion summarises the result, which also includes a discussion of the study's ramifications.

2. Literature Review

CBM&As have recently received extensive attention from experts from various disciplines, including strategy, global enterprise, organisational behaviour, and economics, as a vital

internationalisation approach. Theoretically, with splendid monetary and strategic possibilities and intents, multinational firms ought to generate extra prices and reintroduce their marketplace situations by accomplishing CBM&As (Yu et al., 2021). On the contrary, Kumar et al., (2019) found that younger firms are most likely to be found in the liberalised era, and affiliated younger firms conduct CBM&As relatively faster.

In contrast, smaller-sized and less experienced corporations face several restraints in soaking up, integrating, or even reorganising sources (Fung et al., 2010). After introducing M&A regulatory regimes, European Union and China made conforming provisions for M&A scales (Yu et al., 2021).

Cho & Ahn, (2017) examined 4720 CBM&As deals. They discovered a negative influence of target firm size on the anomalous collective rate of return, i.e., poorer market response perceived in bigger acquirer businesses. Conversely, (Hu et al., 2020) expressed that deals valued over $500 m in international businesses destroyed shareholders' value in acquirer firms.

Karels et al., (2011) investigated the CBM&As between U.S. and India in the context of whether the difference in CBM&As was due to the country's environment or to firm's characteristics and found a combination of results of U.S. and Indian acquiring firms where share prices of public and private firms varied after the M&As announcement.

Economic development has a negative impact on the scale effect of CBM&As (Yu et. al., 2021). It stated that although the economy is developing, it is not favourable for larger enterprises to make international acquisitions, as opposed to small-scale organisations, which are more likely to pursue overseas profits in order to grow. Conversely, Aybar & Ficici, (2009) found a positive influence of abnormal returns in large organisations on the announcement of CBM&As deals.

Foreign Direct Investment as a measure of CBM&As has been investigated that FDI positively affects economic growth, i.e., GDP in the short and long run Hudea & Stancu, (2012).

M&A deals get higher when the economy is booming and less when the economy is

depressed (Kumar et al., 2023). They also states that the area and source of domestic and international acquirers differ across countries. Stefko et al., (2022), Ibrahim & Raji, (2018) also found negative variations in CBM&As inflows due to real GDP and Inflation in two different regimes of the U.K. Higher GDP discourages the acquisition of foreign firms as the cash reserves are usually utilised in acquiring local firms, increasing their sizes and expanding their influence in the Market Christofi et al., (2019).

CBM&As create downscaling in a variety of industries and weaken them. Employee turnover increases after M&As because increased uncertainty in the organisation negatively influences them. Instability in the organisations due to the M&A process causes psychological and behavioural impacts on employees Liu et al., (2021); Sun et al., (2018).

Degbey et al. (2021) expressed that domestic M&As increase the unemployment rate in each sector, though, from a foreign acquisition perspective, it only affects the service and construction industry. In weak labour-regulation countries, acquirers purchase the firms that are labour dependent, whereas in stronger labour-regulation countries, they use CBM&As to enter new markets (Bandick & Koch, 2022).

Change in ownership due to M&As weakens the implicit and explicit contractual ties with the employees, which causes them to lose their job interests and wages Bandick & Koch, (2022). However, leveraged buyouts with unrelated Private and non-private equities do not affect blue-collar employees and their wages, whereas related takeovers negatively affect employment. On the other hand, Hossain, (2021) postulates that firms prefer to connect in the form of M&A with similar and well-connected human resource capital.

3. Theoretical framework

3.1 Dunning's Location Theory

In this study, the analysis of the macroeconomic influence on the trends of M&A is based on Dunning's location theory. Dunning's, (1980) eclectic paradigm focuses on the motivations of firms engaging in international production activities. According to this theoretical framework, a country's propensity to attract foreign investment can be attributed to three key components. These factors comprise the advantage of ownership, which

encompasses a firm's capabilities and resources, location-specific advantages inherent in the target economy, which encompass both tangible and intangible resources fostering a favourable business environment, and organisational arrangements, which enable a firm to combine its ownership and location advantages to enhance its competitive edge.

3.2 Corporate Control and Market Entry Hypothesis

A recent study on domestic M&A (Kinateder et al., 2017) investigated both sides of domestic M&A deals and found that target returns are negatively associated with preannouncement returns and firm size, but positively related to GDP growth. On the other hand, (Nguyen et al., 2017) reported a broad-based and persistent result, which indicates that bidder returns might be more substantial for larger acquisitions and unrelated targets, irrespective of whether the transaction is domestic or cross-border.

Zhu et al., (2011) consider domestic and cross-border acquisitions in emerging markets in an attempt to test the corporate control hypothesis and the market entry hypothesis, respectively. According to the corporate control theory, domestic acquisitions act as a corporate control market, improving the target companies' operational performance. As home acquirers are acquainted with the domestic market and likely to have superb information relative to foreign acquirers, such information is used to detect the targets that are not properly managed and to reorganise them at lower costs Zhu et al., (2011).

On the other hand, the strategic market entry hypothesis motivates cross-border acquisitions Kumar et al., (2023); Zhu et al., (2011). For instance, Western businesses are searching for methods to enter the growing Southeast Asian markets, as these nations offer enormous market potential.

4. Data and Methodology

Various methodologies have been used to analyse CBM&As and economic development drivers. CBM&As is a dependent variable in this study. Our explanatory variables are economic development determinants, which include GDP, EMP, MC, net exports, and I; Ibrahim & Raji, (2018) studied the GDP as the most critical macroeconomic factor that causes fluctuating trends in CBM&As. Our exogenous variable is firm scale, quantified

by firm size (total assets). (Hashmi et al., 2020) took total assets as a measure of firm size. The data for CBM&As transactions comes from the Venture intelligence data source, while the data for MC, EMP, GDP, net exports, and I comes from the World Bank data sources and UNCTAD (World Bank Group, 2020; UNCTAD, 2020). Total assets were obtained from annual reports for the relevant period to measure the organisation's size. The current exchange rate was used to convert all data to U.S. dollars. The study period is from January 2010 to December 2023 as the CBM&As activities increased after the financial crisis, and more shareholders value was created by the acquiring firms (Alexandridis et al., 2017). India has represented developing countries, and the United States of America has represented advanced countries. Successful M&A transactions are part of the sample in this analysis, and their announcement happens between both study periods. Companies worth more than $6.56 million in the sample are classified as large-scale, while those worth less than that are classified as small-scale. Our ultimate sample contains 974 businesses participating in CBM&As transactions among the aforementioned nations, with 410 Indian firms acquiring United states of America firms and 564 United states of America firms acquiring Indian firms. Data cleaning was done, and we removed the samples with no deal value. This resulted in a final sample of 514 businesses participating CBM&As transactions, with 215 Indian firms acquiring United states of America firms (163 Large and 52 small firms) and 299 United states of America firms acquiring Indian firms (189 Large and 111 small firms). To examine the proposed hypotheses, we utilised a linear regression model and further conducted a correlation analysis. To decrease endogeneity, dependent variable is delayed by one period. To investigate the relationship between CBM&A and significant economic development indicators, the following models are used:

$$Y_{it} = \alpha_{it} + \beta Y_{(S,L)it-1} + \sum \gamma A_{it} + \sum \delta B_{it} + \zeta C_{it} + \sum D_{it} + \sum F_{it} + \varepsilon_{it} \qquad (1)$$

In Equation (1), Y represents CBM&As, S and L represent small and Large scale organisations, i is a nation (Host Country), and t represents the respective period 2010-2023. α, β, γ, δ, ζ, λ and μ are the coefficients.

$$CBM\ \&\ A_{(S,L)} = \alpha_{it} + \beta CB\ \&\ A_{(S,L)it-1} + \gamma GDP_{it} + \delta EMP_{it} + \zeta MC_{it} + \lambda(X - M)_{it} + \mu I_{it} + \varepsilon_{it} \quad (2)$$

GDP, EMP, MC, X-M, I and ε are the gross domestic product, employment rate, market capitalisation variables, net exports, Inflation, and error term, respectively.

5. Results and Discussion

5.1. Descriptive Statistics

Table 1 indicates the number of observations, standard deviation (S.D.), mean, and correlation coefficient for each distinct variable in small-scale organisation sample. According to Table 1, each variable's total number of observations is 455, the average value of CBM&A agreements is 106.78, and SD is 204.01. The mean value of EMP, GDP, MC, Net Exports, & I is 32.235, 3.328, 118.256, -3.111, and 3.909, respectively. The EMP, GDP, MC, Net Exports, and I, SD is 18.102, 2.735, 64.835, 1.264, and 3.127, respectively. The correlation coefficient between all variables has a maximum value of 0.789.

Table 1: Descriptive Statistics: Small-Scale Organisations

Variables	CBMA	EMP	GDP	MC	(X-M)	I
CBMA	1	0.025	-0.22	0.039	0.014	0.006
GDP	-0.022	-0.163**	1	-0.497**	-0.537**	0.402**
EMP	0.402	1	-0.163**	0.789**	-0.116*	-0.641**
MC	0.039	0.789**	-0.497**	1	0.23**	-0.674**
(X-M)	0.014	-0.116*	-0.537**	0.23**	1	-0.382**
I	0.006	-0.641**	0.402**	-0.674**	-0.382**	1
Mean	106.78	33.235	3.328	118.256	-3.111	3.909
Standard deviation	204.01	18.102	2.735	64.835	1.264	3.127
Number of Observations	455	455	455	455	455	455

**, * Significant at 10 and 5% level of significance

Table 2: Descriptive Statistics: Large-Scale Organisations

Variables	CBMA	EMP	GDP	MC	(X-M)	I
CBMA	1	-0.362**	0.328*	-0.306*	-0.106	0.219
GDP	0.328*	-0.669**	1	-0.791**	-0.306	0.638**
EMP	-0.362	1	-0.669**	0.774	0.174	-0.709
MC	-0.306*	0.774**	-0.791**	1	0.44**	-0.689**
(X-M)	-0.106	0.174	-0.306*	0.44**	1	-0.562**
I	0.219	-0.709**	0.638**	-0.689**	-0.562**	1
Mean	134.148	55.696	2.943	90.215	-3.093	2.68
Standard deviation	198.705	25.001	2.418	33.633	0.88	2.395
Number of Observations	59	59	59	59	59	59

**, * Significant at 10 and 5% level of significance

Table 2 displays number of observations, mean, S.D., and correlation coefficient for each distinct variable in large-scale organisation sample. Table 2 indicates 59 observations for each variable, the average value of CBM&As agreements is 134.148, and standard deviation is 198.705. The mean Employment rate is 55.696, with a SD of 25.001. GDP has a mean value of 2.943 and a SD of 2.418. Market Capitalization has a mean value of 90.215 and a SD of 33.633. Net exports have a mean value of -3.093, with a SD of 0.88. Mean value of Inflation is 2.68, while SD is 2.395. The correlation coefficient of all variables has a maximum value of 0.774.

5.2. Multicollinearity Test

A multicollinearity test is performed to assess any significant correlations among the independent variables, as these correlations might possibly affect the estimates of the model. If the VIF (variance inflation factor) value reaches 5 and tolerance values are less than 0.1, multicollinearity can be recognised (Hair et al., 2019). Thus, it confirmed the dataset didn't exhibit substantial multicollinearity. VIF and tolerance values are displayed in Table 3.

Table 3. Multicollinearity Test

Small-Scale Organisations			**Large-Scale Organisations**	
Variables	**Tolerance**	**VIF**	**Tolerance**	**VIF**
GDP	0.211	2.568	0.148	3.245
EMP	0.116	4.878	0.205	3.267
MC	0.208	2.094	0.141	2.088
(X-M)	0.247	3.256	0.146	4.056
I	0.148	3.732	0.211	4.732

5.3. Regression Analysis

Table 4 shows findings of regression study between CBM&A and critical economic development drivers based on 455 CBM&A agreements between India and the United States of America. For smaller businesses, the regression model is as follows.

$$CB\ M\&A_{(S)it} = 36.894 CB\ M\&A_{(S)it-1} + 0.234 GDP_{it} - 6.722 EMP_{it} + 0.345 MC_{it} + 13.621 (X\text{-}M)_{it} + 20.488 I_{it} + \varepsilon_{it} \quad (1)$$

Table 4: Impact of GDP, EMP, MC, (X-M) and I on CBM&A in Small-Scale Organisations

Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	36.894	70.959	0.544	0.523
GDP	0.234	0.641	5.084	0.000
EMP	-6.722	14.746	-0.456	0.649
MC	0.345	0.264	5.408	0.000
(X-M)	13.621	24.393	0.532	0.595
I	20.488	20.268	1.011	0.313
CBMAS(“1)	0.863	0.0864	76.198	0.000

Adjusted R^2= -.0936; Durbin-Watson = 2.012; Prob(F-statistic) = 0.0000.

Table 4 shows, GDP (0.0000, $P < 0.05$) and MC (0.0000, $P < 0.05$) have a significant positive effect on CBM&As deals, whereas employment rate (0.649, $P > 0.05$), net exports (0.595, $P > 0.05$), and Inflation (0.313, $P > 0.05$) have an insignificant negative effect. This suggests that GDP and MC have a more significant influence on CBM&As agreements than employment rates, net exports, and Inflation. According to the findings, a one-unit rise in GDP and MC will enhance CBM&A agreements in small-scale businesses by 0.234 and 0.345, respectively.

An increase in one unit of employment, net exports, and Inflation reduces the value of CBM&A transactions by -6.722, 13.621, and 20.488, respectively.

Table 5 provides the regression analysis results between the CB M&A and several economic development factors based on 59 larger firms CB M&A deals between India and the USA. Below is larger firms' regression mode.

$$\text{CB M\&A}_{(L)\ it} = 50.008 + 0.907\text{CB M\&A}_{(L)it"1} + 30.504\text{GDP}_{it} + 3.381\text{EMP}_{it} - 0.077\text{MC}_{it} - 2.57(\text{X-M})_{it} - 21.357\text{I}_{it} + \varepsilon_{it} \quad (2)$$

Table 5: Impact of GDP, EMP, MC, (X-M) and I on CBM&A in Large-Scale

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-80.008	910.686	-0.088	0.93
GDP	30.504	31.999	0.953	0.345
EMP	3.381	18.895	0.179	0.859
MC	-0.77	2.917	-0.264	0.793
(X-M)	-2.57	74.871	-0.034	0.973
I	-21.357	36.181	-0.59	0.558
CBMAS (–1)	0.907	0.062	14.59	0

Adjusted $R^2 = 0.973$; Durbin-Watson = 1.687; Prob (F-statistic) = 0.0000.

Organisations

As Table 5 shows, GDP (0.045, $P < 0.05$) has a significant positive effect, whereas employment rate (0.065, $P > 0.05$) and net exports (0.073, $P > 0.05$) have an insignificant

negative impact. MC (0.063, $P > 0.05$) and Inflation (0.558, $P > 0.05$) have a positive but insignificant effect on CBM&A deals. It demonstrates that, when compared to other variables, CBM&A has a substantial impact on GDP. The results reveal that a one-unit rise in GDP will boost CBM&A agreements in large-scale businesses by 0.504. Employment rate, market capitalisation, net exports, and Inflation will decrease the deal value by -3.38, -0.077, -2.57, and 21.357, respectively. As small-scale enterprises, the value of CBM&A agreements in larger organisations has been positively influenced by the previous year's deals.

Regression statistics of the sample are reported in Table 5. It demonstrates that the suggested model is significant as a whole and performs well when it comes to the combined importance of variables. The F value is 0.0000 (probability 0.05). The model is considered to be significantly fitted. The higher adjusted R^2 value (97.30%) suggests that the independent factors in our model very effectively explain the dependent variable.

Table 6 displays the findings of a regression analysis based on 201 Indian and 235 American smaller acquirer organisations in terms of CBM&A, GDP, employment rate, MC, net exports, and Inflation. Using a sample of smaller-scale enterprises, the research is carried out separately to empirically compare the differences between advanced and developing host countries in order to analyse the impact of independent variables on CB M&As.

Table 6: A Comparison of Advanced and Developing Host Countries: Small-Scale Organisations

	India			United States of America		
Variables	**Coefficient**	**t-Statistic**	**Prob.**	**Coefficient**	**t-Statistic**	**Prob.**
C	-36.185	-1.366	0.041	15.605	12.611	0.0008
GDP	0.233	1.014	0.023	0.399	1.925	0.000
EMP	17.176	0.414	0.679	-35.562	-0.171	0.0015
MC	0.574	4.792	0.000	-4.643	-1.329	0.0026
(X-M)	-8.856	-0.468	0.640	47.394	1.345	0.018
I	13.867	0.706	0.481	69.748	1.752	0.081
CBMAS(–1)	0.003	0.028	0.028	-0.004	-0.055	0.957
Adj. R^2 = 0.9302; Prob(F-statistic) = 0.0000.				Adj. R^2 = 0. 9137; Prob(F-statistic) = 0.0000.		

In Table 6, all of the independent factors, namely GDP (0.0231, $P < 0.05$) and MC (0.0000, $P < 0.05$), had a substantial positive influence on CBM&A agreements for Indian small-scale enterprises. On the contrary, all of the independent variable's GDP (0.0000, $P < 0.05$), employment rate (0.0015, $P < 0.05$), MC (0.0026, $P < 0.05$), and net exports (0.018, $P < 0.05$) have a significant positive impact on CBM&As deals in small-scale firms of United States of America.

The regression data in Table 6 demonstrate the suggested model's significance since the F value is 0.0000 (Probability 0.0000). Furthermore, with an adjusted R square of 93.02 percent, this model may display a more significant percentage of emphasis on postulated economic factors in CBM&A negotiations. Because the model's F value is 0.0000 (Probability 0.05), its importance is also reported on the other side of the Table. Furthermore, a higher corrected R^2 value (91.37%) indicates that our independent variables accurately represent our model.

Table 6 displays the findings of regression analysis of 14 India and 45 United States of America large-scale acquirer firms among CBM&As deals and proposed determinants of economic variables to analyse the impact of independent variables on CBM&As by comparing the host nations India and the United States of America by using large-scale firm's samples.

Table 7: A Comparison of Advanced and Developing Host Countries: Large-Scale Organisations

	India			United States of America		
Variables	**Coefficient**	**t-Statistic**	**Prob.**	**Coefficient**	**t-Statistic**	**Prob.**
C	21.47	3.909	0.339	55.128	2.007	0.035
GDP	0.147	1.897	0.047	4.928	1.758	0.238
EMP	-34.288	-1.245	0.024	-31.183	-0.241	0.053
MC	53.956	0.34	0.745	4.118	0.434	0.667
(X-M)	-0.035	-0.765	0.127	6.162	0.572	0.063
I	-6.457	-0.155	0.073	-2.585	-0.704	0.946
CBMAS(–1)	0.609	19.14	0.00	0.741	25.988	0
Adj. $R^2 = 0.9645$; Prob(F-statistic) = 0.0000.				Adj. $R^2 = 0.9674$; Prob(F-statistic) = 0.0000.		

Table 7 reveals that GDP (0.047, $P < 0.05$) significantly positively affects CBM&A deals for Indian large-scale firms. In contrast, the employment rate (0.024, $P < 0.05$) has a significant negative impact, and MC (0.745, $P > 0.05$) has an insignificant positive effect. Net exports (0.127, $P > 0.05$) and Inflation (0.073, $P > 0.05$) have a negligible negative influence on CBM&A transactions. The independent variable GDP (0.238, $P > 0.05$) has a negligible positive influence on CBM&A agreements for U.S. businesses, but the employment rate (0.053, $P > 0.05$) has an insignificant negative effect. MC (0.667, $P > 0.05$) and net exports (0.063, $P > 0.05$) have insignificant favourable effects on CBM&A agreements, but Inflation (0.946, $P > 0.05$) has a negligible negative impact.

Table 7 shows that the overall significance of both models is 0.0000 (Probability 0.05). Higher adjusted R^2 values, 96.45 % for Indian organisations and 96.74 % for USA firms suggest that our independent variables significantly influence the model.

6. Discussion

The findings reveal that GDP favourably influences CBM&A in both advanced and developing nations. In contrast, the employment rate has a negative impact on the dependent variable because, for small organizations, CBM&As can lead to job losses due to restructuring and cost-cutting, explaining the reverse causality with employment. In large organizations, CBM&A often facilitates expansion and efficiency gains, potentially boosting employment and reversing the causality trend observed in small firms.

Market Capitalisation influences CBM&A positively in small-scale organisations but negatively in large-scale organisations, whereas net exports and Inflation influence CBM&As positively in small-scale organisations but in the case of net exports, negatively in large-scale organisations, and positively in the case of Inflation. GDP and market capitalisation have a beneficial influence on CBM&A transactions in small businesses. Contrary to popular belief, the employment rate, net exports, and Inflation negatively impact CBM&A transactions. All the proposed independent variables, except employment, substantially influence CBM&As negotiations in small-scale firms. GDP benefits CBM&As agreements in major firms, but employment rate, market capitalisation, and net exports have a negative impact. Only GDP influences the dependent variable considerably, whereas other variables have minor values.

We looked at the effect of economic growth determinants on CBM&A between advanced and developing nations separately in small and large-scale acquirer companies. According

to the findings, GDP and market capitalisation had a substantial and beneficial influence on CBM&A negotiations in small-scale acquirer organisations in developing nations. GDP and net exports substantially influence CBM&A agreements in the USA, size acquirer companies. For large-scale acquirer organisations in advanced and developing nations, all of the independent factors except market capitalisation have a negative sign but statistically significant, for GDP and employment and are statically insignificant, for net exports and inflation influence on CBM&A transactions in Indian large-scale acquirer organisations. All the independent variables except employment and Inflation have a beneficial influence on CBM&A agreements in the USA big-scale acquirers; however, the employment rate has a negatively significant impact. All of the independent factors have a negligible influence on CBM&A transactions.

Empirical data reveal that the coefficients of variable GDP positively influence CBM&A, implying that whether the nation is advanced or developing, a rising economy invites both small and large businesses to execute M&A agreements. It supports the study of (Vissa & Thenmozhi, 2022; Ibrahim & Raji, 2018) and other researchers that mergers increase when the economy is booming. The MC coefficients haven't any beneficial influence on large-scale acquirer organisations, but in the case of small-scale Indian organisations; it shows the beneficial influence. For small organizations, market capitalization often reflects investor perceptions of growth potential and financial health, making it a significant determinant in economic models. In large organizations, diversified operations and established market presence dilute the influence of market capitalization on outcomes, reducing its statistical significance. As a result, large-scale firms need to improve in advanced and developing countries, whereas small-scale organisations tend to be more acquirers in developing countries. These findings are aligned with the study of (Kukreja et al., 2022) that firms used to be more acquirers in countries with good stock markets. For small-scale firms, Coefficients of Employment rate and net exports have a detrimental influence on CBM&A negotiations in developing nations, as compared to advanced countries. This may be explained by saying that nations with high employment rates discourage people from becoming acquirers. They believe that if they are involved in M&As activities, the turnover rate might increase as Sun et al., (2018) assumed that M&As cause uncertainty in organisations, and turnover rate increases in post-merger periods.

7. Conclusions and implications

The research has emphasised the importance of major macroeconomic determinants in

persuading multinational firms to locate investment activities. However, the impact of macroeconomic factors on acquisition activity has yet to receive much attention. We determined that a country's economic development is critical to internationalisation since it substantially influences CBM&As agreements. Besides large-scale acquirer corporations in India as a host nation, GDP benefits CBM&A agreements in advanced and developing countries. Market capitalisation has a beneficial influence on large-scale acquirer organisations, but it only positively impacts small-scale organisations in relation to Indian firms. Most corporations are likely to engage in CBM&As in nations with greater GDPs and stock markets trending upward, particularly in small-scale organisations. Except for small-scale organisations in developing nations, the employment rate appears to negatively influence CBM&As agreements in large-scale firms for both advanced and developing economies. Except for small-scale organisations in developing countries, the inflation rate appears to have a negative impact on CBM&A agreements in both advanced and developing countries. Net exports appear to influence CBM&A agreements in large-scale firms in advanced countries negatively.

Our work is important because it fills a research gap on the effects of CBM&As by various economic variables while accounting for the size effect of firms participating in CBM&As discussions. The findings indicate that macroeconomic variables exert influence on the occurrence of merger and acquisition endeavors within both developed and emerging nations. The outcomes furnish substantiation that macroeconomic factors, serving as principal constituents of geographically specific advantages, play a pivotal role in elucidating the patterns and geographical placement of merger and acquisition activities.

This has significant significance for organisations participating in M&A operations since it communicates to corporations or investors where to focus foreign resource flows, especially in recent years as the world has become more globalised and linked. Furthermore, because firms' objectives include, among other things, minimising costs, maximising profits, and enhancing competitive advantage, understanding the relative levels of market size (measured by GDP, EMP, MC, net exports, and I) in both home and host countries can be critical for investment decisions. Policymakers might use this and, eventually, investors to push organisations to execute the "moving out" approach. Policymakers ought to implement suitable macroeconomic measures, such as a reduction in the monetary policy rate, that have the potential to foster increased inflows of M&As. Furthermore, literature on advanced and emerging markets contributes to the corporate community's debate on international

strategy by filling institutional gaps in the financial area. Additionally, future researchers will be able to analyse the influence of industry and nation on CBM&As as a result of this work.

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The Author(s) declares(s) that there is no conflict of interest.

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India's Trade Relationship with the Member Countries of SAARC: A Gravity Trade Model Approach

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Abstract

International trade improves the welfare of a country by allowing higher level of consumption and investment. There has been a development in international relations among countries in recent years due to the growth of regional trade blocs. The present study examines India's trade with SAARC members from 1991 to 2020 by using the augmented gravity trade model and a set of macroeconomic variables. It reveals that there has been a notable increase in both India's overall exports to the member countries of SAARC and imports from the member countries of SAARC during the study period. The study also concludes that there exits an enormous opportunity to increase the trade flow of India with the member countries. The globalization index of India as well as the member countries are positively related to the trade flow and is also statistically significant which shows that the trade relationship of India with the member countries of SAARC can be increased by trade liberalization. Therefore, the Governments of all the member countries should liberalization their respective trade by reducing their respective trade barriers to improve their trade relations in order to get the benefits of international trade.

Keywords: *SAARC countries, Regional Trade Blocs, Gravity Trade Model.*

JEL Classification: F14, F15, F13, C23, C12

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1. Introduction

International trade improves the welfare of a country by allowing higher level of consumption and investment. Globalization led to many economic activities both at the national and international levels. It has also brought fundamental changes in these economic activities. Close collaboration between participating nations and the elimination of all trade obstacles within the region are prerequisites for economic integration. The SAARC (South Asian Association of Regional Cooperation) is a regional bloc among eight countries of South Asia. Now, what factors determine the level of trade flows that occurs between India and member nations? What is the extent of association between the trade value of these determinants? Past studies have answered this questions primarily in terms of distance (D) and economic size (GDP). The present study considers additional variables as potential determinants of trade relations between India and member nations. In this literature the trade relationship between India and the member countries of SAARC have been analysed with the help of econometric model. More precisely, to analyse the bilateral trade between India and the member countries of SAARC gravity model of international trade has been used. This paper contents three sections: the first section reveals the objective of study. The second section reveals the methodology of the study. The third section analyses the bilateral trade between India and the member countries of SAARC by gravity trade model and the last section reveals the conclusion of the entire chapter.

2. Objectives

This study attempts to analyse the trade flow of India with the member countries of SAARC by using an econometric model during 1991-2021. More precisely, the objectives of the study are as follows:

1) To analyse the bilateral trade flow between India and the member countries of SAARC by using augmented gravity trade model during the study period.

2) To determine the factors which determine the level of trade flow between India and the member countries of SAARC during the study period.

3. Reviews of Literatures

Various studies have been done to investigate the trade relationship of a country with regional trade agreements (RTA) and regional trade blocks. Few of them are depicted below.

Raghurampatruni et al. (2021) examined the opportunities and commodity potential of trade between India and the SAARC countries during 2010-2016 by using different trade indices. The authors said that the exports and imports intensity of India to the member countries increased. Also, there is a high trade potential between them. Banik and Kim (2020) examined the pattern of trade between India and ASEAN from 2002 to 2018, using comparative advantage by country and market comparative advantage (MCA). India's trade with the ASEAN region has grown at 11.8 percent CAGR. The literature found that India had the comparative advantage in majority of the good exported to ASEAN. In particular, ASEAN is the major export destination for India's machinery goods. Sharma and Kumar (2020) analysed the trade relation of India and member nation of SAARC during the pre-SAFTA and post-SAFTA period. They evaluated the total trade of India with its neighbouring member nations in the SAARC region. They noted that the trade openness of these countries has increased but trade between India-SAARC has not grown substantially. Mathur and Arora (2019) revealed that the trade flow of India with the SAARC region as a whole has increased significantly from 2013 to 2018. There has been a significant growth in the major commodities exported to Bangladesh and Nepal and also imports from both nations have increased. However, some major commodities imported from Bangladesh and Nepal both have experienced a steep decline. Sharma and Kumar (2020) attempted to analyse India's trade potential with other SAARC member states under the SAFTA agreement during 1992-2019, by using the augmented gravity model. The findings proved that the intra-regional trade volumes between SAARC countries can be increased and encouraged. Moreover, it was important to introduce structural reforms aiming to boost trade with non-member states. Jain and Kumar (2018) investigated the trade-led growth paradigm of India from 1994 to 2015 for SAARC countries. They confirmed the existence of short-term relationship and absence of long-term relationship between GDP of India and trade flow among the SAARC counties. Alam (2015) analysed the bilateral trade between India and ASEAN region-wise, country-wise and commodity-wise by using Revealed Comparative advantage (RCA) and trade intensity indices (TII). They found that countries which got complementarity trade structure are likely to trade more whereas economics with similar trade structure often struggle to improve trade structure unless there is substantial intra-industry trade. Rizwanulhassan & Shafiqurrehman (2015) attempted to examine the extent of intra-regional trade among SAARC nations by using the "Extended Gravity Model" for the time period 1991-2010. They found a significant effect of "GDP, GDP per capita, Exchange Rate Volatility, and Common Border on intra-regional trade". Akram and

Mahmood (2012) analysed the intra-industry trade determinants of Pakistan and other SAARC nations. The study revealed that the country-specific factors are more important as compared to the industry-specific factors. Vadra (2012) investigated the trade relations of India with member countries SAARC from 1999 to 2009. The result suggested that India has a very open trading regime. India-Pakistan official trade is very poor. The author said the exports of India to Bangladesh was highest and the imports of India from Nepal is highest among the other member countries. Velde, Dirk William Te (2011) examined the importance of regional integration for convergence and growth of developing countries, during 1970-2004. They found that regional integration did not lead to rapid growth but, it had positive effects on trade and investment in developing countries. They also recommended that regional integration was essential for the growth of member countries as it led to increased trade and investment. Akhter and Ghani (2010) revealed that the potential of trade creation effect depends on a proper regional trade agreement among India, Pakistan and Sri Lanka. They found that SAFTA was more useful in the long run than in the short run. The trade diversion effects under SAFTA would be minimized if trade liberalization, continued in the region. Jain and Singh (2009) revealed that India has a relative trade comparative advantage in majority of industry groups as compared to other member nations of SAARC during 1990-2007. They said that trade integration in SAARC nations is growing at a slow pace. Ali and Talukdar (2009) concluded a low level of bilateral and intra-original trade shares in South Asia for the time period of 1995 to 2007. The region accounts for a very insignificant share of world trade but persistently high levels of tariff barriers. Thus, preferential trade liberalization is more likely to bring about trade diversion than trade creation and political policies of individual countries are shaped more by political considerations than economic factors. Madhusoodanan (2010) analysed the effect of macroeconomic variables on the trade flows of the SAARC region during 2000-2005. The study revealed that to improve trade relation with the region tariff reduction is needed. Further, the study supports specialization in the region based on the relative factor endowments and cost advantage as well. Rahman (2008) investigated the macroeconomic structure of the member nations of SAARC for the time period of 1972 to 1999. The finding suggested that there are inter-country differences in the patterns of production and consumption, investment, tax and non-tax structure etc. Hence there is good scope for trade expansion among the member nations. Based on these literatures we attempted to examine the trade relationship of India with the member countries of SAARC during 1991-2020.

4. Methodology

4.1 Gravity Trade Model

The gravity model of international trade is used to analyse the bilateral trade flow of India and the member countries of SAARC during 1991-2020. The model was first used by Tinbergen (1962). It relates the export flow of a nation to its GDP, the GDP of the trade partner and the distance between the countries. More precisely, countries will trade more if their economic size will be larger and will trade less if they are located far apart from each other. The basic form of the gravity model is represented below.

$$X_{HF} = \frac{Y_H * Y_F}{D} \quad \text{..... (1)}$$

$$LnX_{HF} = LnY_H + LnY_F - LnD \quad \text{..... (2)}$$

Here X_{HF} is the export flow of home country to foreign country, Y_H is the GDP of home country, Y_F is the GDP of foreign country and D be the distance between countries. Equation (1) shows export flow of home country is the product of GDP of home and foreign, relative to the distance between them. After the log-transformation we got the equation (2). The econometric model corresponding to the equation (2) is given below.

$$LnX_{HFit} = \beta_0 + \beta_1 LnY_{Hit} + \beta_2 LnY_{Fit} + \beta_3 LnD_{it} + u_{it} \quad \text{..... (3)}$$

Where u_{it} is the error term, and β_0, β_1, β_2 and β_3 are the unknown coefficients to be estimated. The above equation (3) is the main equation where trade is found to be a positive function of GDP and inverse function of distance, that is the value of β_1, and β_2 are positive and β_3 is negative. Therefore, export of a country positively depends on the economic size of the country and its partner country and negatively related to the distance between the country. Here we are using an augmented form of gravity model by considering some new variables in our econometric model, these are exchange rates of exporting and importing countries and globalization index of exporting and importing countries. The augmented form of the model is given below.

$$LnTV_{it} = \beta_0 + \beta_1 LnY_{Hit} + \beta_2 LnY_{Fit} + \beta_3 LnD_{it} + \beta_4 LnE_{Hit} + \beta_5 LnE_{Fit} + \beta_6 LnGI_{Hit} + \beta_7 LnGI_{Fit} + u_{it} \quad \text{... (4)}$$

Trade Value (TV) is taken as a dependent variable which is the sum of total exports of

goods from India to member countries of SAARC and total imports of goods to India from member countries of SAARC. The value of TV is in million (000,000) US dollars and also inflation adjusted by using CPI with the base period 2010. Gross domestic product is the proxy of the economic size. We have included the gross domestic product of India (Y_H) and other member countries of SAARC (Y_F) as explanatory variable, to explain the trade value of India. The values of both variables are in millions of US dollars, and adjusted inflation by CPI with base period 2010. The geographical distance is considered as the proxy of trade restriction, because countries will trade more if they are located close to each other and will trade less if they are located far apart to each other. Here, distance between countries (D) is taken as an explanatory variable to explain the trade value (TV). The exchange rate is the price of the one country's currency in terms of the other country's currency. Here the exchange rate of India (E_H) and the exchange rate of member countries of SAARC (E_F) are taken as an explanatory variable in our study. Globalization Index (GI) is a composite index of three indices viz. economic, social, and political. The economic globalization includes trade and investment flow and its restrictions, the social globalization one includes personal contacts, cultural proximity, and flow of information while the political globalization includes membership in an international organization, embassies and involvement in international treaties etc. These three indices are used to calculate the globalization index. The value of the index would be from zero (0) to hundred (100). Higher the value of the index, more globalized the country is and more globalized county will trade more to its trade partner. Similarly, lower the value of the index, less globalized the country is and less globalized county will trade less to its trade partner. That is, positive relationship exists between globalization and trave value. Here, the globalization index of India (GI_H) and member countries of SAARC (GI_F) are taken as an explanatory variable to explain the trade value of India. Here TV is the dependent variable and Y_H, Y_F, D, E_H, E_F, GI_H, GI_F are the explanatory variables, that is TV will be explained by Y_H, Y_F, D, E_H, E_F, GI_H, GI_F.

The secondary data sources of the variables are represented in the table-1. In the above equation (4) log transformation has been done. The above equation can be estimated in three different ways like pooled OLS, fixed effect model (FEM), and random effect model (REM). The model's estimated coefficient in three different approaches are given in table-3, table-5 and table-6.

4.2 Panel Data Analysis

Panel data considers cross-sectional observations as well as time-series observations, implying it employed information regarding both cross-sectional and time-series units. Our study wants to analyse the trade relationship of India with the other member countries of SAARC (seven member countries) from 1991 to 2020. Here we have seven cross-sectional units and 30 time-series units, which construct a panel data of 210 observations. Now, the panel data model can be estimated by pooled OLS regression method, Fixed Effect Method (FEM) and Random Effect Method (REM).

Under the pooled OLS method, we pool the cross-sectional entity and time series entity and estimate a regression model, neglecting the cross-sectional and time series nature of a panel data and estimate the model by OLS method. Therefore, we impose a restriction that both the types of entity are homogeneous that is we ignore the heterogeneity of variables coming from cross-sectional and time series entities. So, this method is only suitable if the panel data does not have any heterogeneity across cross-sectional and time series units. If there exists an unobserved heterogeneity, then the resulting estimator will be biased and inefficient. In this situation we can use either the Fixed Effect Model or the Random Effect Model.

Under the Fixed Effect Model (FEM), we can use the Least Square Dummy Variable (LSDV) model or the Fixed Effect Within model to capture the unobserved effect present in the model. In this method, all the differences coming from the cross-sectional units are captured by introducing intercept-dummy variables for each cross-sectional unit. After introducing dummy variable we can use OLS techniques to estimate the model. Now, in the Fixed Effect Within model, we eliminate the unobserved fixed effect across cross-sectional by subtracting the time-mean of each variable. That is, we have to consider the "de-meaned" or "mean-corrected" value of each variable, then we have to use OLS technique to estimate the model.

In the Random Effect Model (REM), we assume that the unobserved heterogeneity across the cross-sectional units is random in nature and follow all the assumption of standard regression model. Moreover, the unobserved heterogeneous effect across the cross-sectional unit is completely random and is uncorrelated with all the regressors, implying these individual-specific unobserved effects will not affect the bilateral trade flow of our model.

4.3 Research Hypotheses

Here to analyse the trade flow of India with the member countries of SAARC, the gravity trade model is used. Based on our study, the following hypotheses are formulated.

H_{01}: There is no impact of India's GDP on India's trade value to the member countries of SAARC.

H_{A1}: There is a positive impact of India's GDP on India's trade value to the member countries of SAARC.

H_{02}: There is no impact of the GDP of member countries of SAARC on India's trade value to the member countries of SAARC.

H_{A2}: There is a positive impact of the GDP of member countries of SAARC on India's trade value to the member countries of SAARC.

H_{03}: There is no impact of the geographical distance between the India and the member countries of SAARC.

H_{A3}: There is an adverse relationship between the trade value and the geographical distance between India and the member countries of SAARC.

H_{04}: There is no impact of the exchange rate of India on India's trade value to the member countries of SAARC.

H_{A4}: There is a positive impact of the exchange rate of India on India's trade value to the member countries of SAARC.

H_{05}: There is no impact of the exchange rate of the member countries of SAARC on India's trade value to the member countries.

H_{A5}: There is a positive impact of the exchange rate of the member countries of SAARC on India's trade value to the member countries.

H_{06}: There is no impact of the globalization index of India on India's trade value to the member countries of SAARC.

H_{A6}: There is a positive impact of the globalization index of India on India's trade value to the member countries of SAARC.

H_{07}: There is no impact of the globalization index of the member countries of SAARC on India's trade value to the member countries.

H_{A7}: There is a positive impact of the globalization index of the member countries of SAARC on India's trade value to the member countries.

5. Estimates

The trade relationship of India with the member countries of SAARC has been analysed here by using the gravity model of international trade. The panel data analysis has been used to capture the country-wise heterogeneity over time. So, the model will reveal the average trade flow of India to the member countries of SAARC over time. The study is based on these variables, TV, Y_H, Y_F, D_{HF}, E_H, E_F, G_H and G_F, where TV is the trade value of India with the member countries, Y_H is the GDP of India, Y_F is the GDP of member countries, D be the distance between the India and member countries, E_H and E_F are the exchange rate of India and member countries respectively and G_H and G_F are the globalization index value of India and member countries. After the log transformation, we have calculated the correlation matrix of each variable, which is depicted in the table 2. The table-2 shows the correlation of the variables under consideration. Here LnTV is the dependent variable, and LnY_H, LnY_F, LnD, LnE_H, LnE_F, $LnGI_H$ and $LnGI_F$ are the explanatory variables. The higher correlation between explanatory variable lead to the multicollinearity problem, the value of the correlation of the explanatory variable must be less than 0.80. Here all the variables have relatively less correlation (less than 0.80), implied we can use these variables for econometric analysis.

5.1 Estimated Result of Gravity Trade Model

The table-3 shows the estimated result of the augmented gravity trade model by using pooled OLS method. The Pooled OLS method neglects the cross-section and time-series nature of the data and estimates the model by using the Ordinary Least Square method. That is, it estimates the model by ignoring the cross-sectional and time-series heterogeneity. Here the GDP of India (Y_H) and the GDP of member countries (Y_F) both are positively related to the trade value of India with one percent level of significance, that is, an increase in the GDP of either India or any member country leads to increase in the trade value of India with the member countries of SAARC. Now, the distance between India and member countries (D) has a significant and positive impact on the trade value of India, which is not economically justifiable. The exchange rate of India (E_H) negatively and substantially influences the trade value, that is an increase in the India's exchange rate leads to decrease in the trade value, while the exchange rate of member countries (E_F) positively and

substantially influences the trade value, that is an increase in the exchange rate of the member countries leads to increase in the trade value. Now, the globalization index of India (GI_H) and the same of member countries (GI_F) have a significant and positive impact on the trade value of India, that is, as India or any member country become more and more globalized, the level of trade between countries will also be increased. The overall model is also significant with the coefficient of determination of 0.8205, that is 82 percent of the variation in the trade value of India with the member countries is being explained by this gravity model under the pooled model.

The pooled OLS method does not distinguish the cross-sectional and time-series nature of the panel data, implied it is unable to reduce the heterogeneity problem of the gravity model in the presence of individual and time effects. That is, the estimated results would be biased and inconsistent. The heteroskedasticity of the pooled model can be tested by using white-test. The table-4 shows the statistic value of the white-test. Here the value of the statistic is 129.71, with probability value less than 0.01, implied the statistic is significant at one percent level of significance. Therefore, we conclude that null hypothesis of homoskedasticity is rejected and there is problem of heteroskedasticity, which makes the model inappropriate. Therefore, we have to go for Fixed Effect Model (FEM) and Random Effect Model (REM) to reduce the problem as well as to get more reliable estimators of the model.

Subsequently, the estimated results of the model by Fixed Effect Model (FEM) method and Random Effect Model (REM) method are also revealed in the table-5 and table-6. The FEM assumes there is a fixed unobserved heterogeneity across cross-section units and the REM assumes the same but its random. Therefore, both the models consider the unobserved heterogeneity. Let's analyse the result of the model under FEM method and then under REM method. Here also the GDP of India (Y_H) and the GDP of member countries (Y_F) have positively and significantly impact the trade value of India. Now, the exchange rate of India (E_H) as well as the exchange rate of member countries (E_F) are negatively and insignificantly related to the trade value, while the distance (D) is completely excluded because of the collinearity problem. The globalization index of India (GI_H) as well as the same of member countries (GI_F) have a significant and positive impact on the trade value of India. The overall model is also significant. The Hausman Specification test can be used to judge the consistency of the model between FEM and REM. The estimated result of the moden under REM is shown in the table-6. Now, to choose the appropriate model between

FEM and REM, Hausman test can be used. From the Table-6 the value of the statistic is 2.77 with a p-value of 0.8376, implied that the test accepts the null hypothesis that differences in coefficients are unsystematic and estimators of REM are efficient and consistent. So, as per the result, the REM is more appropriate as compared to the FEM to estimate the gravity model. Now, to check the consistency between pooled and REM model the Breusch Pagan LM test is used. The REM considers the unobserved heterogeneity, which is random and the test is used to determine whether random effects are significant in the panel data or not. Because ignoring heterogeneity leads to biased and inconsistent results. Here, the value of LM statistic is 973.29 with a p-value of 0.000. The result is significant at 1% level which implies that it rejects the null hypothesis. Thus there is no individual effect in the panel and concludes that there is a significant random effect. Therefore, REM is appropriate for the estimation of the gravity model.

So, both the tests confirmed that the REM is more appropriate to estimate the gravity trade model and will produce unbiased and consistent estimators. Therefore, we will use the REM method to analyse India's trade with the member countries of SAARC. The table-6 also shows the estimated result of REM, as per the result the trade value of India to the member countries of SAARC is positively and significantly influenced by the GDP of India (Y_H) and the GDP of the member countries (Y_F), which justifies the theoretical background of the gravity model of international trade. The result shows that 1% percent increase in India's GDP leads to a 0.84% increase in the trade value of India. On the other hand, 1% percent increase in member country's GDP leads to a 0.49% increase in the trade value of India. Implied India's GDP has more impact as compared to the member county's GDP to influence the trade value of India. Moreover, the distance between India to member countries of SAARC is negatively related to the trade value, but it is statistically insignificant. Which also justifies the conclusion of gravity model but the distance variable is irrelevant to explain the trade flow of India to the member countries of SAARC. Similarly, the exchange rate of India (E_H) is negatively related to the trade value, and the member country's exchange rate (E_F) is positively related to the trade value. Moreover, both of them are statically insignificant to explain the trade value of India. Now, the globalization index of India (G_H) as well as the globalization index of member countries (G_F) are positively and significantly related to the trade value of India. It is a composite index covering a nation's social, economic, and political aspects, which play a major role in influencing the trade flow of a nation. The result shows that a one percent increase in the globalization index of

India (G_H) leads to an increase in the trade value by 1.07% and a one percent increase in the globalization index of the member countries (G_F) leads to an increase in the trade value by 0.79%, that is as the countries are getting more and more globalized the trade value of India with the member countries of SAARC increases. Moreover, India's globalization index has more impact on the trade value as compared to the globalization index of the member countries. Now, the overall model is significant at the 1% level of significance as the value of the statistic Wald-Chi2 is 719.66 with a p-value of 0.000. Implied the model is significant and all the coefficients of the variables are jointly different from zero at 1% level of significance, which justifies our augmented gravity model of international trade.

6. Conclusions

In this paper we tried to analyse the bilateral trade relationship of India with the member countries of SAARC during 1991 to 2020. Here gravity model of international trade were used to analyse the trade flow. India's exports to the member countries of SAARC and the imports from the member countries of SAARC have increased many folds during the study period. But its export share and import share both are relatively low as compared to the rest of the world. The gravity model found that India's GDP (Y_H), member countries GDP (Y_F), India's globalization (GI_H) and member countries globalization (GI_F) are significant and positively related to the trade value of India with the member countries of SAARC. On the other hand, distance (D) and exchange rates India and member country (E_H and E_F) are insignificant. Therefore, as the economic size of India and member countries increase which also increase the trade value and as the countries become more and more globalized which also increase the level of trade. Thus, the study concludes that most of the variables are significant to influence the trade flow of India with the member countries of SAARC and also justify the gravity model of international trade. Here globalization is the significant factor for India to increase its trade flow to the member countries. That is, if countries will be more globalized, the trade relation between India and the member countries will also be increased. Therefore, countries should liberalize their foreign policies and also should established good political relations in order to increase their trade relations. Because all the member countries are neighbouring country implied distance between India and the member country will not be the problem. Therefore, member country can increase their trade by reducing their mutual trade restrictions and by establishing good political relations.

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Table 1: List of Variables

Variables	Data Sources
Trade Value of India (TV)	UN Comtrade
GDP of India (Y_H)	World Development Indicator, World Bank Database
GDP of Member Countries (Y_F)	World Development Indicator, World Bank Database
Geographical Distance Between India and Member Countries (D)	CEPII, GeoDist database
Exchange Rate of India (E_H)	World Development Indicator, World Bank database and CEIC Data Global database.
Exchange Rate of Member Countries (E_F)	World Development Indicator, World Bank database and CEIC Data Global database.
Globalization Index of India (GI_H)	ETH Zurich database
Globalization Index of member countries (GI_F)	ETH Zurich database

Source: Author's Calculation.

Table 2: Correlation Matrix of the Gravity Variables

	LnTV	LnY_H	LnY_F	LnD	LnE_H	LnE_F	$LnGI_H$	$LnGI_F$
LnTV	1.0000							
LnY_H	0.4274	1.0000						
LnY_F	0.7594	0.1424	1.0000					
LnD	-0.1892	0.0000	-0.3120	1.0000				
LnE_H	0.3568	0.6416	0.1109	0.0000	1.0000			
LnE_F	0.7709	0.3376	0.5728	-0.4035	0.4359	1.0000		
$LnGI_H$	0.4056	0.7236	0.1130	0.0000	0.6872	0.3975	1.0000	
$LnGI_F$	0.6947	0.5983	0.6248	0.1584	0.5694	0.4533	0.5935	1.0000

Source: Author's Calculation.

Table 3: Estimated Result of Augmented Gravity Trade Model by Pooled OLS

Variables	**Pooled OLS**	**t-value**	**p-value**
Constant (á)	-17.7367***	(-4.82)	(0.000)
LnY_H	0.8392***	2.92	(0.004)
LnY_F	0.3311***	6.80	(0.000)
LnD	0.3964***	2.98	(0.003)
LnE_H	-1.1748***	(-3.61)	(0.000)
LnE_F	1.1606***	11.84	(0.000)
$LnGI_H$	1.0571***	2.65	(0.009)
$LnGI_F$	0.5639*	1.78	(0.076)
F-Statistic	136.50*** (0.000)		
R^2: Overall	0.8205		

Source: Author's Calculation.

Note: *** and * denote the level of significance at 1% and 10% respectively. The values in parenthesis are the p-values of related coefficients of parameters.

Table 4: Heteroskedasticity Result of White Test

Chi Square (S^2)	129.71
Probability Value (Prob > S^2)	0.0000 < 0.01

Source: Author's Calculation.

Table 5: Estimated Result of Augmented Gravity Trade Model by Fixed Effect Model (FEM)

Variables	**Fixed Effect Model (FEM)**	**t-value**	**p-value**
Constant (á)	-17.0838***	(-5.99)	(0.000)
LnY_H	0.9541***	3.09	(0.002)
LnY_F	0.4359***	2.74	(0.007)
LnD	Omitted		
LnE_H	-0.2516	(-0.69)	(0.490)
LnE_F	-0.0374	(-0.12)	(0.902)
$LnGI_H$	1.0766***	4.46	(0.000)
$LnGI_F$	0.7436***	2.74	(0.007)
F-Statistic	118.11***		(0.000)
R2: Overall Within Between	0.6865 0.7765 0.6548		
F-Statistic (u_i=0)	69.39*** (0.000)		

Source: Author's Calculation.

Note: *** and * denote the level of significance at 1% and 10% respectively. The values in parenthesis are the p-values of related coefficients of parameters.

Table 6: Estimated Result of Augmented Gravity Trade Model by Random Effect Model (REM)

Variables	**Random Effect Model (REM)**	**z-value**	**p-value**
Constant (á)	-16.0056***	(-2.88)	(0.004)
LnY_H	0.8447***	3.44	(0.001)
LnY_F	0.4870***	4.36	(0.000)
LnD	-0.0245	(-0.03)	(0.973)
LnE_H	-0.4045	(-1.38)	(0.167)
LnE_F	0.1157	0.51	(0.609)
$LnGI_H$	1.0671***	4.42	(0.000)
$LnGI_F$	0.7875***	2.98	(0.003)
Wald - (S^2)		719.66***	(0.000)
R2: Overall Within Between	0.7212 0.7762 0.7003		
Hausman Statistic (S^2)	2.77(0.8376)		
LM Statistic (S^2)	973.29***(0.0000)		

Source: Author's Calculation.

Note: *** and * denote the level of significance at 1% and 10% respectively. The values in parenthesis are the p-values of related coefficients of parameters.

Drivers and Barriers to Non-Farm Employment in India: Issues and Evidence from Selected Villages in West Bengal

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Abstract

Non-farm activities have contributed significantly to the development of rural economies in India. According to the recent Periodic Labor Force Survey 2022-2023, non-farm activities employ over 54 per cent of India's rural and urban populations. This study examines the socioeconomic factors that influence and impede nonfarm activities in the state of West Bengal. The study uses primary data collected through multi-stage stratified sampling from 400 households spread across ten villages from five districts in West Bengal. A binary logistic regression is used to analyse the determinants of nonfarm activities. The findings indicate that the number of male household members, higher educational attainment, work experience, vocational training and household size all have a positive impact on nonfarm activities. However, the implementation of programs such as MGNREGA, a lack of formal education and training, a poor asset base and a greater distance from urban centers all contribute to a decline in nonfarm activities. The paper contends that nonfarm activities at the village level should be encouraged to support larger household sizes and more vocational training centers should be established at the village level to capitalize on the demographic dividend.

Keywords: *Rural Development, Non-farm Employment, Employment Choice, Livelihood Diversification, Mgnrega*

JEL Classification: C51, J43, O1

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1. Introduction

The agricultural sector in developing countries struggles to meet rural employment demands (Basole, 2017), prompting workers to seek jobs in urban areas. However, high living costs and skill deficits hinder their success. Non-farm employment (NFE) provides an alternative for rural job seekers, encompassing sectors like mining, construction, manufacturing, and healthcare (Haggblade et al., 2010). NFE opportunities are influenced by various factors such as demographics, economics, and geography. For instance, older age can limit participation in physically demanding agricultural tasks, while increased household income, education and family size can boost NFE. However, barriers arise when job access is distant from villages. In India, the non-farm sector has seen significant growth, contributing to 55.9% of output and 34.8% of employment in rural areas (Kumar et al., 2020). A notable 39% of rural households engage in NFE (Sabreen & Behera, 2021). West Bengal saw a decline in agriculture followed by an increase in NFE (Das et al., 2020). Despite this increase, India's urbanization rate remains low at 31.2% (Punyamurthy & Bheenaveni, 2023), indicating untapped potential in the non-farm sector. This study focuses on the determinants and barriers to NFE in rural West Bengal, based on a primary survey conducted from 2021-2022. A stratified multi-stage random sampling method was used to select ten villages across five districts. The drivers and entry barriers are estimated using a logistic regression model.

The organization of the paper is as follows. Section 2 offers a brief review of the existing literature. Section 3 explicates our sampling method and the basic methodology we deploy to estimate the determinants and barriers to NFE in West Bengal. Results are elaborated upon in section 4 followed by policy implication in section 5. Finally, section 6 concludes.

2. Literature Review

To understand the importance of non-farm employment (NFE) in the economy, we can refer to economic development theories. Arthur Lewis categorized the economy into two sectors: manufacturing (capitalist) and labor-surplus (subsistence), with agriculture often showing low wages and productivity (Kindleberger, 1988; Fields, 2004). Underdeveloped nations typically experience an unlimited labor supply (Gollin, 2014). Lewis argued that

improving the unemployment rate relies on transferring surplus labor from agriculture to industry. The Fei-Ranis theory supports this by suggesting that only a limited workforce is needed in agriculture, while the Clark-Fisher model (1930) emphasizes the necessity for workers to transition from the subsistence to the capitalist sector for sustained economic development (Mukherjee, 2018).

Rural NFEs can help alleviate poverty, reduce rural-to-urban migration and create jobs in developing nations (Lanjouw, 2001; Lanjouw and Feder, 2001). In rural Ethiopia, Gutema (2019) found that female-headed households are more active in NFEs than male-headed ones. Tshabalala and Sidique (2020) identified key factors influencing NFE participation, including household size, access to credit, social capital and market proximity. Olugbire et al. (2020) noted that male-headed households with higher education in rural Nigeria are more likely to engage in NFEs. Similarly, access to credit boosts diversification prospects in Bangladesh (Salam and Bauer, 2020). Lanjouw and Sharrif (2004) found that wealthier households in India typically engage in salaried NFE. Das (2017) noted a positive link between educational attainment and non-farm employment in Assam. Jatav and Sen (2013) identified barriers to entry in NFE based on age, gender and education using NSSO data. Khatun and Roy (2016) indicated that livelihood diversification reduces poverty and improves economic conditions. Furthermore, studies show that NFE enhances household economic resilience amidst challenges like low agricultural productivity and climate change (Das, 2017; Pramanik, 2021). Singh (2020) found that household participation in non-farm activities was hindered by factors such as gender, caste, and lack of education. Additionally, villages clustering around sub-urban regions experience higher NFE (Choithani et.al, 2021). Ghosh and Ghosal (2021) found that distance to town, food insecurity and land size influence non-farm work participation. Banik and Barai (2023) examined challenges in the agricultural sector of India and Bangladesh, highlighting the role of non-farm enterprises in sustainable rural livelihoods. Pattayat and Parida (2024) identified improved infrastructure and policies like MGNREGA and NRLM as key drivers of rural non-farm enterprises in India.

The topic of rural NFE has received significant attention, yet several research gaps remain. Most studies rely on outdated secondary data and focus on a limited number of districts, which may not reflect the broader situation in a state. While some research discusses national drivers of NFE, they often neglect unique, state-specific factors and few address entry barriers in West Bengal. This study enhances the literature by analysing the drivers

and entry barriers to rural NFE in West Bengal. It explores socio-economic and village-specific factors, such as urban proximity, vocational training and the role of the MGNREGA program. Additionally, we examine gender disparities in NFE and propose solutions, alongside investigating a skill development program aimed at increasing NFE in the region.

3. Data and Methodology

Sampling Design

The primary survey was conducted in five districts of West Bengal—Howrah, Nadia, Hooghly, North 24 Parganas, and South 24 Parganas—from 2021 to 2022. The study used both primary data, collected on demographics, income, wealth and education, and secondary data from the 2011 Census of India (see Table 1). Ten villages (refer to Table 1) were selected from the five districts of West Bengal. The selection of these villages was based on the idea that being near urban areas, like census towns, enhances non-farm employment opportunities (Unni, 1991). These villages exhibited a higher level of non-farm activities, as illustrated in Figure 1. The total number of households in the 10 villages was 9,199. The sample size is determined using Taro Yamane's formula. The formula is given by:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size, N = total number of households of our selected villages, and e = margin of error at 5%. Yamane's formula yields 383.3316 ~ 384 households.

We conducted a survey involving 400 households and 1,588 respondents, using a stratified sampling method. Districts were the sampling units in the first stage, followed by blocks in the second stage, villages in the third stage and households in the fourth. We assigned sample sizes to each stratum using the formula from Scheaffer et al. (2011).

$$n_i = n\left(\frac{N_h\sigma_h / \sqrt{c_h}}{\sum_{k=1}^{L} N_k\sigma_k / \sqrt{c_k}}\right)$$

Where N_h: Size of the ith stratum (indicates the number of village households per stratum), $ó_h$: variance of the ith stratum (households), C_h: Cost of obtaining an observation from the ith stratum (cost of obtaining observation from each village), n: sample size.

Econometric Model

Discrete choice models are used for categorical outcomes. Logistic regression applies to binary dependent variables, while multinomial logit models are for those with three categories. In our analysis, the employment choice is binary: it takes a value of 1 for NFE and 0 for farm work. The logit model takes the following form:

$$In\left(\frac{P}{1-P}\right) = Z_i$$

Where, $\text{In}\left(\frac{P}{1-P}\right)$ is the log odds ratio and $Z_i = \alpha + \beta X_{i,}$ where Z is the dependent variable and X_i denotes the vector of independent variables, then α and β signify the intercept and slope respectively. P represents the probability of statistical success for non-farm households and 1-P represents the probability of failure for farm households. We aim to explore the relationship between non-farm employment participation and various factors such as demographics, education, employment, income and location. Using existing literature, we establish the expected sign of each variable which is detailed in Table 1. We expect a positive relationship between age and non-farm participation, as older individuals are likely to engage in less physically demanding activities compared to agriculture. While Kumar et al. (2011) found that age negatively affects entry into the non-farm sector, our expectations are consistent with Stifel (2010), who argues that elderly individuals are more inclined to pursue non-farm work. Higher education levels are associated with increased participation in non-farm activities. Additionally, research indicates that male members in a household often boost non-farm engagement, while women tend to be restricted to household chores and farming. Although Pandey et al. (2002) found instances where women participated more in non-farm activities in some regions of Madhya Pradesh, limited job opportunities may require women to commute for work. Overall, we assume that male-headed households and male members are more likely to engage in non-farm activities.

Household members are more likely to engage in nonfarm work with larger household sizes or higher dependency ratios, indicating a positive relationship. Higher family expenditure correlates with increased income, allowing households to invest in nonfarm businesses. Nonfarm work spans all castes, consistent with Pandi (2015). Conversely, greater distances to industries, railway stations and urban areas can discourage participation,

according to Salam and Bauer (2020). Table 5 in the appendix summarizes the variables, showing the average working age of surveyed households is 38 years, with education ranging from two to eighteen years. The average monthly family expenditure is Rs 925.08, and the average household size consists of four members, with villages located about 14 km from urban areas.

Table 1 : Explanation of Variables

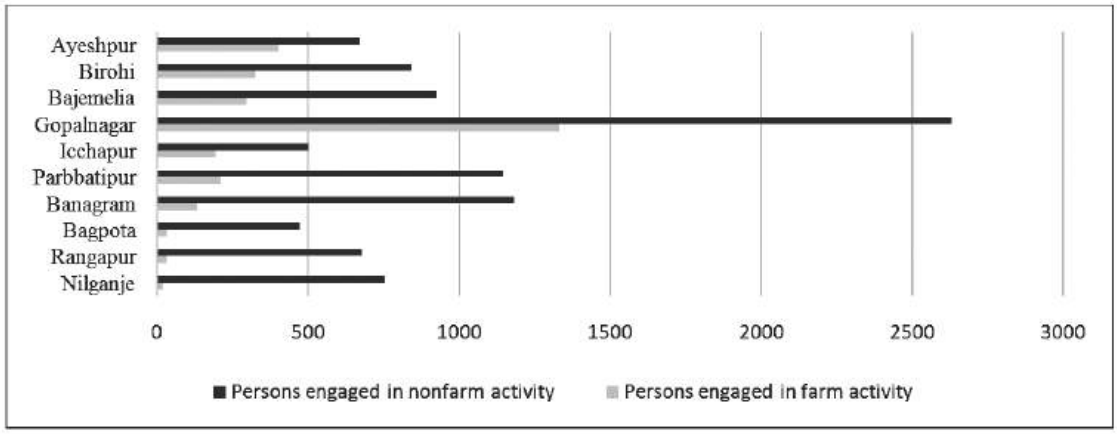
Variables and Notation	Measurement	Expected Sign
Employment choice	1: Performs non-farm work 0: Performs farm work	
Independent variables		
	Demographic variables	
Age (X1)	Age of the household members in years	+
Gender (X2)	Dummy variable, 1: Male, 0: Female	+
Marital status (X3)	Dummy variable, 1: Married, 0: unmarried	+
Household size (X4)	Household size refers to the absolute number of people residing in the family	+
	Educational attainment variables	
Years of education (X5)	Refers to the total years of education	+
Household head years of education (X6)	Refers to the total years of education for the household head for each family	+
	Employment variables	
Work experience of household head (X7)	Total work experience of household head in years	+
Dependency ratio (X8)	The dependency ratio is measured in percentage	+
	Mahatma Gandhi National Rural Employee Guarantee Act program	

Variables and Notation	Measurement	Expected Sign
MGNREGA (X9)	Dummy variable, 1: participate, 0: otherwise	+
Vocational training (X10)	Job-oriented training for youth Dummy variable, 1: Training taken, 0: otherwise	+
	Income & Wealth variables	
Monthly expenditure (X11)	Total monthly expenditure in INR	+
Total asset value (X12)	Total asset value in INR	+
	Village level variables	
Population density (X13)	Population per square Kilometres (Kms.)	+
Net area sown (X14)	Total land sown for crops	-
Land under non-agricultural use (X15)	Total land used for non-agricultural purpose	+
	Distance variables	
Workplace distance (X16)	Distance from home to workplace in Kms.	-
Distance to bus stand (X17)	Distance from home to nearest bus stand in Kms.	-
Distance to railway station (X18)	Distance from home to nearest railway station in Kms.	-
Distance to urban region (X19)	Distance from nearest large city in Kms.	-

4. Empirical Analysis and Results

Figure 1 shows farm and non-farm activities in selected villages. Farm activities mainly involve crop cultivation, while non-farm work includes household industries and other non-agricultural occupations. The data indicates that non-farm activities are more common in these villages, based on the 2011 census**.**

Figure 1: Employment status of the selected villages (total number)



(Source: Author's calculation based on the Village and Town Wise Primary Census Abstract data, GoI, 2021)

The survey data showed that 84 per cent of individuals in the surveyed villages were engaged in nonfarm activities, while just 16 per cent were involved in farming. This suggests a shift from agriculture to non-agricultural pursuits, with most non-farm activities performed by male household members.

Table 2 : Employment in Farm and Non-farm activities (in %)

Employment type	Female	Male	Total
Farm	6	10	16
Non-farm	15	69	84
Total	21	79	100

(Source: Author's calculation from survey data)

Table 3 summarizes employment categories from our primary survey. Self-employed activities encompass both farm and non-farm activities that run on one's investments.

Regular wage employment is typically characterized by fixed working hours, regular payment, social security benefits and employment contract. Among the self-employed, 21 per cent of businesses are run by men. In regular salaried roles, 15 per cent of men are employed, compared to 3 per cent of women. Men also make up 43 per cent of casual employees, while women account for only 16 per cent.

Employment category (in %)	Male	Female	Persons
1. Self-employed (%)	21	2	23
2. Regular salaried (%)	15	3	18
3. Casual workers (%)	43	16	59
Total workers (1+2+3)	79	21	100

Table 3: Employment Categories (in %)

(Source: Author's calculation from survey data)

Research shows that high-paying nonfarm jobs generally require higher education, especially for salaried positions, whereas self-employment in nonfarm businesses requires sufficient capital (Mech et al., 2017; Das, 2017). Most male and female students complete primary and upper primary education, but fewer women attain secondary education compared to men. Overall, 69% of individuals complete seven years of schooling and only 25% complete eight to thirteen years. This educational gap contributes to the prevalence of casual jobs, which require less education, and limits women's participation in nonfarm activities.

Determinants and Barriers to Non-farm Employment

The logit model results highlight several significant variables that align with our expectations: gender (male), household size, education years, work experience, age, monthly expenditure, total asset value, vocational training, MGNREGA participation and city distance. Table 4 also highlights entry barriers related to education, asset base, vocational training, population density, distance to urban areas and government scheme implementation. Addressing these factors can enhance NFE opportunities in rural West Bengal. Table 4 shows the marginal effects of these variables, with standard errors in parentheses. The Variance Inflation Factor (VIF) is 1.89, indicating no multicollinearity

among the variables and individual VIF values are detailed in Table 5 of the appendix. The model's goodness of fit was evaluated using the Hosmer-Lemeshow statistic, yielding a value of 0.35, which exceeds the 0.05 significance level, confirming the model's suitability for logistic regression.

The study found that age is positively associated with participation in non-farm employment (NFE), with an average working age of 39 years in the surveyed village. Older individuals often struggle with manual agricultural work, leading them to seek employment outside agriculture. Additionally, an increase in household size correlates with a 0.0248% rise in NFE participation indicating that larger families in rural areas tend to have lower living standards. In 2011, India's average household size was 4.91, compared to China's 2.87 (Nayak & Behera, 2014). Promoting more rewarding non-farm work is crucial for supporting these families. Furthermore, the number of years of education is positively significant at the 1% level, enabling households to shift to non-farm activities through acquired skills. Lower education levels often lead households to low-return casual work or agricultural wage labor indicating that less education drives individuals to seek casual jobs. Higher education is essential for securing well-paying non-farm jobs. However, the poor quality of education in rural areas often hinders students' success while these schools face teacher shortages and outdated infrastructure. Addressing these issues, such as improving facilities and access to resources like computer education can help close the educational gap between rural and urban areas.

Furthermore, regression analysis shows that NFE is influenced by the household head's work experience and positively correlates with asset value. Starting a self-employed non-farm business requires initial household wealth and access to credit, ultimately leading to greater asset accumulation. The variable "monthly expenditure" positively impacts NFE, as higher expenditures enable households to engage in nearby rural non-farm businesses. Additionally, the education level of the household head correlates positively with NFE, suggesting that educated heads are more inclined to participate in non-farm work. Our findings reveal that vocational training significantly encourages participation in non-farm activities, with a noteworthy coefficient at the 1% level. Nonetheless, the absence of vocational training can serve as one of the entry barriers to NFE. Interestingly, a positive relationship exists between NFE and the distance to bus stands. This may seem counterintuitive, but it likely stems from the need for households involved in NFE to

travel further to purchase materials from distant markets, using buses for transportation, especially in areas far from bus stops. This indicates that the positive association is linked to travel requirements rather than a detrimental effect of distance.

The distance to urban areas serves as an indicator of constraints on non-farm activities. Studies indicate that non-farm engagement increases closer to urban centres (Atamanov & Van den Berg, 2012; Damena & Habte, 2017). Villages located near urban centres benefit from easier access to markets, shorter commuting times, and access to high-quality educational institutions and vocational training centres. Additionally, the proximity of these villages to urban areas enables household members to pursue both farming and non-farming jobs simultaneously. Model shows NFE decreases as villages are away from urban regions at 5% significance level. In our surveyed villages, the average distance to urban areas was around 14 kilometres. This suggests that as distance increases, households are less likely to engage in non-farm activities due to higher transportation costs and commuting times. Remote villages face the greatest challenges despite some access to local transportation.

Our logit model shows that male family members have a positive association with NFE and are more likely to commute to nearby villages or urban areas for work. Specifically, each additional male family member increases the likelihood of participation in non-farm activities by 0.15 per cent. The model reveals a negative relationship between NFE and MGNREGA, contrary to our expectations. MGNREGA involves casual non-farm work, but it suffers from limited job opportunities throughout the year and irregular wage payments. Consequently, households are seeking more stable non-farm jobs with consistent salaries. Research in eastern India shows that higher asset holdings are positively linked to participation in non-farm work (Bhattacharjee & Behera, 2018; Nakajima et al., 2018; Bhuyan & Mitra, 2018; Bhushan et al., 2019). Increased assets improve households' creditworthiness, fostering greater involvement in rural non-farm activities. Thus, insufficient capital can hinder self-employment opportunities in this sector. The findings suggest that as population density increases in villages, non-farm activities decline due to heightened competition for limited jobs. To address this issue, it is crucial to increase non-farm activities in these areas.

Table 4: Regression Estimates (Marginal Effects of Binary Logit model)

Dependent variable: Employment Choice (1: Nonfarm, 0: Farm work)	
Demographic factors	**Marginal Effects**
Age	0.00251*
	(-0.00141)
Male	0.0917**
	(-0.0448)
Married	-0.00431
	(-0.0389)
Household size	0.0248*
	(-0.0149)
Years of education	0.0235**
	(-0.0115)
Household head years of education	0.0213***
	(-0.00747)
Village level factors	
Population density	-0.000192*
	(-0.000108)
Net area sown	-0.000764*
	(-0.000442)
Land under non-agricultural use	-0.00184
	(-0.00127)
Employment factors	
Work experience of HH head	0.00328**
	(-0.00165)
Dependency ratio	0.000317
	(-0.000397)

Dependent variable: Employment Choice (1: Nonfarm, 0: Farm work)	
MGNREGA	-0.126***
	(-0.0483)
Vocational Training	0.176***
	(-0.0397)
Income and wealth factors	
Monthly expenditure	0.000399***
	(-8.21E-05)
Asset value	5.65e-06***
	(-1.07E-06)
Distance factors	
Workplace distance	0.0579***
	(-0.00873)
	(-0.13)
Bus stand distance	0.241***
	(-0.0642)
Railway station distance	0.00952
	(-0.00837)
Distance to urban region	-0.0611**
	(-0.0304)
LR chi2	296.78
Log-likelihood	-169.82909
Pseudo R square	0.4663
Mean VIF	1.89
Hosmer-Lemeshow statistic (Prob > chi2)	0.35
Observations	625

*** p<0.01, ** p<0.05, * p<0.1

(Source: Author's Calculation)

5. Discussion and Policy Implication

The findings show that most workers were employed as casual labourers. A concerted effort is required to create regular salaried and self-employed non-farm jobs. Regular salaried employment would necessitate higher educational attainment which would require effort on the part of both households and local governments. Easier access to credit through formal rural banking institutions can boost self-employment activities. The development of rural infrastructure is crucial for remote villages including internet access, electricity availability and roads that connect to national highways.

Our study reveals that only 21 per cent of women surveyed participate in the labor force. This low participation rate is primarily due to lower education levels which hinder their engagement in non-farm jobs. When non-farm jobs are located away from villages, women often face challenges related to commuting, including limited transportation options in remote areas. Safety concerns also discourage them from travelling long distances for work. Additionally, women have to manage household duties such as cooking, childcare, and other family responsibilities which further limits their ability to work outside the home. The existing educational gaps make it difficult for women to secure formal non-farm employment which tends to be concentrated near urban centers. To enhance women's participation in the labor force, policymakers have implemented several initiatives. For instance, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) mandates that at least 33 per cent of jobs be reserved for women within villages. The Mahila Kisan Sashaktikaran Pariyojana (MKSP) aims to create linkages between farming and non-farming activities, providing opportunities for women engaged in agriculture to transition to non-farm work such as agri-processing. Additionally, the Start-Up Village Entrepreneurship Program (SVEP) offers business management training and financial assistance to help women establish small rural businesses.

Survey findings indicate that 47 per cent of males and 27 per cent of females have participated in the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in a subsidiary capacity. Most workers in this program have low education levels, rendering them unskilled or semi-skilled. The wage rate for unskilled agricultural laborers in West Bengal is Rs 254 per day, while the wage under MGNREGA is Rs 223 (GoI, 2023a). Workers are typically employed for only 48 days under MGNREGA, which is significantly below the promised 100 days of work (GoI, 2023a). As households experience this shortfall and face issues with irregular wage payments (Manoj et al., 2018),

many are opting out of the scheme and returning to unpaid farm work. Consequently, the MGNREGA program struggles with funding challenges and administrative issues, leading households to seek alternative avenues for non-farm employment (NFE) that align with their aspirations for formal jobs. These jobs would provide not only a stable income but also defined working hours and social security benefits, such as paid leave and healthcare. In addition to MGNREGA work, greater emphasis should be placed on state-level urban employment generation programs for unemployed rural youth, as they often migrate to urban centers in search of job opportunities.

To harness the demographic dividend, it is essential to prioritize vocational training programs for young men and women aged 16 to 26 years. Access to such training encourages households to seek well-paying non-farm employment. In the villages surveyed, few vocational training centers offer skill development programs. These include basic computer training, mobile repair, small business management and logistics management, which were observed in the industrial city of Howrah. Additionally, food processing and packaging skills are typically offered in the Nadia district. In North 24 Parganas, there are training opportunities for data entry and telemarketing jobs, which are in high demand. However, these programs face certain challenges, such as gender disparities, especially in fields like electrical work. Furthermore, the certification for these courses often has limited value due to rapid technological advancements. The Government of West Bengal has launched several skill development initiatives. For instance, the Paschim Banga Society for Skill Development aims to provide training aligned with current industrial trends by offering high-quality information technology courses and free healthcare training for graduates. Lastly, the Government could leverage the potential of e-commerce companies by allowing them to establish warehouses in suburban or rural areas, which would create meaningful non-farm employment opportunities for young people in these regions.

Our logit model shows that the NFE decreases as villages are located farther from towns or cities. Additionally, the lack of proper transportation networks, such as railways, and limited road connectivity further exacerbate the situation. Policymakers should consider implementing several strategies to address these issues. For instance, prioritize reclassifying nearby villages as census towns if they meet specific criteria. This change would allow households to seek employment opportunities in the census towns instead of having to travel long distances for jobs. Furthermore, villages should focus on developing local enterprises that support small businesses, such as handicrafts and dairy processing plants.

These initiatives would benefit cattle farmers and create off-farm job opportunities within villages.

The present study has limitations, as certain choices were intentionally made to align with the research aims. Our study utilized cross-sectional data to examine the factors influencing the non-farm economy (NFE), which does not capture changes in this sector over time. Using longitudinal data would be helpful for two reasons: First, it would enable us to track the evolution of the non-farm sector over time. Second, longitudinal data would help in assessing the causal relationships between independent variables and NFE.

6. Conclusions

Researchers have noted a significant increase in non-farm employment (NFE) activities within the villages of West Bengal. This trend signifies a meaningful shift in rural livelihoods, driven by a complex interplay of various factors. In this paper, we look to identify the key factors influencing participation in NFE in rural West Bengal, thereby providing insights into the opportunities and challenges associated with non-farm employment in the region. Employing a multi-stage stratified sampling method, this cross-sectional study gathered data from 400 rural households across ten villages in five districts: Howrah, Nadia, Hooghly, North 24 Parganas, and South 24 Parganas. The analysis investigates factors that encourage or impede the decision to engage in non-farm activities, using a binary logistic regression model. Two primary findings appeared from the descriptive statistics: first, 59 per cent of households were engaged in casual non-farm labor, with female participation at 21 per cent compared to 79 per cent for males. The econometric analysis found several significant variables affecting participation, including gender (male), age, household size, educational attainment, work experience, income and wealth factors, vocational training, participation in the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), and distance from urban areas. Age has a positive effect on participation in non-farm activities and NFE tends to rise with the number of male members in the household. Furthermore, years of education, household size and the work experience of the household head all show a positive correlation with NFE, aligning with the expected trends outlined in Table 1. Lastly, both monthly expenditure and total asset value exhibit a positive and statistically significant relationship with non-farm employment. Conversely, an increase in village population, the implementation of MGNREGA and greater distances from urban centers contribute to a decrease in NFE participation.

This study leads to several policy recommendations. To begin with, the Government should prioritize the creation of non-farm employment opportunities in rural areas primarily focusing on self-employed and regular salaried jobs. Second, female education should be prioritized and jobs should be created in nearby towns. To increase women's participation, it is critical to promote women's education, encourage rural non-farm enterprises near small towns and villages, and ensure gender pay equity, particularly in the informal sector. Third, in addition to MGNREGA work, emphasis should be placed on state-level urban employment generation programs for the unemployed rural youth and the creation of formal jobs characterized by fixed working hours and social security benefits, such as paid leave and healthcare within villages.

Fourth, to take full advantage of the demographic dividend, vocational training programs should be prioritized for young men and women aged 16 to 26, ensuring that they align with current industry standards. Additionally, specific policies should be aimed at villages located away from major urban centers. This can be achieved through reclassification efforts and by supporting local enterprises, particularly by linking agricultural and non-agricultural activities. In conclusion, we believe there is still a dearth of comprehensive empirical research on the impact of non-farm employment on household well-being in West Bengal, which can be expanded upon to examine the role of non-farm activities as a catalyst for burgeoning peripheral urbanization.

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Appendix

Table 5

Variables	**Mean**	**Std. Dev.**	**Min**	**Max**	**CV (%)**	**VIF**
Age	38.86	11.59	17	72	68	1.87
Years of education	7.10	3.14	2	18	44	3.33
Population density	2057.84	715.02	711	4604	35	1.97
Net area sown	255.76	137.73	0	352	54	3.24
Area under non-agricultural use	64.93	27.95	16.4	172	43	1.64
Dependency ratio	25.27	33.40	0	200	132	1.25
Household size	4.36	1.63	1	10	37	1.42
HH years of education	6.61	2.93	2	15	44	3.24
Work experience of HH head	23.69	9.45	3	48	40	1.71
Monthly expenditure	925.08	514.66	300	4382	56	N.A.
Asset value	62031.84	78802.51	600	517000	127	1.56
Employment choice	.7936	.4050451	0	1	51	1.28
Workplace distance	5.55	7.87	1	55	142	1.24
Bus stand distance	2.94	0.47	2	4	16	1.75
Railway station distance	3.87	4.48	2	19	116	2.67
Distance to urban region	13.86	2.60	4	15	19	2.91

(Source: Author's calculation), Note: N.A. – Not applicable

Consumption Expenditure Pattern: With Special Reference to Scheduled Tribe Households in Assam

Dibyajyoti Sarmah[1], Kaushik Barman[2]

Abstract

Consumption expenditure pattern is the way to combine consumption categories to form a way of life. The study is a way to ascertain a close picture about socio-economic status and wellbeing of a group of population. To attain the socioeconomic parameters like equality, stability, social justice without discrimination can only be possible from the knowledge of consumption expenditure pattern of a certain part of population. A successful study on them can enhance the effectiveness of policy measures to carry out interventional as well as welfare measurements. Therefore, this study tries to explore the standard of living through consumption expenditure study on ST households in Assam. It also clarifies the different vulnerability aspects of ST households of Assam and their differences with other non-ST households. It will be helpful to find out different expected ways to remove this backwardness and to take initiatives to correct the social constraints.

Higher proportion of food consumption expenditure and low percentage of non-food consumption indicates a depressive status of wellbeing. Moreover, low expenditure in health and education indicates their inadequate attainment on basic social overhead. In the overall study, it is evident that the household size , land holding and gender are negatively significant with the household consumption expenditure. The paper is an initiative to explore the extent of wellbeing of ST households as compared with the other social groups in Assam and it will be helpful for researchers, policymakers to initiate appropriate remedies for upliftment of the vulnerable section of the society.

Keywords: *Consumption, Expenditure, Household, Tribe, Assam*

JEL Classification: D12 and P36

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1. Introduction

Consumption at present is considered as a reliable indicator of productivity, standard of living and wellbeing of a certain group of population over income. It is directly related with the intake of food item and non-food utilization by household in their day to day life (Mitra & Srivastav, 2024). The theory of consumer choice expresses that a consumer has different baskets of choices for final consumption, from which they pick up the items from more necessary to less in order to maximize their utility with the limited resources (Marshall, 1890). To whom we call is the consumption expenditure pattern of the consumer. Besides the limited economic resources, a large numbers of qualitative factors, like geographical location (Ha, 2006), environmental setup, religious faith (Subramanian & Deaton, 1991; Gupta & Mishra, 2014), traditional norms (MoTA, GoI, Report, 2014), cultural diversities (Young, 1998), household size (Jain, 1983) also works as constraints in consumption expenditure pattern and choice. These qualitative factors are also indispensible factors of consumption expenditure pattern analysis.

If we observe different consumption expenditure pattern studies, which basically intended to obtain standard of living and wellbeing, it witness a considerable consumption inequalities and differences among divers social-groups based on their socio-economic and cultural set ups. As observed by Nayak and Prasad (1984), a considerable inequalities in the standard of living between ST/SC and non-ST/non-SCs in Karnataka is well visible just like, consumption of commodities like tea, sugar and gur, fuel and lighting, milk and milk products consumption are observed to be lowest among the STs of Maharashtra. They consider these items to be luxurious (Sathe, 1971).

However, Saggar and Pan (1994) in their studies observed that SC/STs of Assam living in both rural and urban areas have a better socio-economic status as compared to other states. Mathew (2003) also observed the mean spending of SC households of Kerala are comparatively better than the national average. Therefore, a special study on wellbeing of ST household in Assam is necessary, because the ST households in Assam have its unique consumption patterns based on their ethnic backgrounds.

From pre-independent period, STs of Assam has been encountering a lots of socio-economic backwardness, socio-political conflicts with their identity crisis. Till date, they have been

suffering from massive backwardness in literacy rate, attainment to higher education, law availability of institutional healthcare facilities (Census, 2011). Moreover, their low use of non-clean fuel, open defecation, higher consumption of alcoholic intoxicants always has been the cause of increasing health hazard (MoTA, GoI, Report, 2014). Inadequate economic wellbeing being the prime cause of all the socio-economic, socio-political and ethnic identity adversities directly and indirectly linked with consumption expenditure pattern of ST household of Assam. This study will help us to focus on the impediments of those welfare bottlenecks that hinders in the wellbeing of ST households in Assam.

2. Materials and Methods

The study is basically based on secondary data of NSSO 68th round. It is also based on various government reports, publication, census report etc. Statistical tools like tabulation, diagrammatic presentations are applied to simplify the understanding by using IBM-SPSS software packages and MS-Excel datasheet. A multivariate regression model has been carried out to capture and to detect their extent with direction of relationship with the dependent variable.

3. Discussion and Results

In order to study the comparative consumption expenditure pattern of ST households, the comparative $MPCE_{MRP}$ on food and non-food status has been presented as follows.

Table - 01

Community-Wise Comparative Mean $MPCE_{MRP}$ (in 0.00)

It is obvious from the NSSO sampled data that the mean $MPCE_{MRP}$ for STs (₹1154) are

Social Group	Rural	Urban	Total
State Average	1117.00	2390.60	1277.33
ST	1076.96	2225.23	1154.50
Non-ST	1124.83	2390.60	1299.26

Source – Authors own Calculation, 68th round, type-I NSSO data

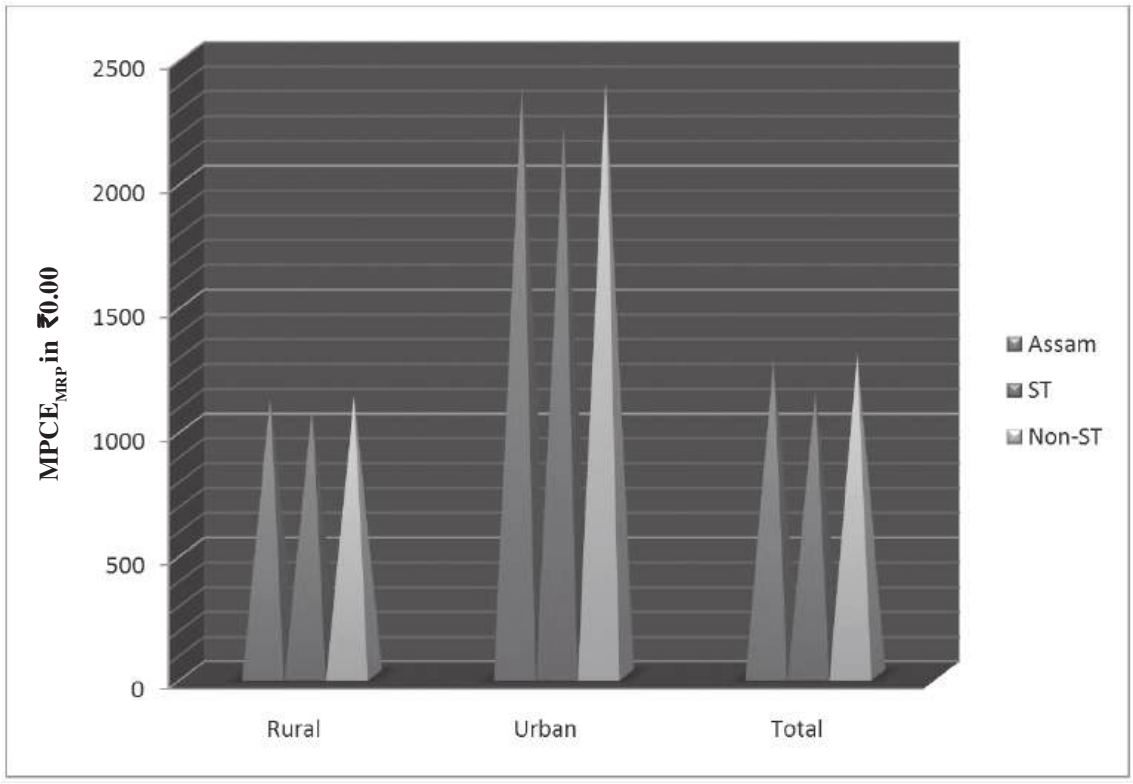

Figure 01: Rural-Urban MPCE$_{MRP}$ Differences across Social-Groups.

lower than the state overall (₹ 1277) and of non-STs (₹1300). It shows the similar trend, in both rural and urban STs, non-STs and for overall population. This shows that, STs have low consumption expenditure as compared to other communities.

3:02 **Comparative Households' Food-Consumption Expenditure across Social Groups –**

We can conceive an idea from general speculation that people belonging to higher income class are associated with healthier dietary component, which includes fruits, vegetables, oil and meat consumption (Gupta & Mishra, 2014). Notwithstanding, low earning households may also have it from household production, by dissaving (Johnson, 2004), from their permanent assets (Friedman 1957) or he may spend more by assuming that he will be rich in future. The analysis of household food expenditure on individual items will show clearly how total food expenditure has been allocated and define a consumption expenditure pattern. This can be present as following-

Table -02

Social-Group Wise Household Mean Food-Consumption Expenditure with its Respective Percentage in Assam (In- ₹ 0.00)

30 Days Food- Items Consumed	General	% of General	ST	% of ST	SC	% of SC	OBC	% of OBC	Assam Overall	% of Assam Overall
Cereal	999.86	29.96	1051.54	31.60	896.99	27.91	848.45	28.67	952.38	29.65
Pulses & Pulse Product	183.89	5.51	175.68	5.28	191.53	5.95	167.38	5.65	178.59	5.56
Milk & Milk Products	252.65	7.57	236.62	7.11	226.96	7.06	196.62	6.64	231.11	7.19
Salt & Sugar	79.03	2.36	79.06	2.73	77.49	2.41	72.14	2.43	76.85	2.40
Edible Oil	219.03	6.56	198.97	5.98	216.54	6.73	190.29	6.42	207.31	6.45
Egg, Fish & Meat	559.67	16.77	568.72	17.08	529.05	16.46	502.23	16.97	540.95	16.84
Vegetables	330.34	9.90	348.65	10.47	351.09	10.93	299.08	10.11	326.00	10.15
Fruits(Fresh)	82.40	2.46	65.84	1.98	97.54	3.03	69.70	2.36	77.74	2.42
Fruits(Dry)	13.08	0.39	4.76	0.14	5.85	0.18	4.84	0.16	8.67	0.26
Spices	109.93	3.29	100.88	3.03	105.72	3.28	97.52	3.29	104.49	3.25
Beverages(Non-Alcoholic)	93.67	2.80	74.60	2.24	91.22	2.83	83.33	2.82	87.52	2.72
Served Processed Food	145.83	4.37	125.93	3.78	138.94	4.32	151.57	5.12	143.84	4.47
Packaged Processed Food	113.55	3.40	98.06	2.95	133.73	4.16	106.66	3.61	111.29	3.46
Pan	88.40	2.64	78.25	2.35	84.25	2.62	81.81	2.76	84.52	2.63
Tobacco	53.33	1.60	44.63	1.34	40.91	1.27	33.36	1.12	44.87	1.39
Intoxicants(With Alcohol)	11.97	0.36	75.64	2.27	26.18	0.81	54.52	1.84	35.49	1.11
Total Food-Expenditure	3336.63	100	3327.84	100	3213.99	100	2959.51	100	3211.58	100
Per-Capita Food Consumption Expenditure	705.00	-	690.00	-	735.00	-	693.00	-	702.00	-

Source – Authors own Calculation, 68th round, type-I NSSO data.

The table reveals that among different social-groups, mean household food consumption expenditure is highest among general communities. ST households' are at 2nd highest food consumer in Assam. Their mean spending is highest on cereals (₹1051 or 31%), followed by egg-meat & fish (17%). 10% of expenditure spends on vegetables. Spending on tobacco, pan and other intoxicants is not negligible, which is approximately 6% of their total food consumption expenditure. ST households' of Assam regardless spends the largest share (62%) of their mean $MPCE_{MRP}$ on food consumption only (Table-02). It indicates that, they yet to fulfil the fundamental requirements as compared to non-ST households' (59%). Higher the percentage of expenditure make by households in their basic necessary items like food, it always indicates poorer life standard (Gupta & Mishra,2014) . Therefore, it is evident that the economic wellbeing of ST household is lagging behind. It can be illustrate with the help of the following figure.

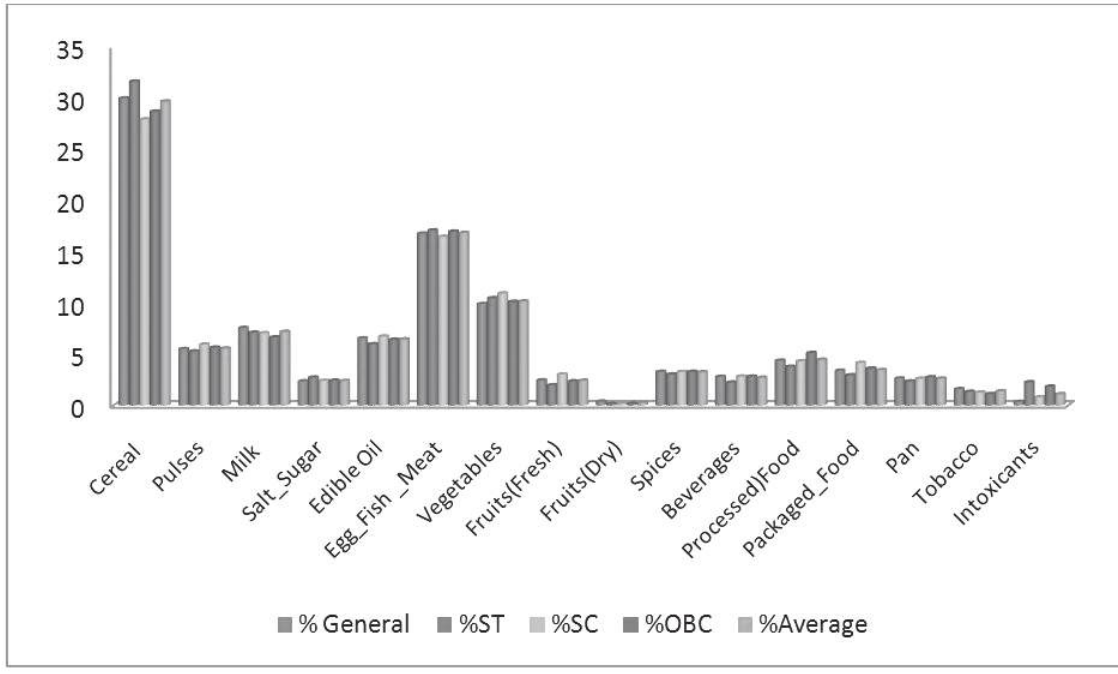

Figure 02: Food-Consumption Expenditure Pattern of Households' of Different Social-Groups (In %)

The complete scenario has been illustrated with the help of the Figure -: 02. The figure shows that ST households spend most of their food consumption expenditure on cereals,

egg-meat-fish and intoxicants (alcoholic). They make least of their food spending on packaged food, processed food, non-alcoholic beverages, spices, on edible oil, and on fruits. To whom they consider to be luxurious food items. Location wise expenditure trend may be different across communities. Similarly, we can examine the comparative non-food consumption expenditure amongst ST household as following.

3:03 Comparative Non-food Consumption Expenditure

Non-food consumption expenditure has no similar cause and effect relationships as it is in the food consumption expenditures. The diversion of households' consumption expenditure share from food to non-food always indicates a better standard of living and vice versa. Vis-à-vis, higher share of consumption expenditure spent on non-food consumption always indicates that the household has already overcome its fundamental requirements and tend to a better material well being. In general overview, the income elasticity of clothing, lighting, durables are positive. Therefore, from this perception these goods are considered as luxurious goods (Sathe, 1971). The consumption expenditure on non-food item is clear from the following table across the households of different social groups.

Table-03

Comparative Non-food Consumption Expenditure (₹ 0.00)

Item	ST		SC		OBC		General		All Assam	
Consumed	₹ 0.00	%	₹ 0.00	%	₹ 0.00	%	₹ 0.00	%	₹ 0.00	%
Clothing	4043.11	43.35	3687.55	36.27	3728.26	34.50	4196.62	36.89	3983.26	36.82
Bedding	406.73	4.36	379.87	3.73	402.24	3.67	401.23	3.52	400.15	3.69
Foot Wear	674.90	7.24	627.74	6.17	663.35	6.05	717.11	6.30	685.76	6.33
Education	1192.40	12.78	1984.83	19.52	2073.95	18.94	2073.72	18.23	1932.93	17.86
Medical	145.56	1.56	356.25	3.50	281.39	2.57	386.43	3.39	316.39	2.92
Durables	2863.54	30.71	3129.89	30.78	3798.56	34.69	3598.87	31.64	3499.51	32.34
Total	9326.24	100	10166.12	100	10947.75	100	11373.97	100	10817.99	100
Per-capita Non-Food Expenditure	1939.00	—	2375.00	—	2612.00	—	2549.00	—	2458.00	—

Source – Authors own Calculation, 68th round, type-I NSSO data

It is clear that the mean non-food consumption expenditures of ST households are lowest comparatively. The one year mean household spending by ST household on non-food item is only ₹ 9326 against the state average of ₹ 10818. Besides, the same is ₹ 10166, ₹ 10947 and ₹ 11373 respectively for SC, OBC and general households of Assam.

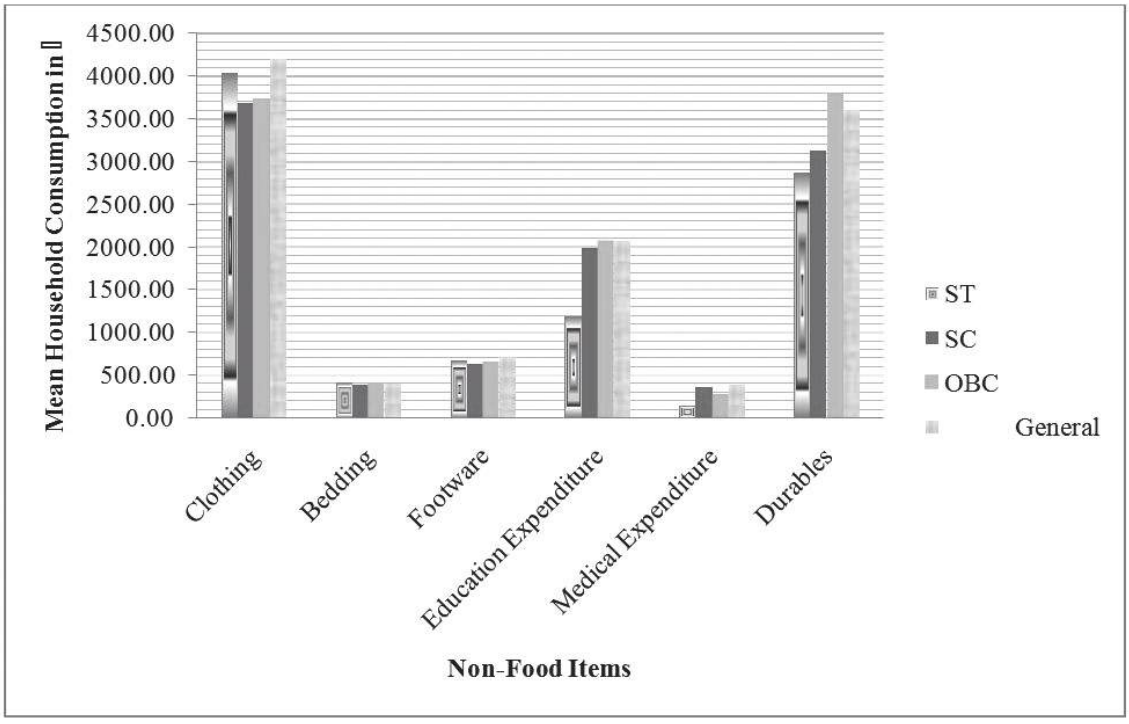

Figure 03: Non-Food Consumption Expenditure Patterns across Social Groups.

The figure illustrates that the ST households' have maximum expenditure share on clothing (43%). The pattern of clothing therefore imply that ST household till date makes the largest share of their total spending to fulfil the basic non-food requirements as compared to their non-ST counterparts.

On the other hand, they spend comparatively smallest amount on basic social overheads like education and health (institutional & non-institutional). It is evident that only 1.56% of non-food expenditure make by ST households' in health or medical head. ST households are lagging behind in educational expenditure (₹ 1192 or 12%) as compared to households of other social groups (state average spending is (₹ 1932 or 17%).

The mean health expenditure of ST household also clearly indicates the similar picture as it is in educational expenditure. The health expenditure is lowest for ST household. The lowest spending on medical may be because of (a)their tradition & ritual, non-availability of medical infrastructure with specialist doctors and lack of awareness (Report, 2014), (b)They consider medical & educational spending as luxurious (Subramanian and Deaton, 1991) and (c) their healthy physical structure they gained in their heredity, environment and lifestyle.

3:04 Education and Consumption Expenditure

Notwithstanding, household consumption decision and standard of living is mostly affected by the educational status of the household heads more than the overall literacy of the family. Therefore, interlink between education & expenditure is measured for the household heads. In order to track out how the different educational status has differential impact on $MPCE_{MRP}$ has been presented under the following table-

Table-04

Social-Group wise Percentage of Household-Heads in Different Educational Levels (In %)

Educational level	State Average	ST	SC	OBC	General
Illiterate	21.12	21.12	16.79	19.85	22.75
Below Primary	19.71	19.13	18.51	20.01	19.86
Primary	20.58	23.69	20.32	18.85	20.62
Middle(ME)	20.01	21.88	21.71	21.73	18.23
Secondary	10.24	8.80	13.88	10.81	9.38
Higher Secondary	5.62	4.01	5.50	6.11	6.03
Diploma/Certificate	0.11	0.00	0.10	0.12	0.11
Graduate	2.30	1.18	2.68	2.32	2.61
PG or Above	0.31	0.19	0.51	0.20	0.41
Total	100.00	100.00	100.00	100.00	100.00

Source – Authors own Calculation, 68th round, type-I NSSO data

The Table-04 indicates social-group wise percentage share of household heads in different educational level of total sampled data. Illiteracy amongst ST household head (21%) is lower than the general category (22%) for the same. However, illiteracy is high as compared

to OBC (19%) and SCs (16%). Attainment to higher education is considerably low among ST household heads. From the sampled data it is evident that, a small portion of ST household heads acquires high-school passed qualification or above, which is lowest as compared to all other social groups, i.e. SC, OBC & General.

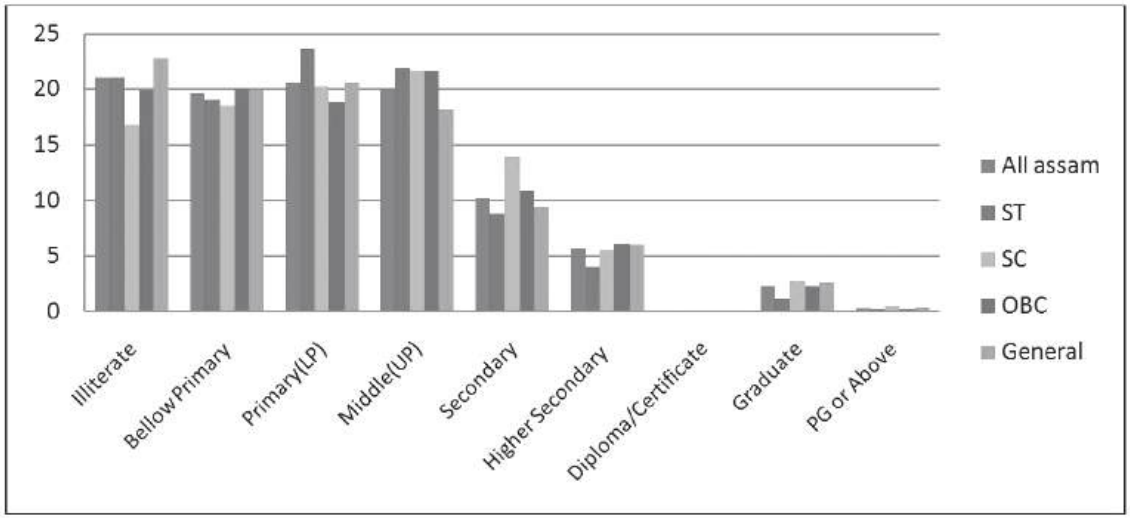

Figure 04: Social-Group wise Percentage of Population in Different Educational Level

From the above figure, it is clear that most of the ST household-heads attained primary education. A majority of the ST household heads are primary (23%) & middle (21%) level qualified as compared to all remaining social-groups (20%). The high school (8%) and higher secondary (4%) qualified household head is despite least. Besides, lowest percentage of ST household head has higher academic qualifications, like diploma/certificate (0%), graduation (1%) and PG & above (0.20%) educational qualification as compared to other social-groups. From this NSSO data, it is evident that, heads of ST households are not highly educated. This may inversely impact the households' consumption decisions. Therefore, it is necessary to examine, whether the literacy status of household heads influences the consumption decisions and is pattern. This investigation has been carried out by examining interlinks between $MPCE_{MRP}$ and educational qualification of the household heads as follows.

Table – 05

Comparative Mean $MPCE_{MRP}$ With Respect to Educational Attainment of HH Heads (In ₹ 0.00)

Educational stage	Assam Overall	ST	Non-ST
Illiterate	1008.62	1036.09	1003.21
Bellow Primary	975.19	926.00	982.81
Primary	1063.00	962.73	1084.37
Middle	1201.95	1120.34	1217.14
Secondary	1620.36	1672.23	1612.76
Higher Secondary	2166.25	2064.13	2177.95
Diploma/Certificate	4843.81	1413.00	4911.72
Graduation	2471.45	2345.70	2448.06
PG/Above	3897.89	1995.48	4013.39

Source – Authors own Calculation, 68th round, type-I NSSO data

From the table-05, we can see that except for those households with illiterate household heads, all the other education standard household heads have low $MPCE_{MRP}$ for STs. The households of STs with highly educated heads also have low $MPCE_{MRP}$ as compared to other communities. For both STs and non-STs, $MPCE_{MRP}$ nevertheless is increasing higher with the increase of educational status of the household heads, except the diploma/certificate holder. The complete picture of changes of $MPCE_{MRP}$ on the basis of household heads educational status is clear from the following figure.

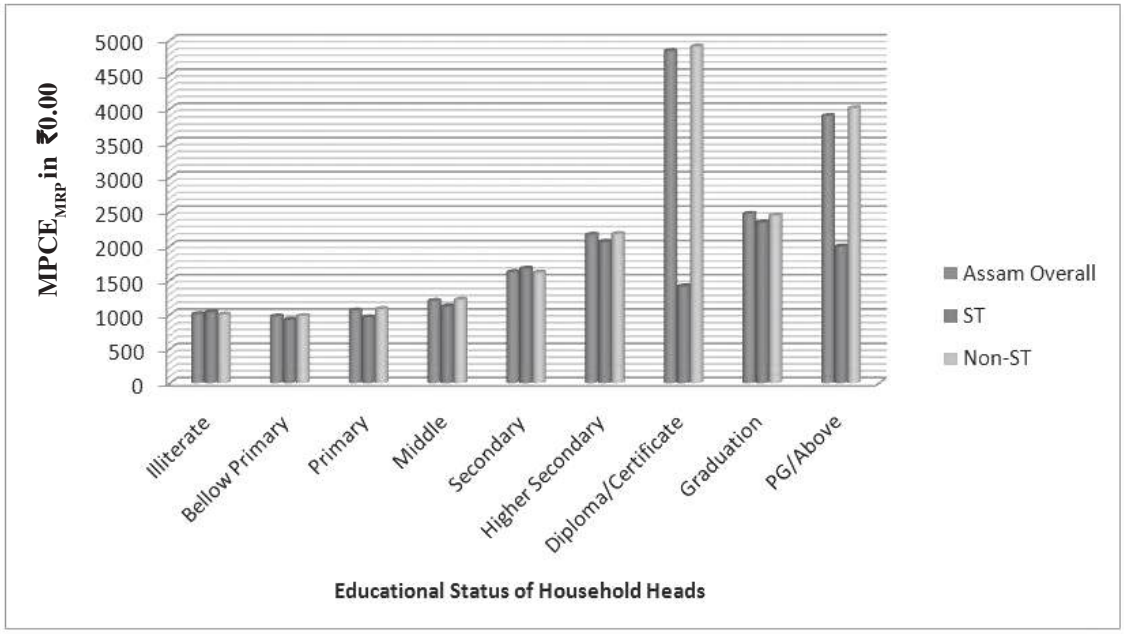

Figure 05: Educational Status Wise Comparative Mean MPCE$_{MRP}$ STs Assam

From the above figure it is clear that, except the 'illiterate' and 'secondary' status of education of household heads among ST households, all the other households have low MPCE$_{MRP}$ as compared to the remaining social groups. However, highly educated household heads have been witnessing a positively higher consumption expenditure of all communities, including STs.

Higher educational status of a household head indicates higher skill and qualification that positively affects the productivity of an individual, therefore more income, subsequently more expenditure and finally it positively accelerates his standard of living. However, from the above analysis, it is evident that even after the completion of post-graduation or above educational qualification, ST households average monthly consumption expenditure is lowest (₹ 1995.48) as compared to other social groups (₹ 4013.39) for the same category. It indicates lower overall standard of living of ST households as compared to non-ST's in Assam.

3:05 Consumption Expenditure According to Household Size

The Size of a household has a significant impact on consumption expenditure of pattern. Larger the size of a household, higher is the consumption expenditure. Notwithstanding the fact that, per-capita expenditure of the household decreases and the household consumption expenditure increases at a diminishing rate (Davis et. al., 1983; Dankwa et. al. 1992). As per this study, the mean household sizes of ST, general, SC and OBC is 5.03, 5.06, 4.57 and 4.56 person-per-household respectively. In general, household-size elasticity is positive for necessary item and negative for luxuries (Jain 1983).

Regarding consumption of non-food items, household size is more important than that of food item consumption. The non-food items are mostly shared by family members of a household. The mean household non-food consumption expenditure is higher for larger household and vice versa. Nevertheless, the yearly mean per capita consumption expenditure is higher for smaller households than it is for larger sized households (Table-06). This is clear from the following table-

Table-06

365 Days HH Size wise Mean HH Non-Food Consumption-Expenditure By Households of Different Social Groups Of Assam (In ₹ 0.00)

Item	Assam		ST		SC		OBC		General	
	HH Size> Mean	HH Size< Mean	HH Size> Mean	HH Size< Mean	HH Size> Mean	HH Size< Mean	HH Size> Mean	HH Size< Mean	HH Size> Mean	HH Size< Mean
Clothing	5203.07	3541.77	5840.10	3471.76	4642.77	3211.47	4724.08	3441.67	5318.34	3752.53
Bedding	461.81	410.38	523.56	394.38	350.99	375.42	482.59	401.45	452.25	433.99
Foot Wear	882.08	625.53	1028.06	531.75	747.05	590.02	821.16	618.95	887.74	671.43
Education	1910.49	1699.93	1491.23	975.74	2076.55	1826.71	1778.66	1723.92	2068.13	1862.61
Medical	356.29	412.97	331.12	125.21	636.46	260.65	445.56	167.45	277.65	750.75
Consumer Durable	4734.41	3395.18	4949.81	2044.55	2957.23	2994.10	4623.55	3889.51	5012.76	3542.29
Total Expenditure	13548.16	10085.76	14163.89	7543.40	11411.05	9258.38	12875.60	10242.94	14016.87	11013.61
Per-Capita spending	1926.30	3119.24	1709.02	2316.84	2051.43	2619.25	2115.78	3088.83	1879.78	3558.73

Source – Authors own Calculation, 68th round, type-I NSSO data

The non-food consumption expenditure always indicates the standard of living more clearly. Because, foods are considered as the fundamental need for subsistence and higher percentage of food consumption to the total consumption indicates lower standard of living (Engel, 1957) and inverse is the case for non-food consumption expenditure. The per-capita non-food consumption expenditure of smaller households is higher, due to diseconomies of household size and on the other hand, the same is lower for larger households due to household size economies (Davis et al, 1983).

From the above table it is clear that the yearly mean per-capita consumption expenditure for ST household is lowest for both greater than the mean household size (₹ 1709) and smaller than the mean household size (₹ 2316) as compared to all other social groups for the same. In contrast, the yearly mean per-capita non-food consumption expenditure for larger households (₹ 2115) and smaller households is higher for general communities (₹ 3558).

From this analysis we can come to a conclusion that larger sized households of all communities including ST enjoys economies of household size mostly in the consumption of non-food items. From another angle, as the STs have least per-capita non-food consumption expenditure irrespective of household size, their vulnerability or economic backwardness is negatively stronger than their economies of household size enjoyed by them.

3:06 Multi-Variable Regression Result on Consumption Expenditure Pattern

On the basis of the objective regarding the relationships between $MPCE_{MRP}$ and other independent variables, the following economic models have been built up –

$$\text{In } MPCE_i = \beta_1 + \beta_2 LH_i + \beta_3 OH_i + \beta_4 \text{In } MPFCE_i + \beta_5 \text{In } MPNFCE_i + \beta_6 ESH_i + \beta_7 HSZ_i + \partial_1 GHH_i + \partial_2 SG_i + \partial_3 Li + U_i$$

In this multiple regression model

Dependent Variable:

ln $MPCE_i$= Natural logarithm of Monthly Per-Capita Consumption Expenditure of i^{th} household

Independent Variables:

LH_i = Land hold by i^{th} household (in 0.000 hectors).

OH_i= Occupation of i^{th} household heads.

ln $MPFCE_i$= Natural logarithm of Monthly Per-Capita Food Consumption Expenditure of i^{th} household.

ln $MPNFCE_i$ = Natural logarithm of Monthly Per-Capita Non-Food Consumption Expenditure of i^{th} household.

ESH_i =Education status of heads of i^{th} household.

HSZ_i= Size of i^{th} household (No of household members).

GHH_i= Gender of Heads of i^{th} household (Dummy Variable).

1 = Male

0 = Otherwise

SG_i= Social-Group of i^{th} Household (Dummy Variable).

1 = ST

0 = Otherwise

L_i= Location of i^{th} Household (Dummy Variable).

1 = Rural

0 = Otherwise

U= Error term, which takes smaller value with higher probability.

Coefficient measures the marginal impact of independent variables on dependent variable. They are…

β_1=Mean, β_2= Slope Coefficient of $LH_{i.}$, β_3=Slope Coefficient of OH_i, β_4= Elasticity Coefficient of $MPFCE_{i.}$, β_5= Elasticity Coefficient of $MPNFCE_{i.}$, β_6= Slope Coefficient of $ESH_{i.}$, β_7= Slope Coefficient of $HSZ_{i.}$, ∂_1 = Slope Coefficient of $GHH_{i.}$, ∂_2 = Coefficient of $SG_{i.}$, ∂_3 = Coefficient of $L_{i.}$

i= 1, 2, 3…….. n individuals

Note that, in the following regression result some of the variables are in logarithm and therefore the estimated co-efficient need to be appropriately adjusted to be consistent with the above equation. For e.g.

$$\frac{\textbf{Mean MPCEi}}{\textbf{Mean MPFCE}} = \beta_4 \overline{Y}$$

Table — 07

Result of Multiple Regression for all Assam Household Consumption Expenditure

Explanatory Variables	Estimated coefficients	"t"
Intercept	2.948***	2077.08
Land hold in hector	-0.003***	-45.25
Household occupation	.0018***	364.60
Monthly per capita food Consumption Expenditure	0.667***	2417.62
Monthly Per capita non-food Consumption Expenditure	0.217***	1629.78
Education	0.008***	272.88
HH Size	-0.205***	-3592.09
HH Gender	-0.106***	-375.01
Social Group	-0.004***	-19.16
Location	-0.228***	-878.82
R^2	0.84	-
F (DF 9)	3360594.912***	—

Source – Authors own Calculation, 68th round, type-I NSSO data ***, **,* Denotes significance at 1%, 5% and 10% level respectively,

The regression result table illustrates that the intercept term is highly significant. Highly significant intercept term is not a good sign for the model. It indicates that we have excluded some important variables from the model. However, this exclusion is unavoidable in this regard. Because, there are a large numbers of smaller socio-economic, demographic, religious, ecological, geographical, traditional and cultural factors, that also impacts the $MPCE_{MRP}$ of an individual. This is not possible to detect all of them in the operation.

From the regression model it is observed that the 't' statistic for coefficients β_2, β_3, β_4, β_5,β_6 & β_7 are highly significant at 1% level .

β_2 = Implies negatively significant coefficient for the variable 'Land-Holding'. It implies the inverse relationship between 'land-holding by household' and the $MPCE_{MRP}$. This means, higher the land hold by household, lower the $MPCE_{MRP}$ and vice versa. This is because; most of agricultural land holds by rural household, which makes their holding larger than the urban household. We already clear that the rural households mean $MPCE_{MRP}$ is significantly low as compared to its urban counterparts irrespective of their holding (Ha, 2006). Secondly, larger land holding households have greater family size than the smaller land-holding families. This actually reduces $MPCE_{MRP}$ of larger families with the effect of household size economies (Dankwa et al 1992), who lives basically in rural agro based areas.

β_3= Implies a positively significant relationship of Occupation and $MPCE_{MRP}$. This indicates that, higher the occupational standard, higher is the $MPCE_{MRP.}$

β_4 & β_5 are the elasticity coefficient of monthly food and non-food consumption expenditure of household which are significant and positively impact the $MPCE_{MRP.}$

Both the monthly food and non-food consumption expenditure of household is taken as independent variable to examine the respective intensity of affect on consolidated sum of MPCE (i.e. dependent variable). As a result we can come to a conclusion that as per the Engels law, ST household are still lagging behind economically, as their coefficient against food item is higher than that of non-food item.

β_6 = Is the coefficient of educational standard of household head and have significant impact on $MPCE_{MRP.}$ It indicates a positive relationship of education with $MPCE_{MRP}$. Higher the educational status of the household head, higher is the $MPCE_{MRP}$.

β_7= Shows a negative relationship of household size with $MPCE_{MRP}$. With the increase of household size, the consumption expenditure also increases, but at a decreasing rate and therefore per-capita expenditure decreases. Because , with the increase of household size, some economies of scale arises (Davis et al 1983; Dankwa et al 1992) with the opportunity to share some items commonly by household members , like TV, refrigerator, radio, communication means, kitchen items, furniture etc., which reduce the per-head consumption expenditure.

Gender of the household head (∂_1), social group (∂_2) and location (∂_3) are three dummy variables, which are also negatively significant in this model. For gender we take 1 for male and 0 otherwise. This means that FHH have higher $MPCE_{MRP}$ than that of MHH. In the Table-12 it is clear that, except the SCs, all the other households with female head have higher $MPCE_{MRP}$ including STs. It indicates a sound economic status of FHHs.

The social group, being a dummy variable, takes value 1 for STs and 0 for non-STs. The regression result shows a negatively significant result. Indicates that gender difference have a highly significant impact on $MPCE_{MRP}$. Non-STs have significantly higher $MPCE_{MRP}$ than that of STs and vice versa. We can come to a perception that socio-economic status of ST is lower than non-STs.

The rural-urban dummy variable shows a negatively significant result. It indicates that, the rural households have comparatively lower $MPCE_{MRP}$ than their urban counterpart. It shows higher mean consumption expenditure for all ST and non-ST households in urban Assam than that of their rural counterparts.

The overall fitness indicator R^2 takes the value 0.84, which implies that 84% variation in the dependent variable is explained by the explanatory variables. This is considered to be a very good fit in the model.

On the other hand 'F' is for the test of joint explanatory power. It holds the 1% significance level. So, we can interpret that overall model has a good fit.

3:07 Results: Apart from the results obtained from the regression analysis, the following result can also clarify the status of ST's from the entire study i.e.

(i) Mean non-food consumption of household as well as per-capita non-food consumptions is significantly low among STs.

(ii) Within the food items, ST households' consumption spending on cereals, egg-meat-fish, pulses, alcoholic intoxicants, vegetable item is higher than non-STs.

(iii) ST Households' spending on education is lowest as compared to other social groups. However, literacy rate is almost equal to state average(Census-2011). This literacy rate is concentrated only within the elementary level(table-04).

(iv) Higher education above high school stage is still at an infant position among STs. Smallest proportions of household heads have higher educational qualification above the high school level(table-04).

(v) With the increase of family size, expenditure on food and non-food item increases, but at a diminishing rate. The household size has more significant impact on per-capita non-food consumption as compared to food items. Therefore, per-capita expenditure decreases with the increase of household size(table-06).

(vi) ST household's expenditure on alcohol, egg-fish-meat, cereals, vegetable, pulses item is higher than non-STs (table -02).

4. Conclusions

It is clear that socio-economic and welfare status of ST household in Assam is not satisfactory as compared to other households. However, ST households in Assam are far better as compared with the ST household's national averages for different socio-economic and welfare indicators. It on the one hand bears a ray of hope for harmonious social equality, vis à vis better future socio-economic environment. Appropriate government and social initiatives towards the educational upliftment and spread of higher education is only the yardstick for all round development and wellbeing of ST households in Assam.

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Disempowerment of Women and its Decomposition: A Study in Howrah District, West Bengal

Senjuti Ghosh-Das*, Supravat Bagli**

Abstract

The paper explores the incidence and intensity of multidimensional disempowerment of women in Howrah district, a relatively developed district in West Bengal, India. For the study a field survey was performed across 300 women respondents in two community development blocks namely Uluberia-II and Sankrail and one town namely Shibpur during February-June, 2022. A Women's Disempowerment Index is designed using twelve indicators that are mapped under four dimensions namely financial empowerment, household decision making power, freedom of movement and attitude towards intimate partner violence. Using the Alkire Foster Methodology (2011) the disempowerment is decomposed across ethnicity, educational attainment and place of residence. Contribution of each of the indicators is analysed to explore the largest contributors to disempowerment using the methodology developed by Alkire et al. (2013). The decomposition of the index shows that the incidence of multidimensional disempowerment varies largely between urban and rural areas. It is also revealed that the burden of multidimensional disempowerment is higher among the lower strata of social caste and women with lower educational achievement. The dimensional breakdown shows that the attitude of remaining silent and non-reporting in case of intimate partner violence remains the biggest barrier in achieving empowerment.

Keywords: *Dimensional Breakdown of Women's Disempowerment Index, Howrah district, Sub-Group Decomposition, Women's Disempowerment Index*

JEL Classification: C83, C87, J16, R10

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1. Introduction

Empowerment is a key instrument to promote inclusive development. Under United Nation's Millennium Development Goal (MDG 3), India took several steps to empower women. Moreover, the Sustainable Development Goals (SDG5) sets a target to achieve women's empowerment in various dimensions (UN, 2022). However, the recent 5th National Family Health Survey report (2019-2020) reveals a poor scenario for women's empowerment in India including West Bengal.

Although women's empowerment and gender equality are closely interlinked, empowerment is relatively a wider concept. The United Nation's Gender Inequality Index (GII), Gender Development Index (GDI), Gender Empowerment Measure (GEM) or the World Economic Forum's Global Gender Gap Index (GGGI) measure gender inequalities, but fail to measure empowerment at the individual level. All these indices are calculated at the aggregate level and hence cannot be decomposed at the sub-group levels. Alkire, et al. (2013) has first time measured the Women's Empowerment in Agriculture Index (WEAI) at the individual level. The superiority of the index lies in its decomposability over dimensions as well as the population sub-groups. Based on the rationale of generic applicability of this method, it is applied in our study.

As the notion of women's empowerment is context-specific, the level of empowerment can be presumed to incorporate inter-state as well as inter-district variation. However, district level data of empowerment is very limited in India. The new methodology to analyse individual level women's disempowerment and paucity of data motivated us to study women's empowerment through field survey in the district of Howrah, West Bengal. NFHS (2019-20) reports that women in this state are lagging behind the national average in most of the empowerment indicators. However, Howrah district is comparatively better positioned in educational and nutritional parameters. According to the latest NFHS the district has an impressive female literacy rate of 80.5 per cent, higher than the state level figure (72.9 per cent) and the national figure (72 percent). The share of women with 10 or more years of schooling (40 percent) is also higher in the district compared to the state level (32.9 per cent) although slightly lower than the national average (41 percent). The percentage of women with below normal BMI (10.3 per cent) is lower in Howrah district compared to the state level (14.8 percent) and the national figures. Further, the median age at marriage

for women in Howrah district is 20.8 years which is higher than the state level and national level in 2019-2020. However, women's workforce participation, which generally is associated with women's economic empowerment (Salgotra & Singh, 2017; Hossain, 2012), is not encouraging for the district. According to the District Statistical Handbook 2017, Howrah district incorporates more than one third of total number of factories operational in West Bengal, but only 13 per cent women in the working age population have joined the workforce.

2. Literature Review

Analyses of women's empowerment is closely connected with the ideology of power and freedom (Luke's, 1974; Freire's, 1978; Rowlands, 1995). Kabeer (1999) has defined empowerment as the expansion of people's ability to make strategic life choices in a context where this ability was previously denied to them. In order to examine the developmental effects of women's empowerment several methods of computation have been developed in literature. To measure women's empowerment index, Kabeer (1999) has considered it as "process" involving the dimensions of resources (enabling factors for achieving empowerment), agency (ability to make strategic life choices that can affect important life decisions) and achievements (outcomes from the very effect of being empowered).

The computation of women's empowerment index involves myriad of challenges. Indicators are not always able to accurately reflect the degree of empowerment as it is essentially qualitative in nature and must be aligned with societal norms (Kabeer, 1999). A number of indices have been developed to measure empowerment of women in recent times, especially in the field of agriculture and allied sectors. One such prominent index is Women's Empowerment in Agriculture Index (WEAI) which is designed by Oxford Poverty and Human Development Index (OPHI) in 2013. The index is designed to explore the degree of empowerment of women who are working under USAID and IFPRI agricultural projects in African and Asian countries by Alkire et al. (2013). Another close version of WEAI is Women's Empowerment in Livestock Index (WELI) developed by Galie et al. (2019). It captures the empowerment level of Tanzanian women who are engaged in the livestock sector. The findings show substantial differences in empowerment across population sub-groups where women in dairy farms with higher productivity have higher empowerment. Contribution of the indicators across different empowerment quartiles also varies

significantly. Narayanan et al. (2017) have measured Women's Empowerment in Nutritional Index (WENI), focusing on women's awareness about nutritional and health requirements in rural India with dimensions of food resources, health resources, fertility and social norms. They have reported a substantial regional variation in women's access to all the selected dimensions as well as level of empowerment across the states of Uttar Pradesh, Kerala, Tamil Nadu, Bihar and Chhattisgarh. Retigg et al. (2020) have formulated an index namely Female Empowerment Index (FEMI) in Nigeria based on the dimensions of violence against women, employment, education, and decision making. They found that women's empowerment increases over a time span of almost 25 years, however, with a widening state and regional variation. Bhattacharya et al. (2013) have delved empowerment as an enhancer of capability while the chosen capability dimensions are health, knowledge and autonomy and report sensitiveness of women's empowerment with respect to age, marital status, wealth, caste and religion varies greatly between rural and urban areas in West Bengal.

Women's empowerment depends more on gender perceptions in different social contexts rather than personal traits of women (Mason & Smith, 2003). While social context includes legal system, public policies and Government intervention in one hand, similarly local geographical communities and their cultural beliefs also define women's empowerment (Mishra, 2013). To this end in view, the paper tries to understand women's empowerment scenario in Howrah district, a comparatively developed district of West Bengal. However, economic prosperity of a state does not always ensure lower level of disempowerment of women (Mishra, 2013). The magnitude of women's disempowerment varies spatially with a clear divide between North and South India indicating women from North India happens to be more disempowered. A state level analysis of multidimensional disempowerment of women finds spatial variation while decomposition analysis shows disempowerment variation arises due to religion, place of residence, educational achievement, family structure and asset endowment in degree of disempowerment of women (Mishra & Banerjee, 2022). Using NFHS (2015-16) data Dutta and Bagli (2024) have reported the significant spatial correlation of the state level women's empowerment in India. Ghosh-Das and Bagli (2024) have identified the clusters of Indian states in respect of the similar level of women's empowerment based on NFHS data. Malapit et al. (2019) have applied the methodology

of multidimensional poverty index for measuring the multidimensional disempowerment of women to explore their deprivation and exclusions from standard dimensions identified for achieving empowerment. However, the study of individual level women's empowerment using the Alkire and Foster (2011) is rare in India particularly in West Bengal. This study reduces this research gap with the following objectives.

3. Objectives

The primary objective of this study is to report the incidence and intensity of women's disempowerment for the district of Howrah in West Bengal. Secondly we decompose the disempowerment level of the district across the different socio-demographic and geographic groups like ethnicity, education level and residential regions. Finally, contributions of the selected indicators in the district level women's disempowerment index are to be reported.

4. Methodology and Data

To undertake the study, Women's Disempowerment Index (WDI) is formulated using four dimensions of empowerment. These are a) Financial Empowerment, b) Freedom of Movement, c) Household Decision Making Power and d) Attitude towards Intimate Partner Violence (IPV). It should be noted that the first three dimensions are based on the practices or real life experiences of women with respect to certain identified parameters while the fourth dimension is based completely on perception. As empowerment is multidimensional concept, including both real life experiences and perception based approaches justifies our selection of indicators. The four indicators included under the financial empowerment dimension are whether a woman has joint or single bank account, whether has money for daily consumption, whether has a voice when any expensive commodity is bought in the family and whether has a decision-making power in any kind of family investment. Three indicators under the domain of freedom of movement are whether a woman has own mobile to access, whether she can visit her pre-natal family alone and whether she is able to visit the market alone. The dimension of household decision making power is captured through indicators like whether a woman has autonomy in what to cook on a daily basis, decision making power in case child(ren) fall ill and decision-making power in case the woman herself falls sick. The two indicators under the dimension of acceptance of IPV are whether beating by husband is justified if wife is disrespectful to him and whether intimate partner violence should be reported to police or local administration. For each of the indicator, the responses are binary, 1 if the respondent is disempowered in that particular indicator and 0

otherwise. Each of the dimensions is weighted equally (one-fourth) and each indicator under each dimension has equal weightage as shown in table 1.

We compute the Women's Disempowerment Index (WDI) using the Alkire-Foster Method (Alkire and Foster, 2011). First, we identify disempowerment in respect of the indicator, if woman i is disempowered in the j^{th} indicator, then disempowerment status Dij=1, and 0 otherwise.

We calculate the Disempowerment Score (C_i) of ith woman, adding up the disempowerment status (D_{ij}) for each indicator multiplied by their respective weights (w_j).

$$C_i = \sum_{j=1}^{12} w_j \times D_{ij} \qquad (1)$$

The bound for C_i is 0 and 1 where $C_i = 0$ implies no disempowerment in any indicator and $C_i = 1$ implies complete disempowerment in all indicators.

Then we compare the disempowerment score (C_i) of ith woman with the cut-off value (k) to identify whether a woman is disempowered or not. Following UNDP's method for identifying multidimensionally poor, we set k = 0.33 for identifying multi-dimensionally disempowered. A woman is identified as disempowered if the value of the disempowerment score is greater than 0.33.

Incidence of Disempowerment: Incidence or Headcount Ratio (H) of disempowerment in a district is calculated as a proportion of the total number of disempowered women to the total sample size.

$$H = \frac{q}{n} \qquad (2)$$

where q is the number of women who are multi-dimensionally disempowered and n is the sample size.

Intensity of Disempowerment: Intensity of Disempowerment (A) is calculated as the average of the censored disempowerment score among the disempowered women. The censored disempowerment score for ith woman is the disempowerment score if the ith woman is disempowered, otherwise zero. In notation, $C_i(k) = C_i$ if $C_i > k$, $C_i(k) = 0$ if $C_i \leq k$

$$A = \frac{\sum ci(k)}{q} \qquad (3)$$

The Women's Disempowerment Index (WDI) at the district level is then calculated as the product of the disempowerment headcount ratio and the intensity of disempowerment.

$$WDI = H \times A \tag{4}$$

The index ranges from 0 and 1, implying higher the value of WDI higher will be the disempowerment level of the women in the state.

The methodology of Women's Disempowerment Index (WDI) used here is applicable to the ordinal, cardinal as well as categorical variables. Moreover, it satisfies decomposability and monotonicity property of an index. We apply the property of decomposability to decompose WDI across social castes, education and place residence to find the contribution of each of the sub-group in the disempowerment index. In notation, the decomposition formula across the regions which are mutually exclusive and exhaustive can be written as-

$$WDI_{DIST} = \frac{n_1}{n} WDI_{Rural} + \frac{n_2}{n} WDI_{Urban} \tag{5}$$

Here WDI_{DIST} is the WDI calculated at the district level, n is the total sample size, n_1 is the sample size of rural women, n_2 is the sample size of urban women, WDI_{Rural} is the WDI calculated for all the rural respondents and WDI_{Urban} is the WDI for the urban women. We can decompose the district level disempowerment index across any mutually exclusive and exhaustive sub-groups in a similar fashion using the same decomposition formula.

The contribution of each sub-group can be obtained using the Alkire, et al. (2013) formula which is:

$$\text{Contribution of subgroup } p \text{ to } WDI_{DIST} = \frac{\frac{n_p}{n} WDIp}{WDI_{DIST}} \times 100$$

WDI_p = women's disempowerment index for sub-group p. and $\frac{n_p}{n}$ is the population share of the sub-group p. Now if the contribution of a subgroup is higher than the population share of that sub-group, then we say that disempowerment is disproportionately higher in that sub-group.

To find out the contribution of each of the twelve indicators in the gross WDI, first, we need to decompose it using the following formula

$$WDI_{DIST} = \sum_{j=1}^{12} w_j CH_j \tag{6}$$

where w_j is the relative weight associated with the j[th] indicator and CH_j is the censored headcount ratio for the j[th] indicator. The censored headcount ratio for a particular indicator is the ratio of the total number of disempowered women in that particular indicator to the total sample size.

Technically $$CH_j = \frac{\sum_i^q Dij}{n}$$

D_{ij} = 1 when the i[th] disempowered woman is disempowered in the jth indicator and D_{ij} = 0 otherwise. We can find the contribution of the j[th] indicator to district level disempowerment index using the following formula,

$$\text{Contribution of j}^{th}\text{ indicator to } WDI_{DIST} = \frac{w_j CH_j}{WDI_{DIST}} \times 100 \qquad (7)$$

If the contribution of the j[th] indicator is higher than the weight (w_j) associated with that indicator, the disempowerment in that indicator is disproportionately high. Alternatively, a multidimensionally disempowered woman faces a significant amount of deprivation in the j[th] indicator.

The data for the study has been collected through a primary survey across 300 ever married women within the age group 15-49. Data is collected from February 2022 to June 2022 from two community development blocks in Howrah district based on Female Literacy Rate (FLR). One CD block whose FLR is very close to the district average and another CD block whose FLR is lower than the district average is selected from the district. As we have collected data from two wards in Howrah Municipal Corporation where FLR is 86 per cent (District Statistical Handbook, 2017) we did not select any CD block with higher FLR than the district FLR. In the first stage of sampling, we have selected Sankrail Community Development (CD) block from Sadar sub division whose FLR (79.56 per cent) is closest to the district average (79.43 per cent) and Uluberia-II Community Development block from Uluberia sub-division having FLR (73.23 per cent) lower than the district average (Howrah District Statistical Handbook, 2017). In the second stage, two gram- panchayats namely Panchpara and Duliya from Sankrail CD Block and Basudebpur and Char Panchla from Uluberia II CD Block have been selected randomly. In stage 3, we have selected randomly two villages from each selected gram panchayat. Two wards from Howrah Municipal Corporation are chosen randomly to complete the rural urban

composition of the district sample. The sample size selected from each unit of sample collection is proportional to population. Thus, the sampling is done in a multi stage stratified random sampling method where the stratification variable is population.

5. Analysis and Discussion

Table 2 shows the socio-economic-demographic profile of the sample households. Sample household size ranges from 2 to 10 with median 4. The average number of rooms in sample households is 2 ranging between 1 and 8 for our survey respondents. The average per capita annual income is around Rs 81 thousands with substantial variation. The average age of the respondent women is close to 37 and the majority of the sample women did not complete secondary level education. Table 3 shows that two-third of the sample women are residing in nuclear families, less than 30 per cent live in joint families while only 5.33 per cent are in extended families. Occupation-wise categorization of households reveals that more than 36 per cent of the main income earners are service holders, 29 (28) per cent are labourers (self-employed). Only 5 per cent of them are agricultural labourers and the rest are engaged in some other work. Almost half of the respondents in our survey are Scheduled Caste; more than one third are General Caste and others belong to Other Backward Caste (OBC) community. To gauge the level of sanitation and hygiene, respondents were asked about the availability of hygienic sanitation and access to clean drinking water at home. The majority of them answered in the affirmative regarding the availability of proper and clean toilets while 63 per cent of them have access to clean drinking water. 73 per cent of the respondents cook using LPG while others use mostly wood. The survey data reveals that only 9 per cent of the respondent women are the owners of their houses. A large proportion (79 per cent) of women are not working. Among the working women, more than half are self-employed, mostly doing works of zari embroidery, around one third are service holders and 10 per cent are labourers.

Women in Howrah district experience widely varying levels of autonomy in the indicators of financial empowerment. 81 percent of the women respondents in Howrah district have bank accounts, either in their own name or as joint account holders (Table 4). 83 per cent of women have decision-making power to purchase expensive item for the household. However, comparatively a lower proportion, approximately 67 per cent, have cash in hand for daily expenditures. Even a much lower proportion (40 per cent) of women have any decision-making power in family investment. Almost 61 per cent of women respondents have mobile phones. 64 per cent of them do not have to seek permission to visit pre-natal family members while 61 per cent can go to the marketplace alone. Women's decision-making power in household activities also varies significantly. 77 per cent of our women

respondents decide what to cook daily. Majority of the women (85 per cent) enjoy decision-making power on the illness of the child. The proportion decreases significantly (68 per cent) when it comes to the decision-making power in case of own illness. Indicators mapped under attitude towards IPV also differ largely. 85 per cent of the survey respondents feel that a wife should not be beaten by her husband. Nonetheless, only 58 per cent of the respondents say that intimate partner violence should be reported to a police station or local administration.

The range of disempowerment is quite large among the survey respondents (Table 5). Five women from Uluberia block, one woman from Sankrail block and two women from Shibpur in Sadar Sub-division have the lowest disempowerment score of zero. It is the maximum (0.94) for a few women in Sankrail. The mean value of WDI is 0.30. The coefficient of variation and the standard deviation is modest for the WDI implying that the degree of variation in the level of multidimensional disempowerment is moderate among the survey respondents.

Considering the threshold value of multidimensional disempowerment as 0.33, 123 respondents among 300 are found disempowered in our study. Based on the value of the disempowerment score, the women are categorized into four groups (Table 6). If C_i < (Mean – SD) value of C_i, then the ith woman is categorized as having a low level of disempowerment; if (Mean – SD) value of $C_i \leq C_i <$ Mean value of C_i, then the ith woman is categorized as having moderate disempowerment; if Mean value of $C_i \leq C_i <$ (Mean + SD) value of C_i, the woman is categorized as having high disempowerment; if $C_i \geq$ (Mean + SD) value of C_i, then the woman is categorized as having very high disempowerment. According to this categorization, 18.8 per cent of our respondent women have a low level of disempowerment, 43.6 per cent of women have moderate disempowerment, 17.8 per cent of women have high disempowerment and 19.8 per cent of women have a very high level of disempowerment. Thus, the sample data suggests majority of the respondent women in Howrah district have moderate to high or very high level of disempowerment.

The decomposition of multidimensional disempowerment varies across various sub-groups such as place of residence, ethnicity and education which are summarized in our study (Table 7). The rural area is comprised of Uluberia II block and Sankrail block and the urban area consists of Shibpur municipality area. The disempowerment in the district is largely contributed by the rural region covered in the study. The contribution of the rural women in district level WDI is much higher than the urban women. Among the multidimensionally disempowered women, SC women have the largest share, followed by

the General caste women and OBC women in disempowerment. We have categorized women in accordance with the years of education as follows- women with no education fall in group 1, women with education up to maximum secondary level fall in group 2 and women with education above secondary level fall in group 3. It is found that women with no formal education and women with education up to secondary level have higher burden of disempowerment compared to women having education beyond secondary level. Table 8 shows the contribution of each of the twelve indicators in the overall multidimensional score of the district. The data reveals that the notion of not reporting IPV has the largest contribution to WDI. This finding has special significance on the background of worrisome scenario of marital violence across the country. Using national level data, Akter & Chindarkar (2019) finds that women victim of IPV has increased by more than 30 percent in 2011-12 compared to 2004-05. The situation is even more grave for West Bengal. Study by Dandona et al. (2022) suggests that the reported cases of cruelty by husbands and in-laws is one of the highest in West Bengal during 2001 to 2018, almost six times higher than the national average. This high rate of incidence combined with the attitude of non-reporting of IPV lead us to believe that the true incidence of IPV are more horrifying than reported. The other three important barriers namely having their own mobile, freedom to visit family and decision-making power on the illness of own.

6. Comparison of Mean Disempowerment across Various Sub-Groups

To check whether the difference in mean disempowerment across various sub-groups are significant or not, we performed statistical tests. To understand if average disempowerment between rural and urban women are statistically different or not, t-test is performed (Table 9). The result suggests that the average disempowerment varies significantly between these two groups in our studied area. To compare means among more than two population sub-groups, one-way ANOVA is performed (Table 10). The average disempowerment across castes does not vary significantly while the average disempowerment across educational level does. To understand what population sub-group is responsible for these variations across different education level, Tukey multiple comparison test is performed (Table 11). The test finds out whether means between each pair of sub-groups are significant or not. The test suggests that the variation across different educational category is occurring due to difference of disempowerment of women with education beyond secondary level with other educational categories.

7. Robustness Check for Threshold Level Disempowerment

As there lies dispute among economists in fixing the second cut-off value in identifying multidimensional deprivation (Bagli & Tewari, 2019), to test the robustness of the findings in our study, the cut-off values are altered and dominance analysis has been performed.

The curve for each category in Figure 1 shows the different levels of incidence of multidimensional disempowerment corresponding to different values of cut-off for that category in urban and rural areas. If the curve corresponding to one category lies completely above other curves, then that category dominates other categories in terms of multidimensional disempowerment. The figure reveals a stable dominant disempowerment scenario in rural areas over the urban areas. Figure 2 shows the dominance relations among all the women surveyed in the district of Howrah, the general caste respondents, the scheduled caste respondents and the OBC respondents. The graph suggests that the incidence of disempowerment remains the highest among the women belonging to the scheduled caste compared to the general caste woman and women from the OBC category up to the cut-off value 0.6. The dominance analysis for different education group shows that education group 1 (women with no formal education) has dominance in terms of incidence of disempowerment over other two education groups up to the cut-off value of 0.7 (Figure 3). Similarly, education group 2 (education up to maximum Secondary level) has higher level of incidence of disempowerment over the education group 3 (education beyond Secondary level) up to the same cut-off value. The dominance analysis for each category reveal a steady and stable dominance of one sub-group over others.

8. Conclusions

Decomposition analyses based on social and demographic traits of the respondent women reveal some interesting findings. Being privileged in terms of residing in urban areas or having more years of education do ensure higher empowerment for women. The incidence of multidimensional disempowerment is the highest for women belonging to the scheduled caste community compared to the general caste women. Similarly, the incidence of multidimensional disempowerment is the highest for those who have no formal years of education at all compared to others The dimensional breakdown shows that among all the twelve indicators of disempowerment in our study, the indicator of 'beating by husband not to be reported' comes out as the most important contributor. Thus, the attitude of remaining silent in case of intimate partner violence remains the most important hindrance

towards achieving empowerment in the district of Howrah. The findings from the study have significant policy implications. Spreading awareness about reporting cases of intimate partner violence would enhance the degree of women's empowerment in the district of Howrah in particular and in West Bengal in general.

Limitations

A sample cannot be fully representative of the population irrespective of the method of sampling technique applied. Thus, the conclusion about women's empowerment in Howrah district might suffer from sampling and non-sampling bias. The true level of women's empowerment could be better captured if we could collect data from the same women in two different time periods, making the data a panel data instead of cross-sectional data, as empowerment is a process.

Table 1: Dimensions and Indicators of Multidimensional Disempowerment

Dimension	Disempowerment Indicators	Weight
Financial Empowerment	Having own bank account	1/16
	Access to money for daily expenditure	1/16
	Having a voice in buying expensive items for the family	1/16
	Having a voice in family investment	1/16
Freedom of Movement	Having own mobile	1/12
	Visit to pre-natal family	1/12
	Visit to market	1/12
Household Decision-Making Power	Decision- making power about what to cook daily	1/12
	Decision -making power regarding the Illness of child(ren)	1/12
	Decision-making power regarding the Illness of own	1/12
Attitude Toward Intimate Partner Violence (IPV)	Whether husband beating justified	1/8
	Whether IPV should be reported	1/8

Source: Compiled by the Authors

Table 2: Socio-Economic-Demographic Profiles of Sample Households (n=300)

Statistics	Family Size	No of Rooms	Per Capita Annual Income (Rs)	Age of the Respondent (year)	Education of the Respondent (year)
Min	2	1	5000	18	0
Max	10	8	833333	49	22
Mean	4.15	2.19	81697.31	36.63	8.89
Median	4	2	40000	36.5	9
SD	1.26	1.37	123904.4	8.00	5.18
CV	30.26	59.20	151.97	21.85	58.23
Skewness	1.42	1.18	4.06	-0.15	-0.11
Kurtosis	3.26	1.39	18.55	-1.04	-0.72

Source: Authors' own calculations from the Primary Survey

Table 3: Some Other Socio-Economic-Demographic Profiles of Sample Households

Family Type	Number	Percentage
Nuclear	197	65.67
Joint	87	29.00
Extended	16	5.33
Main Occupation of the Household		
Cultivation	14	4.69
Labour	87	29.00
Self-Employed	84	28.00
Service-holder	109	36.33
Others	6	2.00
Caste		
General	104	34.66

(Contd...)

Table 3 (Contd...)

OBC	47	15.72
SC	149	49.83
Access to Hygienic Sanitation in Home		
Yes	260	87.00
No	40	13.00
Access to Clean Drinking Water		
Yes	188	62.67
No	112	37.33
Access to LPG		
Yes	220	73.33
No	80	26.67
Whether Owner of the House		
Yes	27	9.00
No	232	77.33
Not Applicable	41	13.67
Occupation of the Respondent		
Non-worker	236	78.67
Worker Cultivator Labour Self-Employed Service-holder	64 0 6 36 22	21.33 0 9.38 56.25 34.38

Source: Authors' own calculations from the Primary Survey

Table 4: Percentage Distribution of Women in respect of the Indicators of Disempowerment

Dimensions	Indicators	Number	Percentage
Financial Empowerment	Having Own Bank Account	244	81.33
	Access To money For Daily Expenditure	203	67.66
	Decision making power in buying Expensive items in the house	249	83
	Decision making power in Family Investment	120	40
Freedom of Movement	Having Own mobile	184	61.33
	Freedom to Visit pre-natal family	193	64.33
	Freedom to Visit Market	183	61.00
Household Decision Making Power	Decision Making Power on cooking	232	77.33
	Decision Making Power on illness of children	255	85.00
	Decision Making Power on illness of Own	204	68.00
Attitude Towards IPV	Whether Husband Beating Not Justified	257	85.66
	Whether Husband Beating Should be Reported	174	58.00

Source: Authors' own calculations from the Primary Survey

Table 5: Summary Statistics of the degree of Multi-Dimensional Disempowerment

Statistics	Min	Max	Mean	Median	Mode	S. D	CV	Skewness	Kurtosis
Values	0	0.94	0.30	0.29	0.29	0.16	53.33	0.7	0.8

Source: Authors' own calculations from the Primary Survey

Table 6: Distribution of the Degree of Disempowerment of the Sample Women

Degree of Disempowerment	Low	Moderate	High	Very High
Percentage	18.8	43.6	17.8	19.8

Source: Authors' calculations from the Primary Survey

Table 7: Decomposition of WDI in Howrah District across Sub-Groups

Region	Sub-Groups	Sample size	Number of Disempowered Women	Incidence	Intensity	WDI	Contribution (per cent)
Area of Residence	Total Sample Size	300	123 (41)	0.41	0.45	0.18	100
	Rural	212 (70.66)	94 (44.33)	0.45	0.47	0.21	77.78
	Urban	88 (29.34)	29 (32.95)	0.32	0.42	0.13	22.22
Caste	General Caste	104 (34.67)	40 (38.46)	0.38	0.44	0.17	27.78
	Other Backward Caste	47 (15.6)	14 (11.38)	0.29	0.47	0.14	11.11
	Scheduled Caste	149 (49.73)	70 (56.91)	0.47	0.46	0.22	61.11
Education	Illiterate	39 (13)	25 (64.10)	0.62	0.46	0.24	20.17
	Up to Secondary	162 (53.67)	74 (45.34)	0.45	0.47	0.42	62.22
	Above Secondary	99 (33.33)	24 (24)	0.24	0.42	0.1	17.61

Source: Authors' own calculations from the Primary Survey

Table 8: Indicator wise Contribution in District WDI in Howrah District

Dimension	Indicators	Censored Head Count Ratio	Contribution to WDI
Financial Empowerment	Having Own Bank Account	0.11	3.89
	Access to Money for Daily Expenditure	0.20	5.75
	Decision making Power in buying Expensive Items for Household	0.11	3.89
	Decision making Power in Family Investment	0.15	5
Freedom of Movement	Having Own Mobile	0.25	12.67
	Freedom to Visit own Family	0.24	12.11
	Freedom to visit Market	0.19	8.99
Household Decision Making Power	Decision Making Power on cooking	0.14	6.67
	Decision Making Power Illness of Child	0.12	5.65
	Decision Making Power on illness of Own	0.21	12.11
Attitude Toward IPV	Whether Husband Beating Not Justified	0.10	5.55
	Whether Husband Beating Should be Reported	0.27	17.72

Source: Authors' own calculations from the Primary Survey

Table 9: Test of difference in degrees of Disempowerment across the Residential Area

Var	Observations	Mean	Mean diff	t-stat.	p-value
Urban	88	0.269	Mean Urban-mean Rural=0.049	-2.39 (df-288)	0.017
Rural	212	0.318			
Combined	300	0.303			

Source: Authors' own calculations from the Primary Survey

Table 10: Difference of Disempowerment among Population Sub-Groups

Source	Sum of Square	d.f	Mean Sum of Square	F stat.	p-value
Official Castes					
Between Groups	.150	2	.075	2.91	0.06
Within groups	7.68	297	.025		
Total	7.83	299	.026		
Education					
Between Groups	.570	2	.285	11.70	0.00
Within groups	7.24	297	.024		
Total	7.81	299	.026		

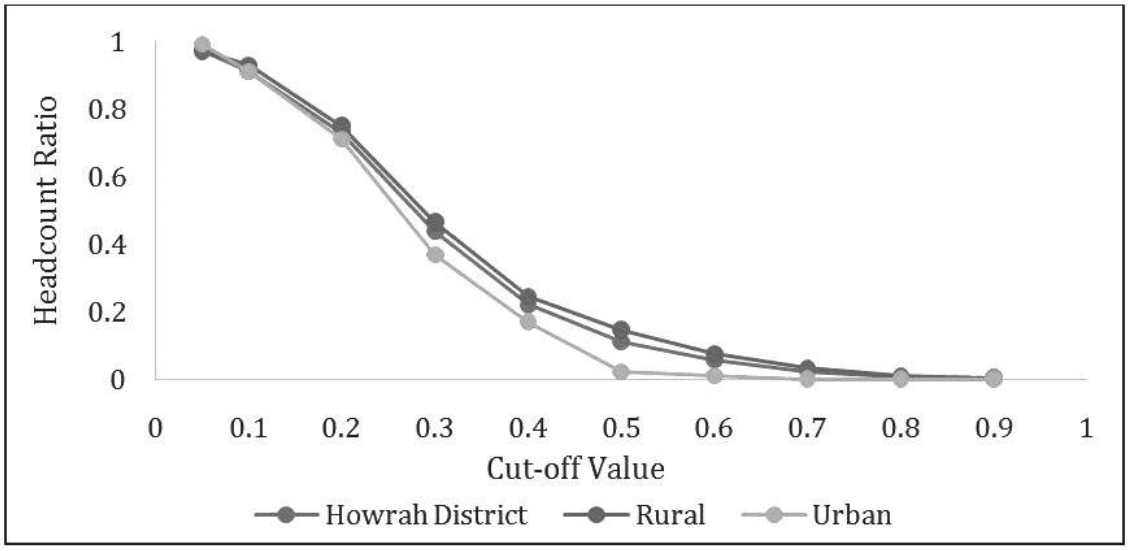
Source: Authors' own calculations from the Primary Survey

Table 11: Pairwise Comparisons of Means (Tukey Test)

Sub-Groups	Contrast	S.E.	Tukey t stat.	p value	Tukey 95 percent C.I.	
Up to Secondary vs Illiterate	-.061	.027	-2.20	0.073	-.126	.004
Beyond Secondary vs Illiterate	-.132	.029	-4.47	.000	-.201	-.062
Beyond Secondary vs Up to Secondary	-.070	.019	-3.55	.001	-.117	-.023

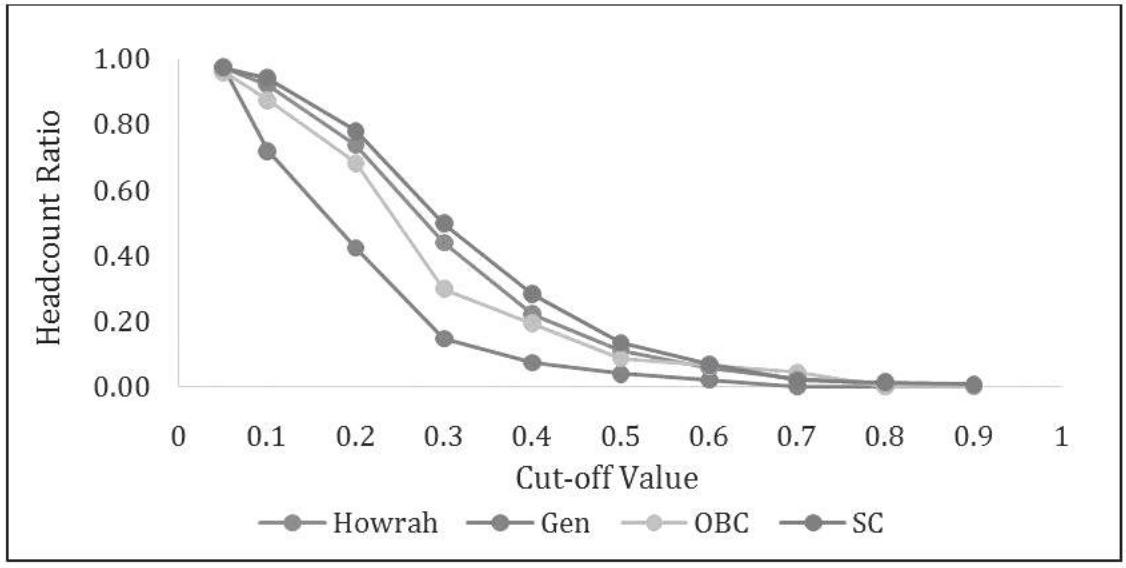
Source: Authors' own calculations from the Primary Survey

Figure 1: Women's Disempowerment Incidences with Different Cut-Off Values among Different Areas



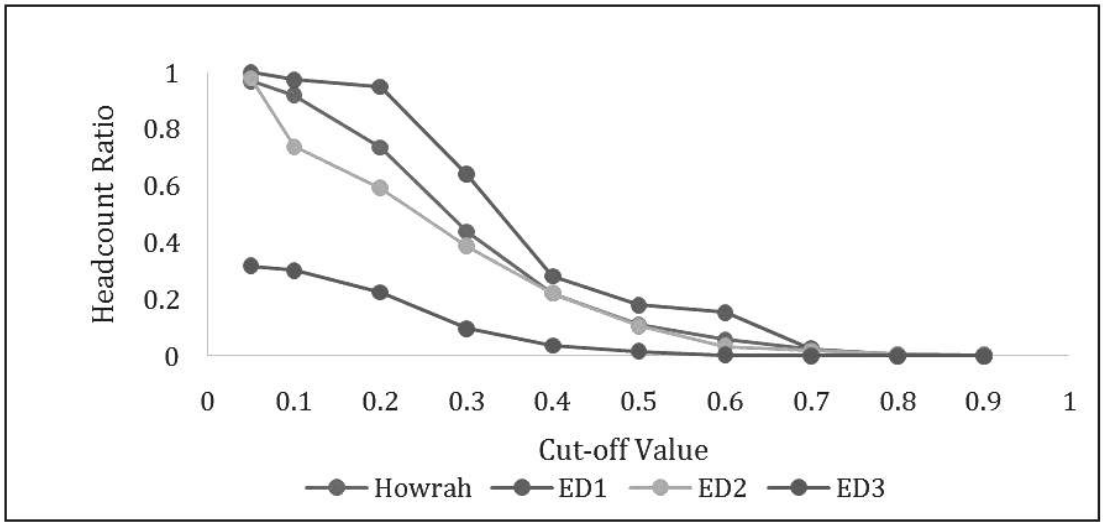
Source: Authors' own calculations from the Primary Survey

Figure 2: Women's Disempowerment Indices with Different Cut-off Values among Different Social Castes



Source: Authors' own calculations from the Primary Survey

Figure 3: Women's Disempowerment Indices with Different Cut-off Values among Different Education Groups



Source: Authors' own calculations from the Primary Survey

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Early Marriage and Discrepancy in Usage of Motherly Health Care in India: A Comprehensive Analysis of Trends and Patterns

Purnendu Modak[1]

Abstract

Purpose: *This study investigates disparities in MHC between women in early and adult marriages across 15 major states in India, focusing on trends over five rounds of the NFHS survey.*

Methodology: *The analysis employs the Achievement Model of Atkinson and the General Entropy Index to measure inequalities and uses regression analysis to examine the association between early marriage and maternal health outcomes. The study tracks changes in intra-women adjusted in the usage of MHC from NFHS-1 to NFHS-5.*

Findings: *The study finds a consistent of adverse relationship between women in early marriage and outcome of MHC in India. Over time, the relative gap in motherly health care utilization has declined in states like Bihar, UP, and WB. Kerala and TN retained top rankings in NFHS-1 to NFHS-3, but Odisha and Tamil Nadu emerged as the leading states in NFHS-4 and NFHS-5. Conversely, Bihar and Uttar Pradesh have consistently ranked lowest in all survey rounds. Some states, including West Bengal and Andhra Pradesh, showed deteriorating rankings over time. Importantly, the overall gap in maternal health care utilization between early and adult marriage groups has narrowed from NFHS-1 to NFHS-5.*

Practical Implications: *The findings underscore the need for policy interventions to reduce early marriages, enhance healthcare infrastructure, and implement targeted training programs for service providers to address intra-state disparities and improve maternal health outcomes.*

Originality: *This study provides a comprehensive temporal analysis of disparities in maternal health care utilization across 15 major states in India, leveraging robust inequality measures and offering critical insights for evidence-based policymaking.*

Keywords: *Early Marriage, Literacy, General Entropy Index, NFHS, India*

JEL Classification: I14, I15, J12, J13, O15

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1. Introduction

Motherly health care is a major issue in health and socio-economic development of a country (Ali & Chauhan, 2021). The usage of motherly cares an improved of both mothers and children, serving as a qualitative indicator of a nation's progress (Habonimana & Batura, 2021). In India, however, significant disparities in the usage of motherly health care, particularly among women who are younger brides as compared to an older bride's (Wodon et al., 2018). This intra-women disparity poses a significant challenge to achieving equitable health outcomes and socio-economic advancement (Habte et al., 2023). Early marriage, defined as marriage occurring before the age of 18 years under the Prohibition of Child Marriage Act (2006), continues to be a prevalent practice in India. Modak (2019) pointed out that the steep decline in the predominance of under-15 marriages, while marriage between the age group of 15 and 17 years continue to occur quite frequently in India. Researchers have used the term 'early marriage' for marriages occurring between 15 and 17 years of age rather than 'child marriage' (Chakravarty, 2021). According to the NFHS report (2019–2021), 23.3% of women married below the legal age of 18 between the age group of 20 and 24. This practice is most prevalent in states such as Bihar, Rajasthan, Jharkhand, UP, WB, and MP, where socio-economic and cultural norms perpetuate early marriages. Moreover, early marriage is associated with limited access to usage of motherly health care services, resulting in adverse sexual and reproductive health outcomes (Santhya & Jejeebhoy, 2020). These health inequalities further exacerbate gender disparities, limiting women's human capital development and impacting India's growingto pursue the Sustainable Development Goals (SDGs) (Parsons et al., 2015). The link between lower age at marriage and the usage of low motherly health care highlights the intersection of socio-cultural barriers (Omer. et al. 2021). Women married early often face restricted access to health education, financial resources, and decision-making autonomy, leading to poor maternal health outcomes (Shantoet al., 2023). Research suggests that delaying the marriageable age of girls by even one year can result in a 2% increase in maternal health care acquisition, emphasizing the critical role of policy interventions (Mondal et al., 2020). The National Policy of Maternal Health Care Service (2001) has set some guidelines for bridging the discrimination in maternal health care for married women, but the disparity has become quite high in India (Awasthi et al.,

2016). This paper examines the disparity in motherly health care usage among married women in India, with a focus on the differences between women married at an early age and those married as adults. By exploring the demographic, cultural, and regional factors contributing to this gap, the study aims to provide evidence-based insights for addressing these disparities. The paper is structured into five sections: objectives, data sources, methodology (achievement model and general entropy index), findings and discussion, and conclusions, which include policy implications and future research directions.

2. Review of Literature and Research Gap

Early marriage remains a pressing issue in India, especially among women from rural and economically disadvantaged backgrounds. This practice significantly influences women's admittance to usage of motherly health care services. A considerable body of literature emphasizes the detrimental effect of early marriage on motherly health care access and outcomes. For instance, studies like those by Raj et al. (2019) highlight that young brides face more motherly health care challenges than women who marry as adults. Beattie et al. (2019) provide empirical evidence indicating that Indian women who married at younger age are less likely to usage of motherly health care services, such as pregnancy care, assisted childbirth, and postpartum care, compared to those marrying at later ages. These findings underline a systemic gap in maternal health access based on the age of marriage. Social norms and cultural practices further aggravate the discrepancy in the usage of motherly health care. According to Pourtaheri et al. (2024), societies with more young brides have prevalence with traditional gender roles, often marginalizing young brides and limiting their opportunities for accessing maternal health care services. These cultural norms perpetuate intra-women disparities, particularly between early-married women and those marrying as adults. Economic factors also play a crucial role in shaping access to maternal health care services. Research by Yoosefi et al. (2023) demonstrates that early marriage contributes to economic vulnerabilities, further restricting young brides' access to essential health services. While household wealth can alleviate some of these challenges, discrepancy in motherly health care usage persist even within the wealthiest quintiles, as noted by Asefa et al. (2023). While these studies offer valuable insights, they predominantly establish an association between lower age at marriage and usage of motherly health care without delving into contextual factors or intra-group variations. Despite the existing literature on early marriage and motherly health care

usage, several gaps remain: Most studies fail to account for differences in every part of the nation, where demographically practices and young bride's pervasiveness vary remarkable. These contextual factors could influence how early marriage impacts motherly health care access. Limited research explores disparities in motherly health care usage within the group of women who married early, considering factors like household wealth, education, or urban-rural residence. Existing studies primarily focus on direct associations between early marriage and motherly health care. There is inadequate examination of potential mediating factors such as individual characteristics (e.g., education), household dynamics, children's care demands, or partner behavior. Many studies rely on older data sets like NFHS-3 and NFHS-4. There is a need to utilize newer data sets, such as NFHS-5, to analyze the trends and persistence of disparities over time.

Objective of the Study: The learning goals are as follows:

1. To investigate the association between early marriage and usage of motherly health care among bride aged 15–30 years in India
2. To compare the usage of motherly health care among women who were married at an early as compared to those who were married at an adult across 15 major states in India? Over time, will it converge or not?

Data and Methodology 1) Data Source: This paper uses National Family Health Survey (NFHS) data for the five rounds. NFHS data is basically cross-sectional data, i.e., all observations are at a given point in time. This analysis use individual-level data on the behaviour of individual women to measure five time points from NFHS-1 to NFHS-5 to check the intra-women adjusted in usage of MHC among women who were married at an early age as compared to adults in India. Here, major states are selected on the basis of the Indian Census 2011. The age at cohabitation variable is used as a proxy for age at marriage of women, because age at marriage of women does not give proper information to compute our results (IIPS & ICF, 2017). According to the NFHS-5 report, 'cohabitation' is defined as a couple living together as if bride and raising the same human rights concerns as marriage (IIPS & ICF, 2017).

2) Methodology: Achievement Model: To measure the gap in motherly/maternal health care among women in early marriage as compared to adults in India. It uses the approach of Atkinson (1970) model for measuring inequality in motherly health care. Let X is measure the achievement of women. Here, X_f and X_m denotes the achievement of early

and adult marriage women. It assume $X_f < X_m$. Moreover, N_f and N_m indicate the numbers of early and adult marriage women in the population. The mean achievement is denote by $\bar{X}$, which is given below:

$$\bar{X} = \frac{N_f X_f + N_m X_m}{N_f + N_m} \quad \text{..... (a)}$$

It can be written as: $\bar{X} = P_f X_f + P_m X_m$. Here, P_f and P_m are denotes the proportion of early and adult marriage women in the population respectively. Here, social planner objectives are to create an optimum trade-off between high level of mean achievement and minimum Intra-women gap in maternal health care. Moreover, social planner wants to increase the mean level of achievement ($\bar{X}$) in one hand and to reduce the gap between early and adult marriage women $(X_m - X_f)$. To solve this problem, then consider a social value function for achievement, which is additively, separable, symmetric and constant elasticity of marginal value. Below represent this equation—

$$V(X) = \begin{cases} \dfrac{X^{(1-\varepsilon)}}{(1-\varepsilon)} & \varepsilon \geq 0, \varepsilon \neq 1 \\ Log\ X, & \varepsilon = 1 \end{cases}$$

Here, ε denotes the chances for equality in the social valuation function, which is positive. Therefore, it can be developed by 'Equally Distributed Equivalent Achievement' (X_{EDEA}). According to social value function, for a given value of ε, X_{EDEA} is defined as below:

$$X_{EDEA} = \left[P_f X_f^{(1-\varepsilon)} + P_m X_m^{(1-\varepsilon)} \right]^{\frac{1}{(1-\varepsilon)}} \quad \text{.....(b)}$$

Where, $P_f = \dfrac{N_f}{(N_f + N_m)}$ & $P_m = \dfrac{N_m}{(N_f + N_m)}$. Here, X_{EDEA} is defined by '' $(1-\varepsilon)$ average'' of X_f and X_m rather than a simple arithmetic average of the two groups. The important results can be demonstrated as " $(1-\varepsilon)$ average" in equation (b): The optimum trade-off

is done by high level of women achievement and the Intra-women equality through X_{EDEA} for $\varepsilon > 0$. When $\varepsilon = 0$, X_{EDEA} reduces to $\overline{X}$. There is no concern for equality. But when $\varepsilon > 0$, say $\varepsilon = 1, 2...$ There is a social chances for equality.

General Entropy (GE) Index: The GE Index (Atkinson and Bourguignon, 2015) is used to measure discrepancy in the usage of healthy motherly health care among women in early marriage as compared to adults in 15 major states of India. This paper uses a parameter α that represents a weight to measure inequality in maternal health care. Here, the value of α lies between zero and infinity. Lower value of α is touchy to changes in the distribution. When $\alpha = 0$, the index is called "mean log deviation" and $\alpha = 1$, the index is called "Theil index". Moreover, $\alpha = 2$, the index is called the "coefficient of variation".

Construction of motherly/maternal health Care (MHC) Index: Motherly health care is crucial for the well-being of pregnant women. Motherly health care can be explained into four components say pregnancy care (PC) and postpartum care (PPC), along with Facility-based delivery (FBD) and skilled birth attendance (SAD). PC is defined as having a minimum of four antenatal visits with a health care provider such as a doctor, nurse, or auxiliary nurse midwife during pregnancy (Gunjan et al., 2019). Skilled attendance at delivery (SAD) is defined as delivery in a health facility or at home with a skilled attendant such as a doctor, nurse, or auxiliary nurse midwife (WHO, 2018). Facility-based delivery (FBD) is defined as delivery in a public or private health facility (Sekine & Carter, 2016). This variable is coded as "1" if a woman falls under the definition and "0" if otherwise. Postpartum care (PPC) is defined as receiving postpartum care from a skilled medical care provider in a health facility or at home at least once within 24 hours of birth (Wudineh et al. 2018). The maternal health of mother is measured by a weighted composite index. Separate weights are assigned to above variable. The weights are assigned in such a manner that women experiencing four and above Antenatal care utilization indicators have a reward of 1, whereas women who experience below the Antenatal care utilization indicator have a punishment of 0. Similarly, a woman experiencing any skilled attendance at delivery gets a weight of 1, while those who do not experience any skilled attendance at delivery get a weight of 0. In addition, women who gave birth in facility-based delivery such as public or private health centre is assigned a weight of 1, while those who do not gave in facility-based delivery are given a weight of 0. Moreover,

woman experiencing any postnatal care utilization indicator have a reward of 1, whereas women who do not experience any postnatal care utilization indicator have a punishment of 0. All these variables are binary in nature. The selection of indicators was done on the basis of those factors that affect the maternal health care utilization of mothers. The analysis is restricted on the basis of recent birth (last child). To construct a Maternal Health Care (MHC) Utilization Index of mothers using a composite index. Indicators may be on different scales or units, so normalization is necessary. Common methods include: a) Min-Max Normalization: Normalized value = $\frac{\text{Value} - \text{Min}}{\text{Max} - \text{Min}}$. This scales values to a range of 0 to 1. b) Z-Score Normalization: Z-Score = $\frac{\text{Value} - \text{Mean}}{\text{Standard deviation}}$. The centers of the data around 0 and provides comparability across indicators. Use methods like Principal Component Analysis (PCA) to derive weights based on the data structure. Weighted Average: $\frac{\sum(w_i \text{ Normalized indicator}_i)}{\sum w_i}$. Classify the MHC index into meaningful categories for better interpretation. For instance, low utilization (0 – 0.33): indicates poor maternal health care utilization. Medium usage (0.34 – 0.66): indicates moderate utilization. High Utilization (0.67 – 1.0): indicates excellent utilization. To ensure the reliability and validity of the MHC index by conducting sensitivity analysis to assess the effect of changes in weights or normalization methods. This analysis can develop a robust and comprehensive usage of MHC Index to evaluate and enhance maternal health care services. Again MHC index divided into two categories, one is healthy usage of MHC and another is non-healthy/poor usage of MHC, which is binary in nature.The weights are assigned in such a manner that women experiencing any moderate and excellent usage of MHC indicator have a reward of 1, whereas women experiencing any poor/non-healthy usage of MHC indicator have a penalty of 0. MHC index constructed at different time point in NFHS. Here, the analysis is restricted to recent birth i.e., last child. The Cronbach's α value represents that the MHC is acceptable limits ($\alpha = 0.459$ in NFHS-1, $\alpha = 0.628$ in NFHS-2, $\alpha = 0.617$ in NFHS-3, $\alpha = 0.623$ in NFHS-4 and finally $\alpha = 0.726$ in NFHS-5), which suggests that the items are reliable, robust, and consistent with each other.

3. Results

This section provides the relationship between usage of healthy MHC and women marriedat an early age as compared to adults in India. Needless to say, the usage of healthy MHC of early marriage women is a concerning issue in India. The descriptive analysis is used to show the difference in usage of MHC among women who were married at early as compared to adults in India. The findings are as follows:

Table 1. Prevalence of usage of motherly health care service of bride's aged 15–30 years who were married an early as compared to adults across 15 major states in India

State	NFHS-3				NFHS-4			
	AM	CM	IWG	RG	AM	CM	IWG	RG
Andhra Pradesh	59.67	44.07	15.6	26.14	63.41	48.52	14.9	23.48
Assam	35.85	21.19	14.66	40.89	61.53	51.11	10.4	16.93
Bihar	37.63	20.46	17.17	45.63	56.2	51.07	5.13	9.13
Gujarat	53.94	41.47	12.47	23.12	63.66	55.52	8.14	12.79
Haryana	47.1	35.41	11.69	24.82	60.65	47.64	13	21.45
Karnataka	60.86	40.32	20.54	33.75	63.16	49.04	14.1	22.36
Kerala	63.32	62.75	0.57	0.9	58.43	53.85	4.58	7.84
Madhya Pradesh	47.87	29.67	18.2	38.02	61.82	51.56	10.3	16.6
Maharashtra	59.41	46.99	12.42	20.91	64.03	54.31	9.72	15.18
Odisha	52.21	31.84	20.37	39.02	66.55	60.96	5.59	8.4
Punjab	54.2	42.04	12.16	22.44	62.6	48.46	14.1	22.59
Rajasthan	40.51	27.51	13	32.09	60.89	54.7	6.19	10.17
Tamil Nadu	63.77	51.13	12.64	19.82	67.09	47.6	19.5	29.05
Uttar Pradesh	36.15	20.43	15.72	43.49	58.96	52.99	5.97	10.13
West Bengal	51.32	39.49	11.83	23.05	60.16	51.58	8.58	14.26

State	NFHS-5					
	AM	**CM**	**IWG**	**RG**	**Change RG from NFHS-3 to 4**	**Change RG from NFHS-4 to 5**
Andhra Pradesh	59.68	45.38	14.3	23.96	2.66	-0.48
Assam	56.88	53.61	3.27	5.75	23.96	11.18
Bihar	63.24	58.37	4.87	7.7	36.49	1.43
Gujarat	61.94	57.18	4.76	7.68	10.32	5.11
Haryana	65.64	52.04	13.6	20.72	3.36	0.73
Karnataka	62.3	50.23	12.07	19.37	11.39	2.99
Kerala	64.06	57.45	6.61	10.32	-6.94	-2.48
Madhya Pradesh	66.52	54.43	12.09	18.17	21.42	-1.57
Maharashtra	62.39	52.32	10.07	16.14	5.72	-0.96
Odisha	66.66	59.86	6.8	10.2	30.61	-1.8
Punjab	60.66	51.11	9.55	15.74	-0.15	6.85
Rajasthan	64.73	55.67	9.06	14	21.92	-3.83
Tamil Nadu	67.19	52.21	14.98	22.29	-9.22	6.76
Uttar Pradesh	65.48	59.05	6.43	9.82	33.35	0.31
West Bengal	56.94	52.95	3.99	7.01	8.79	7.25

Source: Calculated by authors using NFHS (III-V) data. Note: AM denoting maternal healthcare for women in adult marriage, CM denote maternal healthcare for women in early marriage, IWG denote intra-women gap in maternal healthcare, and RG denote relative gap in maternal healthcare. Relative gap (RG) is calculated as (MHC of AM –MHC of CM) /MHC of AM) *100)

The study highlights the importance of MHC for women who marry at an early age, as early marriage is prevalent in all major states of India. Table 1 represents prevalence of usage of motherly health care service of bride's aged 15-30 years who were married an early as compared to adults across 15 major states in India**.** The relative gap is measured over a period of 15 years, from NFHS-3 to NFHS-5. In NFHS-3, Bihar had the highest relative gap in maternal at 45.63 percent, followed by Uttar Pradesh (UP) at 43.49 percent and Assam at 40.89 percent. Moreover, Kerala had the lowest relative gap at 0.90 percent,

followed by Tamil Nadu (TN) at 19.82 percent. Over time, there have been changes in the relative positions of states regarding the gap in MHC between women in early and adult marriages. In NFHS-5 data, Andhra Pradesh (AP) had the highest relative gap at 23.96 percent, followed by Tamil Nadu at 22.29 percent. In addition, Assam had the lowest relative gap at 5.75 percent, followed by West Bengal at 7.01 percent. There is a significant difference between women in early and adult marriages regarding their access to MHC across major states of India. Over the past decade, both groups have experienced volatility in their access to MHC. However, there has been more noticeable improvement among women in early marriage compared to those in adult marriage. The relative gaps have consistently declined over time from NFHS-3 to NFHS-5 for states like Bihar, Uttar Pradesh (UP), and West Bengal (WB). It is important to note that a decrease in relative gaps does not necessarily indicate an increase inequitable social sector development with regards to usage of healthy MHC across all major states in India.

Table 2. Association between women in early marriage and usage of healthy MHC in India

Independent Variables:	Dependent Variables: Usage of healthy MHC					
	NFHS-1		NFHS-2		NFHS-3	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Early Marriage	-0.525***	0.013	-0.513***	0.013	-0.445***	0.013
Observation	45,551		43,962		41,428	

	NFHS-4		NFHS-5	
	Coef.	Std. Err.	Coef.	Std. Err.
Early Marriage	-0.249***	0.005	-0.221***	0.006
Observation	222,193		208,875	

Source: Calculated by authors using NFHS-(I-V) data, *, **, and *** refer to 10%, 5%, and 1% levels of significance, respectively. Regression control for women age, women underweight, women year of schooling, work last 12 month, watching television, access to primary health centre, nuclear family, household wealth.

Table 2 presents the results of a probit model to show the association between early marriage and usage of healthy MHC aged 15–30 years in India. The dependent variable in the model is usage of healthy MHC, which is binary. Women who experience healthy usage of healthy MHC are assigned a value of 1, while those with poor or non-healthy usage of MHC are assigned a value of 0. The key independent variable is early marriage, classified as a binary variable: marriage below 18 years (early marriage) versus marriage at or above 18 years (reference category). Control variables in the model include women's age, underweight status, years of schooling, work status in the last 12 months, television viewership, access to primary health centers, type of family (nuclear or joint), and household wealth. The results reveal a significant negative association between young bride's and usage of healthy MHC across different time points in the NFHS data for India. All coefficients are statistically significant at the 1% level and indicating that early marriage (≤ 18 years) reduces the likelihood of healthy usage of MHC compared to adult marriage (≥ 18 years). These findings suggest that young bride's adversely impacts of women's who access to usage of healthy MHC in India.

Table 3. Intra-women adjusted usage of healthy MHC (Xede, ε = 1) of bride's aged 15-30 years across 15 major states in India

State	NFHS-1	Rank	NFHS-2	Rank	NFHS-3	Rank
Kerala	57.46	1	47.93	1	63.17	1
Tamil Nadu	51.81	2	46.79	2	59.39	2
Maharashtra	39.63	4	39.89	3	53.87	3
Andhra Pradesh	37.06	5	36.94	5	50.78	4
Punjab	30.57	7	35.32	7	50.43	5
Karnataka	44.08	3	39.50	4	50.08	6
Gujarat	36.95	6	35.76	6	48.16	7
West Bengal	26.00	9	33.42	8	44.52	8
Odisha	20.45	11	26.95	9	42.30	9
Haryana	26.98	8	24.86	10	40.98	10
Madhya Pradesh	17.53	12	20.51	12	38.32	11
Rajasthan	12.28	15	19.76	13	31.93	12
Assam	22.05	10	24.14	11	28.79	13
Uttar Pradesh	14.24	13	15.83	14	27.65	14
Bihar	13.22	14	15.70	15	26.54	15

(Contd...)

Table 3 (Contd...)

State	NFHS-1	Rank	NFHS-2	Rank
Odisha	64.61	1	64.46	1
Tamil Nadu	62.21	2	64.18	2
Uttar Pradesh	56.75	12	63.38	3
Kerala	57.73	8	63.28	4
Haryana	56.97	10	62.46	5
Madhya Pradesh	57.19	9	62.02	6
Rajasthan	58.09	6	61.47	7
Bihar	53.55	15	60.68	8
Gujarat	60.53	3	60.42	9
Punjab	60.28	5	58.97	10
Maharashtra	60.39	4	58.88	11
Karnataka	58.04	7	58.40	12
Assam	56.88	11	55.49	13
West Bengal	55.35	14	54.78	14
Andhra Pradesh	56.47	13	53.64	15

Source: Calculated by authors using NFHS (I-V) data,

Table 3 presents intra-women adjusted usage of healthy MHC (Xede, $\varepsilon = 1$) of bride's aged 15-30 years across 15 major states in India. To calculated Xede (equality distributed equivalent achievement) assuming an inequality aversion parameter $\varepsilon = 1$. The results show that states like Kerala and Tamil Nadu (TN) were able to maintain their positions as the top two states in terms of intra-women adjusted usage of healthy MHC from NFHS-1 to NFHS-3. However, in NFHS-4 and NFHS-5, Odisha and TN took first and second positions respectively. In contrast, Bihar and Uttar Pradesh (UP) consistently remained at the bottom two positions in terms of intra-women adjusted usage of healthy MHC from NFHS-1 to NFHS-4. There were some states that experienced a decline in rankings for intra-women adjusted usage of healthy MHC over time. These include West Bengal (WB) and Andhra Pradesh (AP) based on data from NFHS-1 to NFHS-5. On the other hand, some states showed improvement in rankings for intra-women adjusted usage of healthy MHC. Here, Rajasthan and Madhya Pradesh (MP) are examples of such states based on data from NFHS-1 to NFHS-5., In addition, some states whose

rankings were found to be volatile in terms of intra-women adjusted usage of healthy MHC. Moreover, Kerala and Punjab are examples of such states based on data from NFHS-1 to NFHS-5. Overall, Haryana and Madhya Pradesh held the fifth and sixth positions respectively in terms of intra-women adjusted usage of healthy maternal health care during this period.

Table 4. Intra-women discrepancy in the usage of healthy MHC (x_{ede}, ε = 1) among bride's aged 15-30 years at different time points in India

	NFHS-1	NFHS-2	NFHS-3	NFHS-4	NFHS-5
GE(0) / Mean log deviation					
Xede, ε = 1	0.0477	0.0261	0.0150	0.0114	0.0119
Xede, ε = 2	0.0541	0.0288	0.0163	0.0116	0.0121
GE(1) / Theil Index					
Xede, ε = 1	0.0448	0.0247	0.0143	0.0115	0.0117
Xede, ε = 2	0.0508	0.0268	0.0155	0.0118	0.0120
GE(2) / Coefficient of variation					
Xede, ε = 1	0.1109	0.0589	0.0342	0.0112	0.0116
Xede, ε = 2	0.1257	0.0641	0.0370	0.0117	0.0119

Source: Calculated by authors using NFHS (I-V) data. Note: All figures are in log point.

Table 4 presents the intra-women discrepancy in the usage of healthy MHC (X_{ede}, ε = 1) among bride's aged 15-30 years at different time points in India. These results use general entropy index to measure the disparities. The values of GE (0), GE (1), and GE (2) show a decline from NFHS-1 to NFHS-4, indicating a reduction in intra-women adjusted usage of healthy MHC. However, there is a slight increase in the values from NFHS-4 to NFHS-5. This suggests that the states are converging in terms of the intra-women gap in usage of healthy MHC, but there may still be some variability or inequalities remaining. For example, in NFHS-1, the GE (1) value for intra-women adjusted in the usage of healthy MHC was 0.0448 log points. This value dropped to 0.0117 log points in NFHS-5. Similar trends are observed for GE (0) and GE (2). The Xede values show a decline over time, indicating improved gap in the usage of healthy MHC between women in early and adult marriage in India. Overall, these finding support that there

has been an improvement in gap regarding the usage of MHC between women in early and adult marriage in India from NFHS 1 to NFHS 5. Overall, these findings indicate that there has been progress towards reducing intra-women discrepancyin the usage of healthy MHC over time, with states converging towards more equal distribution of services.

4. Discussion

The analysis reveals critical insights into the disparities in the usage of healthy MHC between younger bride's (≤ 18 years) and older bride's(≥ 18 years) across 15 major states in India. This disparity is deeply rooted in socio-economic, cultural, and regional inequalities, requiring urgent attention at multiple levels of policy and implementation. Women married early consistently face significant disadvantages in accessing MHC services compared to their counterparts in adult marriages. The adverse impact of early marriage on the usage of MHC as highlighted by the probit model results, further emphasizes its detrimental role in limiting access to health care. The regional variation in the usage of MHC paints a contrasting picture of India's health landscape. Southern states like Kerala and Tamil Nadu, known for their better health systems, literacy rates, and progressive socio-cultural norms, consistently perform well. These states highlight the long-term benefits of sustained investments in education and health infrastructure. Conversely, northern states like Bihar and Uttar Pradesh lag notably due to structural challenges such as poverty, inadequate health infrastructure, and socio-cultural barriers. While states like Odisha and Rajasthan have shown improvements, others, including Andhra Pradesh, exhibit volatility, highlighting the need for consistent policy focus and monitoring. Over five NFHS rounds, intra-women disparities in the usage of MHC have declined, as indicated by the general entropy index and Xede values. This reflects progress in narrowing inequalities and increasing convergence toward average levels of the usage of MHC. However, the unevenness in this progress, especially as seen in NFHS-5 data, suggests that some states and demographic groups remain remarkable disadvantaged. Persisting disparities in states like Bihar and UP emphasize the urgency for targeted and context-specific interventions.

5. Conclusions

This analysis highlights persistent disparities in the usage of healthy MHC between women in early and adult marriages in India, with women in early marriages facing

significant barriers to access. While there has been a noticeable improvement in narrowing these gaps over time, disparities persist, particularly in states like Bihar, UP, WB, and AP, which require focused interventions to enhance MHC for young married women. States with robust health care infrastructure, such as Kerala and Tamil Nadu, demonstrate consistently better outcomes, illustrating the importance of well-functioning primary health care systems and targeted programs. Effective community outreach, particularly through initiatives like Accredited Social Health Activists (ASHAs), has further contributed to improved MHC access in regions adopting these strategies. However, states with higher initial inequality, such as Bihar and Uttar Pradesh, show slower progress, emphasizing the need for intensified policy efforts and targeted resource allocation. The findings underscore the importance of implementing community-specific programs like the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) and Janani Shishu Suraksha Karyakram (JSSK) effectively, alongside special grants from the central government to support vulnerable groups. Inconsistent progress in some states, such as Punjab and WB, reflects the adverse impact of socio-economic challenges, migration, and shifting political priorities on maternal health outcomes. Addressing these issues requires comprehensive, context-specific strategies to reduce early marriages and ensure equitable maternal health care access for young married women. By prioritizing sustained efforts, improving health infrastructure, and enhancing targeted interventions, India can achieve more significant progress in MHC utilization and reduce inequalities across states and demographic groups.

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Scenario and Determinants of Financial Literacy among Scheduled Caste Women: A Case Study of Palakkad District, Kerala

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Abstract

It is a globally accepted fact that having adequate financial literacy and access to appropriate financial products by all sections of the population is beneficial for the entire economy. For the resource-poor people, financial illiteracy is a major barrier to participation in the formal financial system. The present study is intended to examine the extent and determinants of financial literacy among one of the vulnerable sections of the society such as SC women in Kerala. Since the proportion of SC female population in Kerala is the highest in Palakkad district, primary data for the analysis were collected from SC women in Palakkad district as a representation of SC women of Kerala. Financial literacy is a combination of financial attitude, financial behaviour and financial knowledge as proposed by OECD (2012). For the present study, financial literacy is calculated by using variables representing the three components and measuring them using Likert Scale method. The maximum value for financial literacy score was 15. If consider 7.5 (out of total score 15) as a threshold financial literacy score, only 15.7 percent respondents are financially literate. Thus it is found that SC women exhibit lower levels of financial literacy. It is observed that demographic and socio economic factors of the SC women have significant influence on their financial literacy level. Financial literacy of SC women is mainly driven by youthful age, better education, high income, exposure living, SHG membership and residential location. Socio economic backwardness is the major factor responsible for the low levels of financial literacy. Financial illiteracy and lack of need based financial products compel the poor women to rely on informal finance. Thus this marginalized community woman is unable to reap the benefits of financial inclusion.

Keywords: *Financial Inclusion, Financial Literacy, Financial Attitude, Financial Behavior, Financial Knowledge, Scheduled Caste.*

JEL Classification : G53

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1. Introduction

It is a globally accepted fact that having adequate financial literacy and access to appropriate financial products by all sections of the population is beneficial for the entire economy. An inclusive financial system is inevitable to achieve equitable and sustainable economic growth. Provision of easy and affordable financial services to all especially poor and marginalized sections is crucial for ensuring their wellbeing. Financial literacy is robustly linked to higher financial inclusion (Grohmann et. al. 2017). Financial literacy is universally recognized as a core component of the financial empowerment of individuals (OECD 2017). Financial literacy augments the wellbeing of the people. It brings an orderly financial behavior which inculcate saving culture especially among the weaker sections. Therefore, financial literacy has been expected as an important life skill to be acquired by everyone in order to ensure their financial wellbeing.

The terms financial knowledge and financial literacy are not the same although many consider both as synonyms. Financial literacy is wider than financial knowledge. According to Huston (2010) the two dimensions of financial literacy are first the financial knowledge and second the use or application of financial knowledge to make appropriate financial decisions. The Organization for Economic Co-operation and Development(OECD)/ International Network on Financial Education (INFE) (2012) defined financial literacy as "a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial well-being." In general, financial literacy is a combination of financial attitude, financial behavior and financial knowledge. Information from these three constituents is combined together to find financial literacy score.

Pan-India Financial Literacy and Inclusion Survey conducted by RBI in 2017 reveals that 32 percent Indians acquired financial knowledge; 28 percent have appropriate financial attitude and 56 percent had financial behaviour. National Centre for Financial Education (NCFE), financial literacy survey (2015) reveals that the percentage of financially literate population in India is 20 percent and the percentage of financially literate population in Kerala is 36 percent. There is wide spread gender gap in financial literacy, all India

level 16 percent females are financially literate compared to 23 percent males. In Kerala 33 percent females are financially literate compared to 39 percent males.

2. Significance of the Study

Poor financial inclusion status is linked with lower levels of financial literacy (Atkinson, A. and F. Messy 2013). For the resource-poor people, financial illiteracy is a major barrier to participation in the financial system. Poor people's need for financial literacy differs from that of others because poor have fewer resources and making the two ends meet is their primary objective. Good money management, access to suitable financial products and ability to manage limited resources is critical for poor. Kerala is one of the most financially included states in India. But the marginalized communities exhibit relatively poor status with respect to financial literacy and financial inclusion. Among the marginalized population, the women are the most socially vulnerable and the women from Scheduled Caste (SC) belong to the most deprived sections. At this juncture it is relevant to analyze, how far the women from vulnerable section are financially literate to access appropriate financial services. It seems worthy to examine the factors that facilitate financial literacy among them. Hence, the present study is intended to examine the extent and determinants of financial literacy among one of the vulnerable sections of the society such as SC women.

3. Review of Literature

This section provides an overview of a few studies related to financial literacy. Grohmannetet. al., (2017) studied the influence of financial literacy on financial inclusion at the cross country level and found that financial literacy is always robustly related to higher financial inclusion. Grohmann et. al. (2017) and Klühs et. al. (2017) revealed that the effect of higher levels of financial literacy is greatest on the "use of financial products" in financial systems that are more developed. Ramakrishnan (2011) pointed out that financial literacy can play a significant role in poverty eradication by helping the poor to acquire financial discipline in order to ensure their future financial security.

Lusardi et.al. (2010) observed strong relationship between socio demographic characteristics

and financial literacy. Joseph, (2012) found that geographical difference, education and income are the major determinants of financial literacy. Rachel and Harikumar (2018) found a positive association between educational qualification and financial literacy level among women entrepreneurs in Kottayam district of Kerala. Binod (2019) found that educational qualification, occupation, monthly income and residential location of women in Kerala are associated to their financial literacy level. Morgan and Trinh (2017) argues that the determinants of financial literacy include educational level, income, age, and occupational status in Cambodia and Viet Nam. Financial literacy levels are found to be positively and significantly related to financial inclusion.

Mathivathani and Velumani (2014) observed poor financial literacy status among marginalized rural women in Tamilnadu. Low financial literacy adversely affects their financial decision making and proper utilization of financial resources. Hung et. al., (2012) point out that SC women exhibit poor financial literacy status which adversely affect the economic well-being of their family. Joseph (2012) revealed that financial literacy enables participation in economic life by the marginalized people and enhance their financial wellbeing.

Sharma (2016) opined that there is unavailability and unawareness of banking services among poor people in India. Financial exclusion is a crucial concern amongst the low-income households that can make poor people exposed to the greedy money lenders. It widens inequality, increases poverty and obstructs overall development of the country. Serrao et. al., (2016) found a positive association between financial inclusion and improvement in the socio-economic status of vulnerable segments of the society. Krishnan (2014) evaluated the financial literacy among the tribal people of Wayanad district of Kerala and found poor financial literacy among them. There is noteworthy variation in financial literacy and financial inclusion among tribal subgroups in Wayanad.

4. Research Gap

The literature on financial literacy spread over an extensive array of problems. Previous studies found strong link between financial literacy and financial inclusion. Also many

factors like academic qualification, type of occupation, income and age contribute to the extent of financial literacy. Social development is supportive for financial literacy and inclusion. A state like Kerala is in the forefront of its social indicators and financial indicators. So we expect somewhat improved status among marginalized sections in terms of their financial knowledge and inclusion. The obtained literature is lacking such information among marginalized women community in Kerala.

5. Objectives of the Study

1. To investigate the financial literacy situation among Scheduled Caste women of Palakkad district, Kerala.
2. To discern the determinants of financial literacy among Scheduled Caste women of Palakkad district, Kerala.

6. Data Source and Methods

The present study attempts to examine the extent and determinants of financial literacy among the Scheduled Caste(SC) women in Kerala. The study mainly depends on primary data collected from the Palakkad district of Kerala. Among the 14 districts in Kerala, the number of SC females is highest in Palakkad district (13.21 percent) according to 2011 census. So, Palakkad district is selected for the present study and primary data is being gathered from randomly selected 300 SC women. To understand the financial literacy situation among them a financial literacy score has been constructed by taking three components of financial literacy (financial attitude, financial behaviour, and financial knowledge).

Financial Literacy Score is calculated by using variables representing the three components and measuring them using Likert Scale method. Considering the peculiarities of the sample respondents, only simple queries related to financial literacy were included in the survey. The maximum value for financial literacy score was 15 (5 for financial attitude, 5 for financial behaviour and 5 for financial knowledge). The overall financial literacy score ranges between 3 to 15. Financial literacy score is classified into three categories, viz. low, medium and high. Financial Literacy Score less than 6 is regarded

as low, score in between 6 to 9 is medium and score greater than 9 is regarded as a high financial literacy score.

Regression analysis was used to satisfy the objective of tracing the determinants of financial literacy. A multiple regression model is carried out to find out the relationship between socio economic variables and financial literacy score of the respondents, which is as follows.

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + U_i$$

Y_i = Financial Literacy score of i^{th} respondent, X_1 = (in Years), X_2 = Monthly Income (in rupees), X_3 = Education (Years of Schooling, in Years), X_4 = Nature of Habitat (outside SC colony = 1, inside SC colony = 0), X_5 = Membership in SHG (Yes = 1, No = 0), X_6 = Residential location (Area of Living) (Rural = 1, Urban = 0), X_7 = Activity Status (Employed = 1, Unemployed = 0), X_8 = Marital Status (Married = 1, Single = 0) and U = Random error term, α, β_1……. β_8 are parameters.

7. Discussion of the Analysis

7.1 Socio-Economic Profile of the Respondents

Socio-economic profile of the respondents is depicted in Table 1. Table reveals that sample comprises majority of the women in the age group of 26-55. Regarding the nature of habitat 79.7 per cent of respondents are living inside the SC Colony, whereas 20.3 percent are living outside the SC Colony. Illiterate accounts for 14.7 percent making literacy rate 85.3 percent. One fifths of the respondents opined that they didn't get the opportunity for formal education. Of the respondents, only 14 per cent have degree and above educational qualification. Table reveals that 53.7 percent SC women are members of SHG. Most of the respondents are married (67.7 per cent). Regarding the activity status 56.3 per cent respondents have been working in different fields whereas 43.7 were unemployed. Majority of the respondents (53.3 per cent) have an income between 1,000 to 5,000 rupees per month, while monthly income of 9.3 per cent reaches up to 10,000 rupees and only 2 per cent earn above 10,000 rupees per month. Some women (35.3 percent) are not earning at all. Overall, due to their poor occupational status the income is noticeably very low and irregular as well.

Table 1 Socio-Economic Profile of the Respondents

Attributes		Frequency	Percent
Age Group	Below 25	26	8.7
	26-35	86	28.7
	36-45	75	25.0
	46-55	46	15.3
	56-65	44	14.7
	Above 65	23	7.7
Nature of Habitat	Inside SC Colony	239	79.7
	Outside SC Colony	61	20.3
Educational Qualification	Illiterate	44	14.7
	Literate without schooling	17	5.7
	LP	32	10.7
	UP	25	8.3
	High school	17	5.7
	SSLC	91	30.3
	Plus Two	32	10.7
	Degree and Above	42	14.0
Membership in SHG	Yes	161	53.7
	No	139	46.3
Residential location	Rural	240	80
	Urban	60	20
Marital Status	Married	203	67.7
	Single	97	32.3
Activity Status	Employed	169	56.3
	Unemployed	131	43.7
Monthly Personal Income (Rs)	No Personal Income	106	35.3
	1000- 5000	160	53.3
	5000 – 10 000	28	9.3
	Above 10 000	6	2.0

Source: Primary Survey

7.2 Financial Literacy Status of the Respondents

The performance of SC women on the three dimensions of financial literacy and overall financial literacy score is depicted in Table 2. It reveals that most of the respondents (62.3 percent) scored low financial attitude score and 33.3 percent scored medium financial attitude score and only 4.3 percent scored a high financial attitude score. Most of the respondents (61 percent) scored low financial behaviour score, 34.3 percent scored medium financial behaviour score and only 4.7 percent respondents scored high financial behaviour score. Majority of the respondents (61.3 percent) scored low financial knowledge score, 32.7 percent had medium financial knowledge score and only 6 percent scored high financial knowledge score. Overall financial literacy score is obtained by adding the scores of three components of attitude, behaviour and knowledge. Most of the respondents (50 percent) scored low financial literacy score, 46 percent scored medium financial literacy score and only 4 percent scored high financial literacy score. If consider 7.5 (out of total score 15) as a threshold financial literacy score, only 15.7 percent respondents are financially literate. Thus it is found that SC women exhibit lower levels of financial literacy.

Table2: Financial Literacy Score of SC Women

Level of Score	Component Scores						Financial Literacy Score	
	Financial Attitude Score		Financial Behaviour Score		Financial Knowledge Score			
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Low	187	62.3	183	61.0	184	61.3	150	50.0
Medium	100	33.3	103	34.3	98	32.7	138	46.0
High	13	4.3	14	4.7	18	6.0	12	4.0
Total	300	100.0	300	100.0	300	100.0	300	100.0

Source: *Compiled from an estimate by Dr. Sitara V Attokkaran, Financial Literacy and Financial Inclusion among Scheduled Caste Women in Kerala*

The descriptive statistics of financial literacy score among SC women is depicted in the table 3. The minimum values of the three components of financial literacy are reported to be 1 and for overall financial literacy it is 3.14. There are only slight variations in the maximum scores of financial attitude (4.33), financial behaviour (4.43) and financial knowledge (4.25). Though there is not much variation in the component scores, the financial attitude of SC women is a little higher when compared to other two components. At the same time, it is revealed that the variability in financial attitude among the respondents is also higher than the variability in other two components. The mean scores of financial attitude, financial behaviour and financial knowledge are 2.06, 2.02 and 2.04 respectively. The mean score of overall financial literacy is 6.12 out of 15. The average financial literacy score is 6.12 implying that the financial literacy status of most of the respondents is lower than the medium level. The variability in financial literacy among respondents is found as 24.18.

Table 3 Descriptive Statistics of Financial Literacy Score

Components of Financial Literacy	Minimum	Maximum	Mean	Std. deviation	Coefficient of Variation
Financial Attitude	1.00	4.33	2.06	0.59	20.64
Financial Behaviour	1.00	4.43	2.02	0.53	26.24
Financial Knowledge	1.00	4.25	2.04	0.57	27.94
Financial Literacy	3.14	12.96	6.12	1.48	24.18

Source: *Compiled from an estimate by Dr. Sitara V Attokkaran, Financial Literacy and Financial Inclusion among Scheduled Caste Women in Kerala*

7.3 Financial Literacy Score in Different Locations of the Study Area

The financial literacy score among sample respondents in four panchayaths and one municipality in Palakkad district are shown in Table 4. Average scores of Financial Attitude is 2.06, Financial Behaviour is 2.02, Financial Knowledge is 2.05 and overall Financial Literacy Score is 6.12 for the total study area. Financial literacy score is higher in Parlai and Pattithara Gram Panchayaths as compared to the average score for the study area. There is only a slight difference in financial literacy between rural (6.09)

and urban (6.27) areas of the study area. The scores of financial attitude and financial behaviour are higher in Palakkad municipality area than in all other rural area. But financial knowledge is highest in Pattithara Grampanchayat.

Table 4 Average Financial Literacy Score of Respondents in Different Regions of Palakkad District

Rural/ Urban	**Regions**	Financial Attitude (max 5)	Financial Behaviour (max 5)	Financial Knowledge (max 5)	Financial Literacy (max 5)
Rural	Parlai Gram Panchayath	2.20	1.99	2.11	6.30
	Pallassana GramPanchayath	1.96	1.98	2.00	5.94
	Thenkurissy Gram Panchayath	1.98	1.90	1.98	5.85
	Pattithara Gram Panchayath	2.03	2.04	2.19	6.26
Rural Total		2.04	1.98	2.07	6.09
Urban	Palakkad Muncipality	2.14	2.18	1.95	6.27
Study area - Total		**2.06**	**2.02**	**2.05**	**6.12**

Source: Compiled from an estimate by Dr. Sitara V Attokkaran, Financial Literacy and Financial Inclusion among Scheduled Caste Women in Kerala

7.4 Determinants of Financial Literacy among the Respondents

The results of multiple regression model are shown in Table 5. The multiple correlation coefficient R = 0.74 indicates that there is a strong positive linear relationship between the financial literacy and socio economic variables. The estimated regression model is significant which is evident from the value of F (8,291) = 43.40, p = 0.000; with an R^2 of 0.54. The R^2 value 0.54 explains that 54 percent of variation in financial literacy can be explained by the socioeconomic variables of SC women.

Table 5 Results of Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.327	0.469		9.219	0.000***
Age	-0.013	0.006	-0.125	-1.961	0.050**
Monthly Income	0.00009	0.000	0.360	7.851	0.000***
Years of Schooling	0.128	0.019	0.444	6.801	0.000***
Nature of habitat	0.386	0.153	0.105	2.525	0.012***
Membership in SHG	0.483	0.125	0.163	3.861	0.000***
Residential location	0.283	0.151	0.076	1.874	0.062*
Activity Status	-0.195	0.138	-0.065	-1.415	0.158
Marital Status	0.206	0.137	0.065	1.511	0.132
F(8,291)=43.40, p =0.000					
R =0.74, R square=0.54, Adjusted R square=0.53					
***1% significance level, ** 5% significance level, *10% significance level					

Source: Compiled from an estimate by Dr. Sitara V Attokkaran, Financial Literacy and Financial Inclusion among Scheduled Caste Women in Kerala

The regression coefficient of each variable reveals both the strength and nature of association between explanatory variable and the dependent variable in the model. Age, income, education, nature of habitat, SHG membership and residential location were found to be significant predictors of financial literacy of SC women. Activity Status and marital status were not found to be significant in the model.

The coefficient of age -0.013 indicates that age negatively influences financial literacy i.e. one-year increase in age leads to a decrease of 0.013 in financial literacy score. Young SC women were found more financially literate compared to aged ones. Youngsters were found more interested in acquiring awareness about the cost and benefits of financial products and services. This may be because youngsters are more educated compared to elderly people. Similar result is found by Khan et. al., (2019). Many studies found that

middle aged people are more financially literates compared to young and elderly people (Atkinson and Messy, 2012; Agarwal et. al., 2009; Morgan and Trinh, 2017).

Income positively influences financial literacy ($\beta 2 = 0.00009$). One-unit increase in income leads to 0.00009-unit increase in the financial literacy score. This is in line with the findings of many studies (Bank, A. N. Z. 2008; Joseph 2012; Atkinson and Messy, 2012; Jariwala 2013; Vijaykumar 2014; Potrich et. al. 2015; Arora 2016; Klapper et. al. 2015; Choudhary 2017).

When educational status increases financial literacy increases. The coefficient value indicates that one-year increase in education standard leads to 0.128-unit increase in financial literacy score. Higher financial literacy is found among more educated SC women. Their higher educational qualifications provide them opportunities to acquire more financial awareness. Similar result is also found in many studies (Bank, A.N.Z. 2008; Potrich et. al., 2015; Atkinson and Messy,2012; Lusardi and Mitchell,2011; Arora 2016; Morgan and Trinh, 2017).

Pillai (2008) pointed out that colonization of SCs has negatively influenced their overall development due to marginalization and poor socio-cultural atmosphere. Living outside the SC colony provides opportunity for SCs to mingle with general population which positively influenced their lifestyle. In the present model the regression coefficient of nature of habitat is 0.386. It indicates that nature of habitat (living outside the SC Colony) positively influences financial literacy i.e. if they are living outside the SC colony there is a chance of 0.386 increase in the financial literacy score. Therefore, SC women living outside the SC colony were found to have more financial literacy compared to those living inside the SC colony. Respondents with degree and above educational qualification are found more in number among those living outside the SC colony (83.3 percent) could be the reason for this. Moreover, living outside the SC Colony provides them exposure to gain more financial awareness.

The coefficient of membership in Self Help Group (SHG) ($\beta 5 = 0.483$) indicates that membership in SHG positively influences financial literacy i.e. if they have membership in SHG there is a chance of 0.483-unit increase in financial literacy score. SC women who have membership in SHG were found more financially literate than non-members. Their involvement in SHG activities gives them opportunities to gain more financial knowledge and application of this knowledge. Maiti et.al. (2012) and Ahmad (2017)

also opined that SHGs were imparting money management skills and financial awareness among member women which considerably enlarge their involvement in economic activities.

Arora (2016) revealed that rural women were found to be less financially literate compared to those from urban area. The present analysis contradicts this finding. The regression coefficient of residential location ($\beta_6 = 0.283$) indicates that residential location positively influences financial literacy i.e. if they are living in rural area there is a chance of 0.283-unit increase in financial literacy score. Rural SC women were found more financially literate compared to those from urban area. This may be because of the higher educational qualification found among the rural respondents. All respondents with degree and above educational qualification were from rural area.

8. Outcome of the Study

The analysis results in the following outcomes

- The financial literacy of SC women in Palakkad district is low. If consider 7.5 (out of total score 15) as a threshold financial literacy score, only 15.7 percent respondents are financially literate. The average score of overall financial literacy is 6.12 out of 15. The average scores of financial attitude, financial behaviour and financial knowledge are 2.06, 2.02 and 2.04 respectively (out of 5).
- Age, income, education, nature of habitat, SHG membership and residential location were found significant predictors of financial literacy of SC women. The demographic and socio economic factors of the SC women had significant influence on their financial literacy level. Financial literacy of SC women is mainly driven by youthful age, better education, high income, exposure living, SHG membership and residential location.

9. Conclusions

Present study gives an insight in to the financial literacy status among the SC women in Kerala. Financial awareness is particularly significant for weaker sections because it positively influences the quality of life. The three components of financial literacy like financial attitude, financial behaviour and financial knowledge are very important in defining financial literacy. Poor financial literacy status is found among the SC women in the study area which imply that the above mentioned components are low among them. Socio economic features of the SC women considerably influenced their financial

literacy status. Socio economic factors exert an influence on financial literacy. Financial literacy of SC women is mainly driven by youthful age, better education, high income, exposure living, SHG membership and residential location. Socio economic backwardness is the major factor responsible for the low levels of financial literacy. Financial illiteracy and lack of need based financial products compel the poor women to rely on informal finance. Thus this marginalized community woman is unable to reap the benefits of financial inclusion. Even though alternate channels are being tried and tested by authorities and policy makers, these marginalized sections are still in the nascent stage. So there is wider scope for improvement, if concerned authority provides specialized policy for financial literacy to the poor and weaker sections. Financial institutions, media, NGOs, SHGs and Local Governments should take measures to provide financial literacy programmes to the vulnerable sections so that they can access formal financial services. Financial literacy programmes should make radical changes in the financial attitudes of weaker sections in order to transform financial knowledge into desirable financial behaviour, thus making them responsible clients of financial services. Special training should be given to enable low-income women to act with financial prudence.

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How Far Do Indian Forest Policies Help in Natural Forest Conservation?

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Abstract

On the way to offset global warming and reverse the signs of climate change, there is an uprise in forest conservation campaigns and initiatives worldwide. The present study aims to pinpoint various Acts and Policies relating to forest conservation in India; from its inception in the colonial period till the very recent Forest (Conservation) Amendment Act, 2023, along with highlighting the incessant changes in the definitions of forest cover and an Environmental Impact Assessment of the National Forest Policy, 1988. Further, this study attempts to assess the trends of total forest cover growth, and also categorizing the three types of forests – very dense forest, moderately dense forest and open forest, during 2003-2021, at national and sub-national levels, following India State Forest Reports. It is seen that India's total forest cover has remained fairly stable over the decades despite implementation of various Forest Acts and Policies. In fact, the continuous changes in the definition of forest cover have significantly contributed to preserving one-third greenery in India. However, the study raises question on the types of plantations that India has adapted to mitigate the global challenge. The study concludes that more focus should be on effective conservation of moderately dense and open forests, besides the very dense ones, to retard natural forest degradation, especially in the North-East region.

Keywords: *Forest Cover, Forest Classification, Forest Policy, Forest Conservation, Deforestation, Forest Degradation.*

JEL Classification: Q2, Q5, Q23, Q56, Q57

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1. Introduction

There are worldwide campaigns for reviving forests to enhance the quality of ecosystem and acclimatize climate change (Gosain et al., 2015; Griscom et al., 2017). About 20 percent of global greenhouse gas (GHG) emission is primarily from carbon dioxide (CO2) emissions caused by deforestation.[3] During 2003–2012, the changes in forest cover (FC) resulted in a biophysical land warming. Around 18 percent of worldwide biogeochemical shift was due to CO2 emissions caused by land-use changes (Alkama & Cescatti, 2016). Global Forest Resources Assessments (GFRA, 2020) report also portrayed that the forest area declined from 4,106, 317 to 4, 058, 931 (in 1000 ha) during 2010-2020. However, detail analyses on the bio-mass productivity of forest ecosystem, forest strata, tree species, and soil nutrient dynamics are vital from the point of view of basic ecology as well as for designing conservation programmes and forest management policies (Singh & Singh, 1987). According to the 17 Sustainable Development Goals (SDGs), restoration of FC is therefore the 15th criterion to support 'Life on Land' (Zhang et al., 2020).

Currently, climate crisis in India has become extreme with severe weather events of heightened frequency and magnitude. The study by Gopalakrishna et al. (2022) found that with a cumulatively sequestering 61.3 TgC (teragrams of carbon), around 1.58 Mha of India's land was additionally entitled for refurbishment. The study also found up to 14.67 Mha of prospect for agroforestry in existing agricultural land nationwide, delivering up to 98.1 TgC. However, amounting to 11 percent of its land area, India possessed 31.3 Mha (million hectare) of natural forests, but it lost 134 kha (kilohectare) of natural forests in 2023, which accounted for 81.9 Mt (metric ton) of CO_2 emissions.[4] The Global Forest Watch reports that during 2001-2022, Indian forests emitted on an average 51 Mt of carbon dioxide equivalent (CO_{2e}) and removed 141 Mt of CO_{2e} per year. This signifies a net carbon sink of 89.9 Mt of CO_{2e} a year.[5] Strangely enough, FC in India is increasing as per the latest Forest Survey of India (FSI) reports. According to Economic Times, it is a result of a "statistical jugglery and the application of flawed definitions" by the Indian Forest Department.[6] Moreover, the assumption itself – a forested area can be a perfect substitute for another by disregarding the geographical, biological and social diversity amid them –

3 https://www.edf.org/sites/default/files/10333 Measuring Carbon Emissions from Tropical Deforestation—An Overview.pdf

4 https://www.globalforestwatch.org/dashboards/country/IND/

5 https://indianexpress.com/article/india/india-lost-2-million-hectares-of-tree-cover-since-2000-global-forest-watch-9266750/

6 https://economictimes.indiatimes.com/indias-forests-are-in-serious-decline-both-in-numbers-and-health/articleshow/12540825.cms

is quite threatening and contradictory to the very concept of forest diversity (Ghosh, 2015; Kill, 2014).

In India, while ownership of about 3 percent of forest land is held by the private entities, the State Revenue Department holds around 4 percent, and lastly but primarily 93 percent is owned by the State Forest Department (Report of the National Forest Commission, 2006). As per the agency track records on forest land diversion proposals, forest depletion is carried out effortlessly without facing any resistance. About 45 percent of the 13,656.60 hectares forest land recommended for diversion was the habitat grounds for wild animals (Legal Initiative for Forest and Environment (LIFE), 2019). Directed by the Forest Conservation Act (FCA), 1980, the Ministry of Environment, Forests and Climate Change (MoEFCC) therefore required to efficiently examine and inspect forest loss due to the enactment of development projects in general (Asher & Bhandari, 2021). However, the requisite procedure for forest land acquisition through clearance has now been demoted to a mere transactional protocol, as this criterion is being hardly prioritized.[7] In the last three decades, India lost around 14,000 sq km of forests - around 4,947 sq km was captured by mining, followed by the projects of defense (1,549 sq km) and hydroelectric projects (1,351 sq km).[8] Nearly 90,000 ha (hectare) of Indian forest lands have been approved for "non-forestry purposes"[9] during January 2018 - March 2023[10]; hence, forests other than being a revenue generating resource, is also objectified as 'land bank' for other land usage requirements (Bhojvaid et al., 2016).

Forests differ by their species diversity and above ground biomass. Hence, the rise of plantation forests instead of the natural ones cannot be a major help in combating climate change, and thereby, the primary objective of this study is to analyze how far Indian Forest Policies with the changing definition of FC have helped in effective forest conservation. The specific objectives are

1. to pinpoint various Forest Acts and Policies introduced in India since the colonial rule with regard to forest conservation, and up to the latest Forest (Conservation) Amendment Act (FCAA), 2023,
2. to highlight how the definition of total FC has changed over time in India which has implication on effective forest conservation,

7 https://www.downtoearth.org.in/blog/forests/flawed-forestry-clearance-mechanism-needs-an-urgent-fix-56685

8 https://scroll.in/article/809286/in-just-30-years-india-has-lost-large-forests-to-23716-industrial-projects

9 Utilization of forest lands beyond the objective of afforestation falls under the category of non-forestry purposes.

10 https://www.hindustantimes.com/india-news/unprecedented-forest-diversion-90-000-hectares-of-land-approved-for-development-projects-in-india-101691214967522.html

3. to do an Environmental Impact Assessment (EIA) for the implementation of the National Forest Policy (NFP), 1988 which was a landmark measure undertaken towards forest conservation,
4. to analyze the trends of FC growth for the very dense forest (VDF), moderately dense forest (MDF) and open forest (OF), at the national level during 2003-2021, and subsequently to estimate the Compound Annual Growth rates (CAGR) of FC of these categories at national and regional levels so that to observe the regional status, and thereby, to help the policy makers to frame target-based policies, and
5. to examine the types of plantations in India which have serious policy implication regarding preservation of natural resources.

2. Methodology

2.1 Data

The study utilizes data extensively from the India State Forest Reports (ISFR), which is a biennial data. This data is published by FSI under the MoEFCC. Data from other published sources i.e., either in print or electronic media have also been used for the study.

2.2 Methods Used and Conceptual Building of the Study

In addition to drawing attention to various Forest Policies, the study attempts to analyze natural forest conservation in India at national and sub-national levels. Therefore, the analysis is done considering 27 States and five Union Territories (UT) of India, under the 5 regional zones, which is represented in Table 1. These selected States and UTs bear the largest FC as a percentage of their geographical area (GA).

Table 1: Regional Classification of the States and UTs in India

Region	State & UT
East (E)	West Bengal, Odisha, Jharkhand and Bihar
North-East (N-E)	Tripura, Sikkim, Nagaland, Mizoram, Meghalaya, Manipur, Assam and Arunachal Pradesh
North (N)	Uttar Pradesh, Uttarakhand, Rajasthan, Jammu & Kashmir and Himachal Pradesh

(Contd...)

Table 1 (Contd...)

South (S)	Tamil Nadu, Kerala, Karnataka, Andhra Pradesh and Andaman & Nicobar Islands
Central and West (C-W)	Maharashtra, Madhya Pradesh, Gujarat, Goa and Chhattisgarh

Source: Prepared by authors based upon Agricultural Statistics at a Glance (2021) classification

While doing EIA for a forest conservation policy, the study adopts the technique of ***Before-and-after without control design***, under informal experimental designs. In such a design, a single test group (India) is selected and the dependent variable (growth rate of FC) is measured before and after the introduction of treatment (Forest Conservation Policy of India, 1988). The effect of the treatment would be equal to the level of phenomenon after the treatment minus the level of phenomenon before the treatment.

Subsequently, to calculate the momentum of FC growth, the study estimates CAGRs of various forest categories using the following formula:

CAGR = [(Ending Value/Beginning Value) ^ (1/Number of Periods)] - 1

Where, the *Beginning Value* corresponds to the starting of a reference period, *Ending Value* corresponds to the end of that reference period.

Finally, the types of plantations in India are studied in view of natural resource management and conservation.

3. Results & Discussion

3.1 Forest Conservation Policies in India from Pre-Independence to Post-Independence

With authoritarian forest governance, the East India Company exploited forests for the expansion of agriculture, railways and other commercial activities for revenue generation; thereby treating them as inexhaustible resource. The 'Conservation' measures were indifferent towards ecological concerns (Guha, 1983), and the motto of the colonial rulers was to socially alienate forest dwellers and village communities from forests, and thereby classifying a 'Common Property' (forests) as a 'State Property' for revenue augmentation (Tripathi, 2016). Afforestation measures by the colonial rulers were essentially an imperial experiment, where India functioned as a suitable training ground. Table 2 shows the timeline of forest administration and conservation from pre-independence to the recent times in India.

Table 2: Measures for Forest Conservation since the Colonial Era to the Recent Times in India

Year	Action Taken	Aim
1807	Royalty rights were seized by the East India Company over teak	The conservators assigned themselves as the authority to sanction permissions for teak felling and selling (in order to prohibit unapproved teak felling); i.e. forest dwellers and other locals were debarred from taking forest timber for their domestic needs.
1846	The sovereignty to sanction rights over teak was extended further to all forests and forest-based products	To propagate the prohibition of local rights for timber use and to conduct unlimited extraction of timber from all kinds of forests.
1860	The East India Company protracted its sovereignty over the entirety of forest lands.	The Company obstructed and withdrew all possible entry, rights and entitlements of the locals over forest resources.
1864	The Imperial Forest Department was established.	The purpose was to legalize their domination with administrative support, to reinforce Government control over forests. Additionally, forestry was transformed into a scientific operation, making it out of reach of the forest dwellers.
1865 **1878** **1927**	A Series of Forest Acts were announced.	To monitor the transit of forest products, to levy duty on forest produce and to regulate scientific operations in forestry.
1952	After setting up the Central Board of Forestry in1950, the National Forest Policy (NFP) was introduced in 1952.	To use the forest lands and forest products in a balanced and ethical way; minor forest produce could be used by the forest communities. To restrain forest diversion for agricultural purposes and check soil denudation in susceptible zones. One third of country's land should be under forest cover and to preserve the country's flora and fauna.

(Contd...)

Table 2 (Contd...)

1980	Forest Conservation Act (FCA)	Conservation of forests and reduction of State jurisdiction power over forests.
1988	With the newly formed Ministry of Environment and Forest (MoEF) in 1985, the NFP of 1988 was announced.	Proposed to bring 33 percent of India's GA under tree/FC. Preservation of ecological balance was stressed upon. Basic needs of rural and tribal communities (who were dependent upon forest) were to be taken care of, which initiated Joint Forest Management in India.
1996	T.N. Godavarman Thirumulkpad versus Union of India & Ors. Case (1996).	The Supreme Court of India mandated that tree felling had to be stopped at a National level. The prime focus was the effective implementation of the FCA, 1980.
2006	Forest Rights Act (FRA), 2006, was introduced.	To reclaim the century old rights of the tribal and traditional forest dwellers on forests.
2014	National Agro-forestry Policy (NAP), 2014.	To preserve natural ecosystems and cultivate crops which are weather resilient; thereby boosting India's tree/forest cover.
2023	Forest (Conservation) Amendment Act, (FCAA), 2023.	To revise the FCA 1980; to assure the FCA's operation and provision over recorded forest lands, private forest lands and plantations.

Source: Prepared by authors

In the interim, a breakthrough event in 1976 was the 42nd amendment of the Constitution through which forests as a subject was transferred from the State List to the Concurrent List; thereby reducing the State's power and escalating the Centre's power over forests. As of 1st December, 2023, FCAA has been implemented where forestland encroachments are sped up under the Amended Act[11]. Instead of addressing the drawbacks of the parent Act (FCA, 1980) owing to forest clearance system, the new amendment is overriding the legitimate and constitutional commitments.[12] In its attempt at modification of the

11 https://frontline.thehindu.com/environment/the-forest-conservation-amendment-act-2023-dramatically-alters-forest-governance-in-india/article67726166.ece

12 https://www.downtoearth.org.in/blog/india/why-forest-conservation-amendment-act-may-be-deemed-unconstitutional-95218

FCA, 1980, the FCAA has given provision of clearing forest lands adjacent the international borders; nearly about a distance of 100 km. Thus, it creates threats to the core forests by snatching them for projects which presumably are for the sake of national security or importance.[13] The laws also create threats to the fragile and hyper sensitive ecosystems of Himalayan, Western Ghat regions and majorly the N-E region of India. It, thereby, is seemingly promising for the Central government and its private partners at the cost of the autonomy of the State governments and the local forest communities. The Act is also condemned as it advocates new activities to be included for broadening the periphery of forest and wildlife conservation; through zoos, safaris and eco-tourism facilities.[14]

The FCAA also proposes to provide exemptions to those lands which were diverted for non-forest purposes on or before the 12th December, 1996, by the States or UTs of India. According to ISFR (1999), about 70 percent of the 90,695 ha area leased out for carrying mining activities, which fell under the VDF category of forests in Madhya Pradesh, Orissa and Bihar. Forest lands which were leased for non-forestry purposes for a certain period, were supposed to be returned to the government by law; however, the Act exempts these lands from repossession.[15] Also, the Act do not bear any clause for propagating the idea of inclusion, coordination and cooperation with the forest communities and local dwellers.[16] Moreover, as per the 2023 Act, the 'Deemed Forests' could be mandated for land diversion without requisition of any consent from or consultation.[17] Again, forest lands in Districts which were affected by left wing extremism, are exempted up to 5 hectares, for setting up public utility projects. The Act therefore is regressive, due to its resemblance to the pre-independence mindset which aims accentuating dominance over nature and providing a legal recognition of forest conservation without actually acknowledging its innate value and importance.[18] Thus, to effectuate the increase in FC, active and generous participation of forest communities is pivotal.

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13 https://frontline.thehindu.com/environment/the-forest-conservation-amendment-act-2023-dramatically-alters-forest-governance-in-india/article67726166.ece

14 https://www.downtoearth.org.in/blog/india/why-forest-conservation-amendment-act-may-be-deemed-unconstitutional-95218

15 https://www.downtoearth.org.in/blog/india/why-forest-conservation-amendment-act-may-be-deemed-unconstitutional-95218

16 https://www.downtoearth.org.in/blog/india/why-forest-conservation-amendment-act-may-be-deemed-unconstitutional-95218

17 https://frontline.thehindu.com/environment/the-forest-conservation-amendment-act-2023-dramatically-alters-forest-governance-in-india/article67726166.ece

18 https://www.downtoearth.org.in/blog/india/why-forest-conservation-amendment-act-may-be-deemed-unconstitutional-95218

3.2 Changing Definitions of Forest Cover

It is very important to analyze forest classification before going into conclusion regarding change in FC over time in India. Forest classification was a colonial brainchild, well-strategized for prohibition of customary and livelihood rights of the locals, and for commercial exploitation of forests; wherein timber extraction was disguised in conservation programme (Patnaik, 2007). It had been observed that majority of the National Forestry Programmes, instead of targeting for forest regeneration, primarily aimed at forest utilization (Venkatasubramanian & Bowonder, 1980). Table 3 shows classification of forests from pre-independence era to the present times.

Table 3: Classification of Indian Forests from Pre-Independence Era to the Present Times

Period	Act/Policy/Implementing Bureau with Year	Classification
Colonial Period	Forest Act of 1878	Reserved Forests, Protected Forests and Village Forests.
	Forest Policy Resolution of 1894	Conservation Forests, Commercial Forests, Minor Forests and Pasture Lands.
Post Colonial Period	NFP, 1952	Protected Forests, National Forests, Village Forests and Tree Lands.
	NCA, 1976	Protected Forests, Productive Forests and Social Forests.
	Recorded Forests (1987-1999) as per FSI	Reserved Forests, Protected Forests and Unclassed Forests. FC was the aggregate of Dense Forest, Open Forest and Mangroves. (Only those areas were considered as forests which were under the government records)

(Contd...)

Table 3 (Contd...)

	Total FC (2001)FSI redefined total FC in 2001	Dense Forests and Open Forests. (Ownership of forests were no more considered; Mangrove forests were declassified as a separate class and merged with total FC, where they were classified into Dense and Open Forests)
	Total FC (2003)FSI revised the definition of total FC in 2003	Very Dense Forests, Moderately Dense Forests and Open Forests.(In order to track the changes in forest vegetation quality more closely; since the category 'Dense' was too wide and it enveloped a large variation of crop density. Moreover, this classification carried the motivation that crucial or remarkable changes in canopy density within a specific class should not go unreported)

Source: Prepared by authors

3.3 EIA for the NFP, 1988

EIA plays a decisive role in endorsing sustainable development by recognizing likely impacts, and thereby, suggesting mitigation measures. In India, NFP, 1988 was a landmark measure undertaken towards forest conservation. Hence, while doing EIA of the NFP, 1988 at India level, average rates of growth of FC are computed for the two periods - prior to this Policy (from NFP, 1952)[19] and after this Policy (until 2021)[20], and then the effect of the treatment is analyzed.

19 Calculated from the work of Bhojvaid et al. (2016)

20 Calculated from ISFR data

Therefore, the treatment effect = (Z) – (X) = 3.02 percent, which indicates an augmentation of FC growth due to the implementation of NFP, 1988.

Moreover, if the average rates of growth of FC are calculated for the three decades separately subsequent to the NFP, 1988, then it can be found that this rate was 0.96 percent until 2000, then it reduced to 0.49 percent in the next decade, and after that and until 2021, the growth rate was 0.62 percent. This is suggestive of the facts that the newly formed MoEF coupled with NFP, 1988 and JFM practices boosted forest conservation initially; however, with time this initiative condensed, as the claim for tribal rights on forest land surfaced. Afterwards, NAP, 2014 emphasized on preservation of natural ecosystem, along with the targets to achieve SDGs 13 (Climate action) and 15 (Life on land).

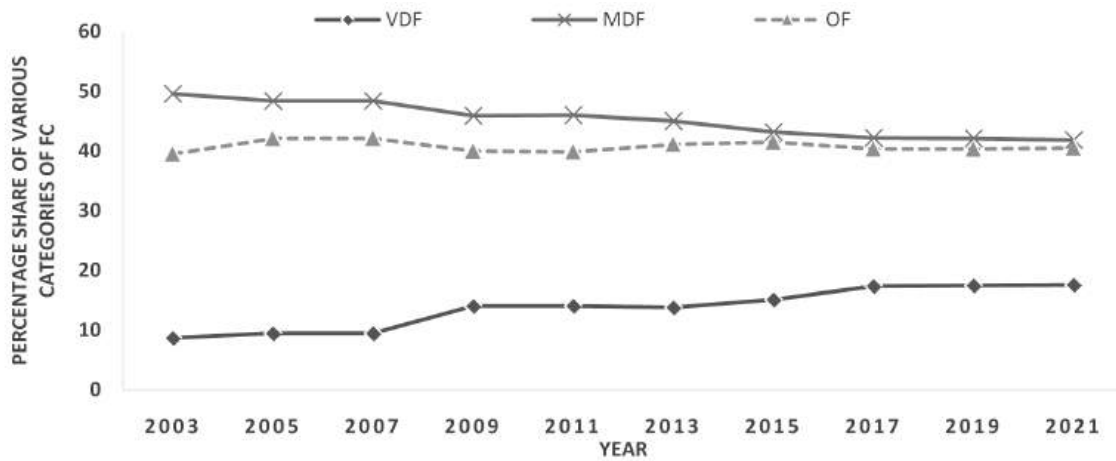
Furthermore, when considering CAGRs of FC, about -3.3 percent and 0.70 percent growth rates were found for the two mentioned periods – before and after the NFP, 1988. Therefore, the treatment effect also reflects an increase of 4 percent FC.

3.4 Growth of Various Types of Forest Cover at National and Sub-National Levels

One of the primary traditions in the French forestry was *taux de boisement* (the idea of fraction of FC woodedness of a country). Thus, the origin of 30 percent mandatory FC in the current times could be linked back to the French lineage of colonial India (Davis & Robbins, 2018). Notably, when FC in 2003 was compared with that of 2001, it was found

that out of the overall increase of 2,795 km2 of FC in the last two years, there was a decline of 26,245 km2 in the dense FC, while the open FC expanded by 29,040 km2 (ISFR, 2003). This established the fact that despite reclassification and more stratification of forests, rampant deforestation was widely prevalent in the dense areas. Thus, bringing in more lands under the umbrella of FC was only to whitewash the actual scenario. Currently, GFRA of India (2020) also revealed that out of the total forest area in India, the rise in naturally regenerating forest was more or less constant, while the increase in forest area had been registered by many folds under plantation forests. Unfortunately, the data published in the ISFRs do not distinguish FC between naturally generating and plantation forests. This study therefore attempts to examine the pattern of FC growth during 2003-2021, under the three broad categories – VDF, MDF & OF in details. Figure 1 shows the trends of the share of three categories of forests in total FC, at India level.

Figure 1: Trends of Various Types of FC - VDF, MDF and OF Growth at the National Level during 2003-2021



Source: Prepared by authors from FSI reports (2003-2021)

It is evident from Figure 2 that forest degradation is more pertinent for the MDF and OF categories as compared to the VDF category. Thus, conservation measures should give priority to the first two categories of forest. Moreover, VDF is relatively much smaller in comparison with OF and MDF; and hence assorted conservation and preservation are more feasible for this class. VDF makes up for only 13.98 percent of the total FC in India; however, MDF makes up for the bigger share, around 42.99 percent. In fact, VDF is the most protected zone since human activities are strictly restricted. But, the picture is quite different for the MDF and OF categories, where unrestricted human

activities often result into forest depletion and degradation. The general result therefore is that the percentage share of VDF in total FC is rising, where the VDF makes up for 3.04 percent of country's GA. The percentage share of OF in total FC is relatively constant, where the OF makes up for 9.34 percent of country's GA. Lastly and more importantly, the percentage share of MDF in total FC is seen to be falling where MDF makes up for 9.33 percent of country's GA (ISFR, 2021). The study result is similar to the ones where it is depicted that during 2002-2023, India lost the 4.1 percent of total area of humid primary forest, making up 18 percent of its total tree cover loss.[21] Also, dense forest areas in Northern, Central and Southern regions, and in Western Ghats have dropped by 2.84 percent, 4.38 percent and 5.77 percent, respectively, over the last ten years.[22] Thus, conservation policies should be so orientated that the real mitigation can be possible as per the requirements for carbon sink.

Estimates of CAGR of FC of Various Forest Categories at National and Regional Levels

At this instant, the CAGRs of the three types of FC are estimated during 2003-2021, for the five regions and also at all India level, and are presented in Table 4.

Table 4: Estimates of CAGR of Different Types of FC across Regions and at India Level (in percentage)

Forest Category	N	N-E	E	C-W	S	India
VDF	3.41	4.46	2.23	5.23	3.80	3.87
MDF	-0.69	-0.27	-1.02	-1.38	-1.47	-0.89
OF	-0.25	-0.59	0.43	0.46	-0.04	-0.08
Total FC	**0.13**	**-0.17**	**0.70**	**0.14**	**0.54**	**0.09**

Source: Estimated by authors from FSI reports (2003-2021)

Table 4 shows that other than the N-E zone which faced a negative CAGR of total FC; all other zones experienced positive CAGRs during 2003-2021. The performance of the E region is best, and followed by the S and C-W and N regions, respectively. Furthermore,

21 India Deforestation Rates & Statistics | GFW (https://www.globalforestwatch.org/dashboards/country/IND/)

22 https://scroll.in/article/809286/in-just-30-years-india-has-lost-large-forests-to-23716-industrial projects

when we look at the CAGRs of the three types of FC, it is only the VDF class which experienced positive CAGRs at both national and sub-national levels; where the increase is most for the C-W region, and then N-E, S, N and E regions, respectively. However, MDF experienced negative CAGRs at both national and sub-national levels. The fall in MDF is most for the S region, and followed by C-W, E, N and N-E regions, respectively. CAGRs of the OF were positive for E and C-W zones, but forest conservation was not at all satisfactory at the national level. OF mostly decreased in the N-E region, and then followed by the N and S regions, respectively. One more striking feature is that though in the N-E, N and S regions both MDF and OF reduced over time, this fall is most significant in the N-E region, and thereby this region perceived a considerable loss in total FC. This might be due to land acquisitions and practice of shifting agriculture in the open forest areas of the N-E region. ISFR (2021) also states that the loss of forests in the N-E region is mainly due to tree felling, shifting agriculture, development activities, natural calamities and anthropogenic pressure. Moreover, since the major areas of the forest lands in the N-E region is 'unclassed' (ISFR, 1987), i.e. they do not hold specified legal status, so afforestation schemes and scientific management practices might not be applicable there. The private owners and local communities might claim ownership over these unclassed lands and/or might continue with shifting agriculture in order to maximize their returns.

Furthermore, ISFR (2021) exposed that although Indian forests covered 21 percent of the total land area, only 5.3 percent of it was under the strictly protected zone.[23] The State Tamil Nadu lost about 500 sq km of dense forests between 2001 and 2003, and recovered about 1,600 sq km of open forests – which is indicative of the fact that dense forests are increasingly getting transformed into moderately dense, while the moderate ones are becoming open forests.[24] Also, plantations of non-native species is more prevalent in open and less dense forests, where human population is less than the dense ones.[25] Plant invasions presumably scale down native plants and deteriorate habitat conditions; thereby endangering the ecosystem (Raghubanshi & Tripathi, 2009; Sankaran et al., 2017). According to Pyšek et al. (2020), unmanaged invasions in general can even trigger global pandemics, heighten biodiversity loss and functional erosion of ecosystems, and ultimately can lead to collapse of ecosystem services.

It also reveals that the net increase in FC is almost negligible; which is a point of contention

23 https://www.nature.com/articles/d41586-024-00152-2

24 https://economictimes.indiatimes.com/indias-forests-are-in-serious-decline-both-in-numbers-and-health/articleshow/12540825.cms?from=mdr

25 https://www.downtoearth.org.in/news/wildlife-biodiversity/no-food-in-forests-bears-langurs-throng-uttarkahand-apple-orchards-as-native-vegetation-gets-taken-over-by-invasives-94087

in view of the fact that despite so many forest Acts and Amendments since independence, retaining one third greenery of the nation has remained a big challenge. Furthermore, India actually practices a mix of afforestation and reforestation.[26] FC assessments include the integrated changes in the areas inside the Recorded Forest Areas (RFA), as well as outside of RFA.[27] During 2019-2021, area under FC increased by 1530 square km. Though seemingly appreciative; however, out of this increase – only 32 sq km was inside RFA, while the remaining was made up by the outside RFA (ISFR, 2021). Thus, it would not be a wrong to claim that afforestation, which is often considered to be a cure for environmental hazards, involves with biopolitics (Davis & Robbins, 2018). The potentiality of naturally regenerative forests in carbon sequestration is proven to be 40 times higher as compared to that of man-made plantations.[28] Therefore, to sustain civilization, we essentially need to mark the words of environmentalists and indigenous forest dwellers (Davis & Robbins, 2018).

3.5 Types of Plantations in India

The British foresters who practiced silviculture in India were educated in the European forestry schools (France's National Forestry School in Nancy). There the usefulness of trees was determined by aesthetical parameters to maintain the uniformity for enabling timber extraction of excellent quality, and therefore, the deformed ones were cut down (Davis & Robbins, 2018). The British regime in India led to the plunge in management systems and traditional conservation by refraining the locals from intervening into the forestry practices.

Thus, while talking about the types of plantations in India, in the colonial period, pines were planted in the Himalayan region, which were brought from Europe and North America. Pine displaced the native oak trees. According to Gosain et al. (2015), oak forests can stock twice the level of carbon in vegetation and soil pool, as when compared to the pine forests. Plantation of teak was introduced in Central India, by giving away grasslands to teak monoculture. Teak replaced traditional sal trees mostly. However, both oak and sal are valuable for timber, resin, fuel, fodder, medicine, oil, fertilizer, etc. Eucalyptus plantation was also introduced in India by the British people. Although eucalyptus trees are famous for medicinal oil and used in paper and pulp production, the oil is toxic to wild animals. Furthermore, these trees use extensive groundwater to

26 Reforestation is when an area which is being planted was originally forested but later deforested. Afforestation takes place when areas which are being planted were previously never forested (Davis & Robbins, 2018).

27 Lands besides RFA with trees containing higher than 10 percent canopy density are considered in FC assessments.

28 https://frontline.thehindu.com/environment/the-forest-conservation-amendment-act-2023-dramatically-alters-forest-governance-in-india/article67726166.ece

grow, and thereby, restrict undergrowth. Acacia trees were brought from Australia and planted in the Nilgiris district of the Western Ghats. These trees have medicinal uses, and provide with fuel and fodder. But, the plantation of black wattle or acacia displaced natural grasslands of Nilgiris. Indecisive plantations of invasive species also resulted in a food crisis for wildlife, thereby caused habitat alteration in Karnataka's Western Ghats.[29] Furthermore, during 1990-2020, the area under bamboo plantation had been raised by 50 percent, where China and India were the two primary contributors (GFRA, 2020). Bamboo grows rapidly; however, crowds out native plants and increases the risk of erosion. Now also, natural vegetation is being replaced by exotic species like paradise-tree (Simarouba glauca), which have been brought from South America, for medicinal uses. These trees can grow even in degraded soils.

Plantations practices with the rapid-growing tree species along with exotic and invasive ones are a worrisome issue for Indian forestry (Robbins, 2005; Saxena, 1992). It is found that afforestation practices with invasive plant species are pernicious. They compel the wild animals in seeking food out of forest premises, like into human settlements due to paucity of feed in their natural surroundings; thereby inciting strife between man and wildlife.[30] It has been seen that due to the loss of native tree species and resurgence of invasive plant species in the forests of Uttarakhand, wild animals such as Himalayan gorals, barking deers, langurs and bears were drifting towards gardens and orchards of locals in search of food. Sadly, herbivores like deer, chital and sambar have started adopting *lantana camara* (an invasive plant species) as food; which is not good for their health.[31] In another study by Mungi et al. (2023), the authors discovered that around 72 percent of their study area (which is 254,880 sq km) was covered by invasive species; thereby endangering biodiversity which is a matter of high concern as it has long-term negative impact on the ecosystem.

4. Conclusions

The study highlights a positive impact of the NFP, 1988 – the rate of growth of total FC augmented in the subsequent period compared to the period before the implementation of this forest conservation policy. Also, the study addresses how the MDF is facing a gradual decline, and increase in total FC is more on paper than in real terms (maintaining

29 https://www.downtoearth.org.in/news/wildlife-biodiversity/no-food-in-forests-invasive-species-and-altered-habitats-in-karnataka-s-western-ghats-are-creating-a-food-crisis-93915

30 https://www.downtoearth.org.in/coverage/forests/no-food-in-forests-dte-s-exclusive-coverage-on-invasive-species-94112

31 https://www.downtoearth.org.in/news/wildlife-biodiversity/no-food-in-forests-bears-langurs-throng-uttarkahand-apple-orchards-as-native-vegetation-gets-taken-over-by-invasives-94087

quality) in India. Although the country pledges to achieve 33 percent total FC by the schemes such as *National Afforestation Programme* and *Green India Mission*, the selection of species and species diversity continuance for afforestation purposes needs much considerations. Now-a-days increase in total FC is being pulled up by inclusion of more non-forest areas under OF; which proves that plantation forests are on rise, but with lesser quantitative changes in the natural forests. However, regeneration of natural forests is crucial in mitigating global warming. As when the CAGRs of various types of FC were computed for the five regions in our study, it was found that the N-E region is experiencing massive forest and vegetation loss in the current times. Furthermore, Andhra Pradesh, Gujarat, Maharashtra and Rajasthan are some of the arid States which have large livestock populace, and therefore they need open grazing lands. But increase in plantations in these regions circumstantially imposing a detrimental effect on the natural grassland ecosystems (Dhanapal, 2019).

Moreover, though plantations with fast growing trees—with a single or a few species—may aid the economy commercially; they are unfavourable to the environment. These plantations affect soil and the local environment, and thereby flora-fauna of these areas gets terminated. On the contrary, wild forests—unlike the plantations or urban trees—are complex, and native eco-systems have matured over millions of years there.[32] Thus, in the blind ambition of raising greenery, India is creating adverse ecological impacts by going for the selection of wrong plant species (Roy & Fleischman, 2022). Also, granting of blanket exemptions[33] from regulatory laws and diluting the benchmarks as per the FCAA, 2023 are not justifiable solutions for environmental sustainability. The valuation loss from natural forest degeneration far outweighs the benefit derived from raising dispersed monoculture plantations; however, the latter is immensely practiced in India as 'Compensatory Afforestation Programmes'.[34] The MoEFCC should be more stringent in its conservation goal with incorporating local dwellers in such management, instead of adopting such flawed paths.[35] After all, forests are not a luxury, rather pivotal necessity for providing sustainable livelihoods of locals and maintaining ecological balance.

32 https://economictimes.indiatimes.com/indias-forests-are-in-serious-decline-both-in-numbers-and-health/articleshow/12540825.cms?from=mdr)

33 According to FCAA (2023), Himalayan and N-E forests too are exempted from the Act's coverage; thereby endangering the landscape and rich endemic ecosystem.

34 https://www.downtoearth.org.in/blog/forests/flawed-forestry-clearance-mechanism-needs-an-urgent-fix-56685

35 https://www.downtoearth.org.in/blog/forests/flawed-forestry-clearance-mechanism-needs-an-urgent-fix-56685

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Regional Disparity: Infrastructure Development Index in Maharashtra State

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Abstract

Economists have recently attempted to study regional disparities in the country. Disparity studies are crucial, as they help us understand why some regions are more developed than others. Infrastructure is one of the most important areas of concern, as it has remained inadequate and has thus hindered the growth and development of the region. The inter district disparity of the Infrastructure Development Index was analysed for the period 1990-91 to 2010-11. Disparity increased over time among the districts. Other than the Konkan division, the Vidarbha and Marathwada divisions have laggards in terms of infrastructure index and have been the most underdeveloped regions. The worst performer in the infrastructure development index is Gadchiroli, which is badly affected by Naxalite attacks. The findings underscore the need for a comprehensive and region-specific approach to infrastructure development to reduce the growing gap between well-developed and underdeveloped districts, ultimately fostering more equitable economic growth in the state. The results of this study can inform future policy decisions aimed at improving infrastructure in Maharashtra and other states facing similar regional disparities.

Keywords: *Infrastructure Development Index, Regional Disparity, Principal Component Analysis, Growth, Maharashtra.*

JEL Classification: O18, R11

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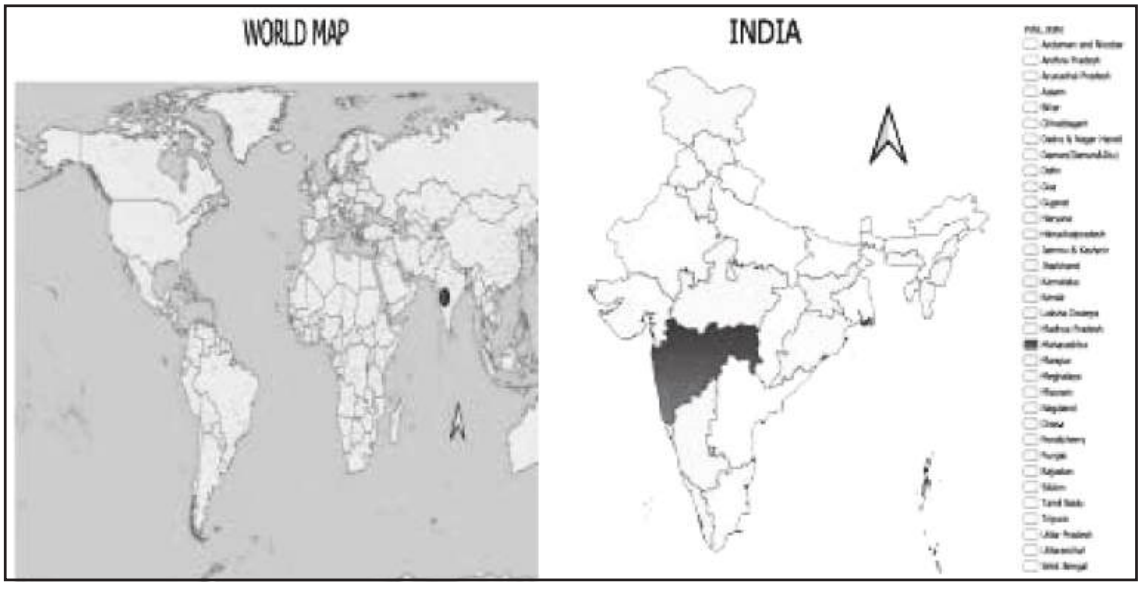
1. Introduction

Most emerging countries, including India, have uneven development and geographical imbalances. Since its independence, India's fundamental national goal has been to achieve inclusive and balanced regional development. The government has implemented a number of reforms and attempts to lessen gaps, but it has not been able to address problems at the regional level. In India, the disparity issue is still present, as is the case in Maharashtra. Maharashtra's districts of Marathwada and Vidarbha have suffered.

Geographically, and in terms of population, Maharashtra is a significant state. Maharashtra has a population of 11.24 crore and a land area of 3.08 lakh sq. km, according to the 2011 Census. Therefore, the state is ranked third in terms of physical area, and second in terms of population. According to the Economic Survey of Maharashtra for 2021–22, the state's average contribution to India's nominal GDP is 14.2%. Compared with other Indian states, it is regarded as the highest. The state of Maharashtra was established on May 1, 1960, and is now composed of 36 districts and six divisions.

Figure 1: Location of Maharashtra state on World and India using QGIS software



Source: Using QGIS software by author

Historically, Maharashtra's regional imbalances began to take shape during the colonial period, when British policies focused on the development of Bombay (now Mumbai) as a port and industrial hub, leaving rural regions neglected. With the restructuring of Bombay, the state was divided into Gujarat and Maharashtra, along linguistic lines. The central provincial legislature unanimously adopted a resolution in 1938, calling

for the creation of a new state called the Maha Vidarbha, with Nagpur serving as its capital. As a result of the "One State, One Language" policy of the 1960s, Nagpur was reduced to a small city and Bombay was designated as the capital of Maharashtra. Since then, Bombay's business potential has exploded, and the city is now the financial centre of India. After the state was formed in 1960, the centralization of political power and economic activity in Mumbai further exacerbated disparities between the western and eastern parts of the state. While Mumbai and Pune flourished, regions like Vidarbha and Marathwada comprising large agrarian populations remained underdeveloped and economically stagnant. The state's industrialization policies, which largely favoured urban areas, and the limited focus on rural infrastructure, have compounded these regional inequalities. Regions such as Marathwada and Vidarbha in central and eastern Maharashtra have long been underdeveloped, despite the state's overall economic success. These areas suffer from a range of socio-economic challenges, including agrarian crises, frequent droughts, farmer suicides, unemployment, and low levels of education and healthcare access. The agrarian distress in Marathwada, for example, has been particularly severe due to recurring water shortages, poor irrigation infrastructure, and limited access to markets. In Vidarbha, while there is a strong agricultural base, poor infrastructure, limited industrial growth, and inadequate public services have contributed to stagnation in economic development. These disparities in regional development have led to tensions and demands for greater attention to these areas, with some advocating for separate statehood or greater autonomy.

Hindu Hrudaysamrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg phase I (Nagpur-Shirdi) started in December 2022. This greenfield road project connects Mumbai and Nagpur. However, aside from Mumbai, the majority of other regions have experienced varying degrees of economic, political, cultural, and other forms of development. Currently, Vidarbha and Marathwada face various obstructions in their development and experience many problems. Khobragade, V. M. (2020). It has frequently been stated that if the Greater Mumbai and Pune divisions are removed, the rest of Maharashtra would not be better than the 'BIMARU' states. Shaban, A. (2006).

Gujarat recently won four expensive industrial contracts from Maharashtra, including the Vedanta and TATA-Airbus projects. Gujarat has supplanted Maharashtra as India's primary manufacturing centre. Agrarian crises, drought issues, farmer suicides, challenges with infrastructure, an unfavourable sex ratio, quality of education, Naxalite violence, urbanization challenges, joblessness, and malnutrition have all been ongoing concerns in the Maharashtra state. Maharashtra, once the leader in industrialization, is now at

risk of losing its competitive edge to states like Gujarat, where business-friendly policies and better infrastructure have spurred rapid economic growth.

Given these challenges, this study aims to analyze the regional disparities in infrastructure accessibility at the district level in Maharashtra. Infrastructure is a key determinant of economic growth and quality of life, and understanding the gaps in infrastructure provision across the state is essential for identifying areas that require targeted investment. By assessing infrastructure distribution and its relationship with regional economic outcomes, the study will highlight areas where intervention is most needed and propose strategies for promoting more balanced and inclusive development. The remainder of this paper is organized as follows. Section 2 reviews the literature on the relationship between infrastructure and economic growth. Section 3 presents the data, methodology, and estimation methods. Section 4 discusses the analysis of the results, and the final section presents the conclusions and findings of the study.

2. Review of Literature: Infrastructure and Growth

Direct productive activities (DPAs) are boosted by social overhead capital through investments. Divergent sequences of investments, which these investments produce, help increase economies of scale and foster the simultaneous expansion of all industries. Hirschman (1958) proposed an unbalanced developmental approach. There was no uniform growth across all the regions. As a result, imbalanced growth strategies are crucial in helping policymakers identify their top-priority sectors. Unbalanced growth causes regional disparities, as formulated by Myrdal's (1958) circular causation theory. Backwash effects, which slow down regional growth, are brought on by pull forces, such as the flight of capital and manpower to other regions, which will increase economic activity in other regions. However, as the region continues to develop, the spread effects are anticipated to increasewith more investment in infrastructure. Government involvement in building public infrastructure is the most efficient approach to promote economic growth. Hansen (1965) divided public infrastructure into two categories: economic overhead capital (EOC) and social overhead capital (SOC), emphasizing the importance of public investment in economic progress. According to Aschauer (1990), infrastructure improves the growth, productivity, and human capital of a nation.

Neoclassical growth theories predict that perfect capital and labour mobility will eventually result in a decrease in regional inequality. Economies with lower capital-to labour ratios often expand more quickly. Solow (1956) predicted that poorer regions would develop considerably more quickly than richer ones and eventually reach a stable state. Sigma convergence and beta convergence are two types of convergence. Sigma convergence is the process whereby the variance in per capita income decreases over time. When the

growth rate is negatively associated with the starting level of per capita income, this phenomenon is known as beta or conditional convergence. Barro and Sala-I-Martin, 1990; 1992. Numerous studies are carried out at various national and regional levels under this neoclassical framework [Mankiw, Romer, and Weil (1992); Islam (1995); Demurger (2001); Datta and Agrawal (2004); Lei Ding, Haynes, and Liu (2008); and Brodzicki (2012); Pandya, F., &Maind, S. (2017)].

According to the World Development Report (1994), "productivity growth is higher in countries with adequate and efficient supply of infrastructure services. The provision of infrastructure services to meet the demands of businesses, households, and other users is a major challenge in economic development. The report also points out that adequate and good-quality infrastructure is a crucial factor in attracting foreign investments". While Majumdar (2003) found that differences in infrastructure levels have decreased over time among Indian states, Ghosh and De (1998) found that regional imbalances have increased among states as a result of the discrepancy in physical infrastructure. While Majumdar (2003) found that differences in infrastructure levels have decreased over time among Indian states, Ghosh and De (1998) found that regional imbalance has increased among states as a result of the discrepancy in physical infrastructure. When comparing the BIMARU states to other Indian states, Bhandari (2012) constructed infrastructure, health, and education indices and noted that these three indices were the lowest. According to Bajar's (2013) analysis, the transportation industry performs worse than power and telecommunications. Study on trade openness De and Ghosh (2005) and Raychaudhuri and De (2010) conclude that infrastructure contributes to a country's growth by lowering poverty, inequality, and transportation costs. Further, Pandya, F., &Maind, S. (2017) examined convergence and regional differences in Indian States and Union Territories. This study demonstrates conditional convergence among states, and indicates a positive and substantial association between growth and infrastructure. These studies discovered that infrastructure has a favourable effect on GDP per capital.

In 1984, the Government of Maharashtra appointed Prof. Dandekar and Prof. Rath to the "Fact Findings Committee on Regional Inequality" to study regional disparity and suggest measures to be taken to achieve balanced growth in Maharashtra. The committee suggested nine priority sectors and recommended that 85 percent of the state funds be utilized for removing backlogs. The Governor of Maharashtra appointed a committee, the "Indicators and Backlog Committee, which identified regional disparities among Vidarbha, Marathwada, and the rest of the Maharashtra. Shaban, A. (2006), analysed sigma and beta convergence for Maharashtra state and found different rates of convergence among districts from 1993–94 to 2002–03. In Maharashtra's agriculture sector, regional disparities are investigated by Mohanty, B. B. (2009). Four metropolitan districts in

Maharashtra account for half of the state's wealth, with the other half being split among the remainder of the state, according to Suryanarayana, M. H., who investigated intra-state inequality in Karnataka and Maharashtra in 2009. In Maharashtra between 2001 and 2009, Hatekar, N., and Raju, S. (2013) empirically analysed inequality, income distribution, and growth and highlighted differences in per capita incomes. It is evident from the research that the majority of studies concern infrastructural differences across states, rather than between districts. Interdistrict analyses are essential for a better understanding of the underlying causes of issues at the local level. As a result, interdistrict variability analysis has gained importance, and the current work addresses this gap.

3. Data, Methodology and Estimation Methods

District-wise data is used for the analysis from the period 1990-91 to 2010-11. Data were extracted from the statistical abstract of Maharashtra published by the Directorate of Economics and Statistics of the Government of Maharashtra. The infrastructure index is formed for 35 districts, as Palghar's newly formed district is included in Thane district. Table 1 lists the variables used to construct the infrastructure index at the district level for Maharashtra. The variables were categorized based on their physical, financial, and social infrastructure.

Table 1: Definition of Infrastructural Variables for Districts of Maharashtra

Variables for Infrastructure Index	Explanation
LRO/ THOUSAND SQ.KM	Total length of roads per thousand sq.km
LRA/ THOUSAND SQ.KM	Total length of railways per thousand sq.km
VE (%)	Percentage of villages electrified
PER CAPITA CE	Per capita consumption of electricity
II	Irrigation intensity
BO/ LAKH POP	Bank offices per lakh population
PS/ LAKH POP	Primary and secondary schools per lakh population
HOSP/ LAKH POP	Government hospitals per lakh population
BEDS/ LAKH POP	Beds per lakh population

Sources: Statistical abstract of Maharashtra State and Selected indicators of Districts in Maharashtra and states in India, Directorate of Economics and Statistics, Government of Maharashtra.

Using the weighted mean, a composite infrastructure index was developed by applying Principal Component Analysis (PCA), and weights were generated. This is a statistical method for converting correlated data into linearly uncorrelated data. Karl Pearson created it at first in 1901, then Harold Hotelling created it on his own in 1930. This method has been used to create indexes for Indian states by Ghosh and De (1998), Majumder (2003), De and Ghosh (2005), Raychaudhuri and Haldar (2009 & 2010), Patra and Acharya (2011), Bhandari (2012) and Pandya, F., & Maind, S. (2017). Infrastructure was calculated using the following formula:

$$INFRAINDEX = \sum wixi / \sum W \text{ .....(1)}$$

Where,

wi: weight assigned to individual infrastructure variables.

xi - Normalized value of the infrastructure variables.

$\sum W$ - Sum of all weights of the infrastructure variables.

The table below (see the Appendix) lists the rotated component matrix and weights determined by the analysis for each year. The eigenvalues for 1990-1991 are 2.222, 1.976, and 1.917, respectively, accounting for 68% of the overall variance. The eigenvalues in 1995–1996 were 3.080, 1.856, and 1.681, respectively, which accounted for 74% of the overall variance. These three eigenvalues from 2000 to 01 accounted for 70% of the variation:3.210, 1.580, and 1.483. The eigenvalues in 2005–06 were 3.850 and 1.917, respectively, which accounted for 64% of the overall variance. The eigenvalues in 2010-11 was 3.435, 1.639, and 1.521, which accounted for 73% of the overall variance.

4. Results

This study devised a composite infrastructure index that considers the infrastructure for banking, education, health, transportation, and irrigation intensity. The infrastructure index in Maharashtra District was examined during the post-liberalization era, as indicated in Table 2. The districts of Sindhudurg, Jalna, Gondiya, and Gadchiroli, which were subsequently split off from their parent districts, are included in their parent districts because the statistics were not accessible. The variable data for Mumbai City and Suburban Mumbai, Dhule and Nandurbar, Parbhani and Hingoli, Akola and Washim are not available separately.

The results show a significant difference between Maharashtra state districts. The districts that were laggards in 1990–1991 continued to have the lowest infrastructure indices,

including Beed, Latur, Buldhana, Osmanabad, Yavatmal, Gadchiroli, Parbhani, and Hingoli. This unequivocally demonstrates that Maharashtra continued to overlook these areas in terms of development. Except for Mumbai City and suburban Mumbai, the Konkan region of Maharashtra is constantly improving, and the infrastructural situation in these areas is improving, particularly in Raigad, Ratnagiri, and Sindhudurg. Mumbai's infrastructure, both in the city and suburbs, has seen significant development. Despite having greater infrastructure than other areas, Mumbai City and its suburbs have seen a sharp decline in the infrastructure index over time. Extreme scarcity caused by an escalating population is one of the main causes. Another factor is a lack of sufficient agricultural land for irrigation. Mumbai has persistent infrastructure constraints despite its enormous number of high-profile projects. In Jalgaon, Amravati, and Nagpur, the infrastructure index has worsened. The infrastructure indices of Maharashtra were ranked from highest to lowest, with Sindhudurg having the highest and Gadchiroli having the lowest.

Table 2: Maharashtra Infrastructure Index Status (1990-91 to 2010-11)

	YEARS				
DISTRICTS	**1990-91**	**1995-96**	**2000-01**	**2005-06**	**2010-11**
Mumbai City and Suburban Mumbai	0.52	0.43	0.41	0.35	0.34
Thane	0.27	0.35	0.2	0.26	0.30
Raigad	0.36	0.39	0.72	0.62	0.63
Ratnagiri	0.26	0.39	0.58	0.55	0.69
Sindhudurg	Included in Ratnagiri		0.63	0.65	0.86
Nashik	0.34	0.38	0.6	0.45	0.46
Dhule and Nandurbar	0.22	0.28	0.44	0.43	0.38
Jalgaon	0.47	0.43	0.28	0.23	0.27
Ahmednagar	0.30	0.42	0.26	0.2	0.24
Pune	0.43	0.38	0.23	0.29	0.34
Satara	0.37	0.37	0.29	0.29	0.34
Sangli	0.41	0.5	0.29	0.23	0.29
Solapur	0.37	0.39	0.34	0.23	0.25
Kolhapur	0.27	0.33	0.28	0.22	0.31

(Contd...)

Table 2 (Contd...)

Aurangabad	0.34	0.46	0.28	0.24	0.29
Jalna	Included in Aurangabad	0.32	0.24	0.26	0.36
Parbhani and Hingoli	0.25	0.29	0.22	0.21	0.17
Beed	0.21	0.28	0.21	0.17	0.24
Nanded	0.26	0.32	0.25	0.19	0.25
Osmanabad	0.25	0.29	0.22	0.19	0.18
Latur	0.26	0.38	0.28	0.2	0.26
Buldhana	0.3	0.31	0.19	0.15	0.20
Akola and Washim	0.32	0.42	0.24	0.20	0.24
Amravati	0.47	0.41	0.21	0.17	0.24
Yavatmal	0.23	0.31	0.19	0.17	0.21
Wardha	0.4	0.46	0.31	0.33	0.31
Nagpur	0.46	0.3	0.24	0.29	0.34
Bhandara	0.25	0.38	0.24	0.23	0.29
Gondiya	Included in Bhandara	0.18	0.27		
Chandrapur	0.28	0.4	0.24	0.19	0.28
Gadchiroli	Included in Chandrapur	0.27	0.19	0.16	0.14

Source: Author's Calculation

In this study, we examined how the relative rankings of districts in Maharashtra evolved between 1990 and 2010 by analysing changes in their infrastructure indices over the two decades. This methodology allows us to not only track the overall progress in infrastructure development but also to assess how individual districts have performed relative to one another. By comparing the districts' rankings over time, we can identify regions that have experienced significant improvements, those that have stagnated, and those that have seen a decline in their infrastructure status. Table 3 clearly illustrates the contrasting trends in infrastructure development across different districts. Some districts, such as Thane, Kolhapur, Ratnagiri, Sindhudurg, Raigad, Nashik, Dhule, and Nandurbar, have demonstrated notable improvement in their infrastructure rankings over the 20-year period. These districts have managed to boost their infrastructure scores, indicating

a positive trend in development, possibly due to targeted investments, improved governance, and a focus on addressing regional disparities. For instance, districts like Thane and Raigad have benefitted from their proximity to Mumbai, which likely facilitated better access to resources and infrastructure projects, while Sindhudurg and Ratnagiri have made strides in tourism-related infrastructure and rural development initiatives. This improvement suggests a more balanced approach to development in some previously underdeveloped areas, helping them close the gap with the better-performing districts.

However, a number of districts, including Bhandara, Jalna, Gondiya, Latur, and Beed, have shown only marginal changes in their rankings. These areas still occupy positions at the lower end of the infrastructure index, indicating that despite some investment or attention, they have not seen substantial progress. Their infrastructure development remains limited, which could be due to a variety of factors such as inadequate funding, insufficient political attention, or challenges related to geographical isolation. These districts continue to face difficulties in areas like transportation, healthcare, education, and agriculture, which hinders their overall development. While there have been some efforts to address these issues, they remain among the districts with the weakest infrastructure performance.

On the other hand, several districts, including Sangli, Nanded, Parbhaniand Hingoli, Osmanabad, Yavatmal, Ahmednagar, Mumbai City and Suburbs, Wardha, Satara, Aurangabad, Nagpur, Pune, Jalgaon, Solapur, Amravati, Akola and Washim, Buldhana, and Gadchiroli, have experienced a decline in their infrastructure rankings. This decline is particularly striking in Mumbai City and Suburbs, where, despite being the economic and financial hub of the country, the rapid population growth and urban sprawl have led to severe infrastructure stress. Issues such as congestion, inadequate housing, strained public transportation systems, and insufficient civic amenities have contributed to a decrease in Mumbai's infrastructure index over time. Similarly, other urban and semi-urban districts like Nagpur, Pune, and Aurangabad have also faced challenges, including overcrowding, aging infrastructure, and limited expansion of basic services in the face of growing populations.

Moreover, rural and semi-rural districts such as Sangli, Solapur, and Amravati, which were previously considered relatively better-performing in terms of infrastructure, have also seen a decline. This could be attributed to factors such as underinvestment in rural infrastructure, slower industrialization, and agricultural distress. In Amravati and Akola, for example, a lack of diversification in the local economy, coupled with repeated agricultural crises, has stunted the potential for infrastructure development in these districts. Similarly, Buldhana and Gadchiroli continue to face significant challenges due to their geographical remoteness, limited access to capital, and insufficient governance capacity,

preventing them from making substantial improvements in their infrastructure scores. These findings underscore the deepening divide between regions that have benefited from strategic investments and those that have not. The districts that have improved their rankings, such as Raigad and Nashik, highlight the positive outcomes of targeted infrastructure development and policy interventions. In contrast, the districts that have either stagnated or declined in terms of infrastructure development reveal the systemic challenges of promoting inclusive growth in a state as diverse as Maharashtra. The reasons for these discrepancies are multifaceted, including political priorities, administrative capacity, economic factors, and regional disparities in access to resources.

The analysis of district-level infrastructure rankings reveals a clear pattern: while some regions of Maharashtra are advancing in terms of infrastructure, others remain trapped in a cycle of neglect or underdevelopment. This calls for a more nuanced and region-specific approach to infrastructure planning, one that takes into account the unique needs and challenges of each district. While regions with better infrastructure, such as Mumbai and Pune, may require more sophisticated solutions to cope with urbanization, districts that have lagged behind, such as Gadchiroli and Amravati, require targeted interventions focused on improving basic infrastructure services like roads, irrigation, healthcare, and education. Addressing these disparities is crucial for ensuring that the benefits of Maharashtra's economic growth are more evenly distributed across its diverse districts.

Table 3: Ranking Districts in Maharashtra as per infrastructure index: 1990 and 2010
In order to gain deeper insights into the regional disparities in infrastructure development

DISTRICTS	Rank 1990-91	Rank 2010-11	Rank Difference
Mumbai City and Mumbai Suburban	1	7	-6
Jalgaon	2	18	-16
Thane	17	13	4
Kolhapur	18	11	7
Ratnagiri	19	2	17
Sindhudurg	Included in Ratnagiri	1	Improved
Wardha	7	12	-5
Satara	8	9	-1

(Contd...)

Table 3 (Contd...)

Solapur	9	21	-12
Raigad	10	3	7
Nashik	11	4	7
Aurangabad	12	15	-3
Jalna	Included in Aurangabad	6	Improved
Amravati	3	26	-23
Nagpur	4	10	-6
Pune	5	8	-3
Sangli	6	14	-8
Nanded	20	22	-2
Latur	21	20	1
Parbhani and Hingoli	22	30	-8
Osmanabad	23	29	-6
Bhandara	24	16	8
Gondiya	Included in Bhandara	19	Improved
Yavatmal	25	27	-2
Dhule and Nandurbar	26	5	21
Beed	27	24	3
Akola and Washim	13	25	-12
Ahmednagar	14	23	-9
Buldhana	15	28	-13
Chandrapur	16	17	-1
Gadchiroli	Included in Chandrapur	31	Declined

Source: Author's Calculation

across Maharashtra, we employed Geographic Information System (GIS) technology to visualize changes in the Infrastructure Development Index (IDI) from 1990-91 to 2010-11. The maps, presented in Figures 2–6, were generated using the Quantum Geographic

Information System (QGIS), a sophisticated tool for spatial data analysis. These visualizations provide a clear and comprehensive representation of the evolving infrastructure landscape in Maharashtra, highlighting the uneven distribution of development across its districts and divisions.

The maps utilize a color gradient to depict the infrastructure index, with darker shades representing higher levels of infrastructure development, and lighter shades indicating areas with lower infrastructure scores. This color-coded scheme enables an intuitive understanding of the spatial patterns of development, allowing for a clear comparison of the progress made in different regions over the two-decade period.

Figure 2: District-wise Infrastructure Index Status (1990-91)

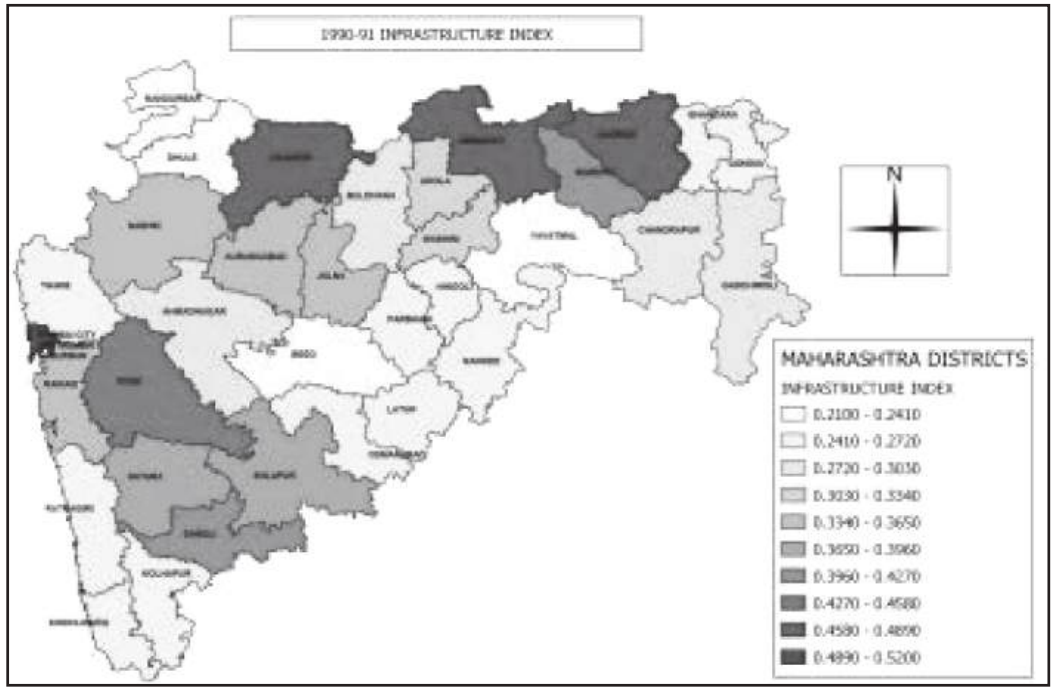


Figure 3: District-wise Infrastructure Index Status (1995-96)

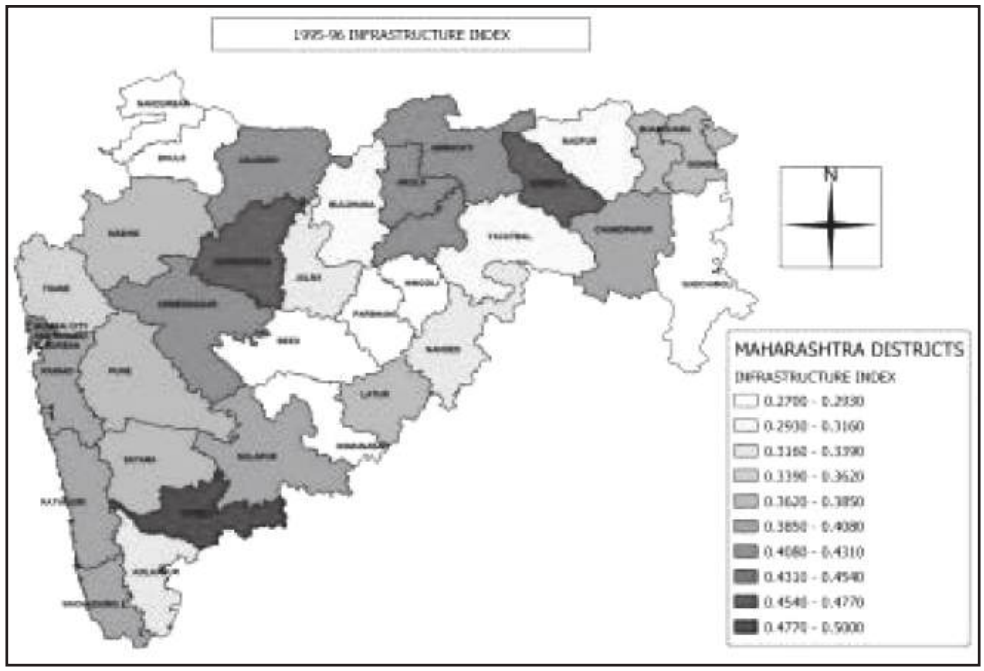


Figure 4: District-wise Infrastructure Index Status (2000-01)

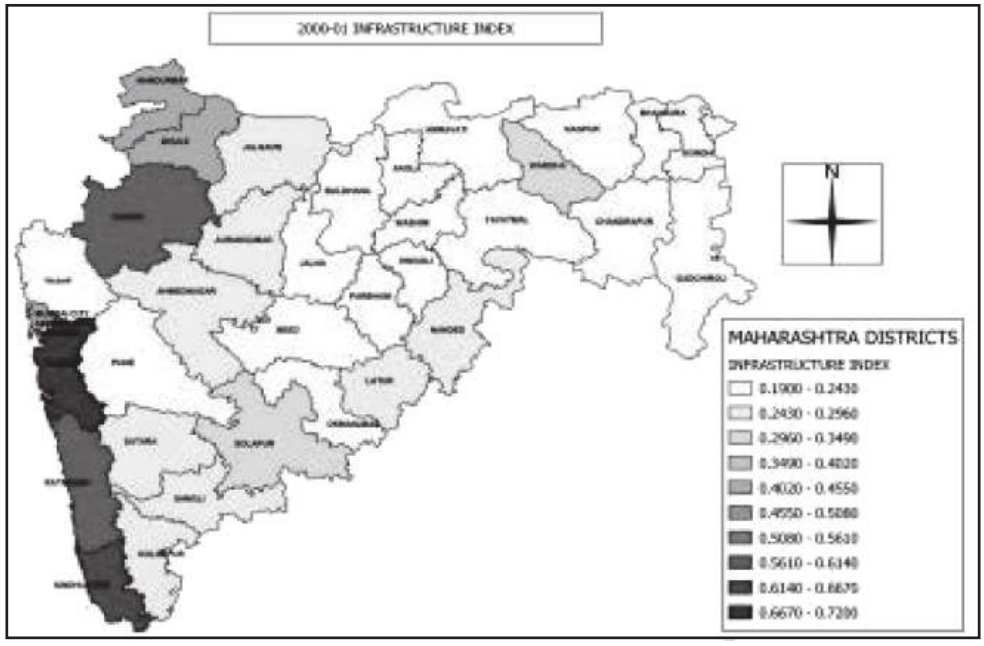


Figure 5: District-wise Infrastructure Index Status (2005-06)

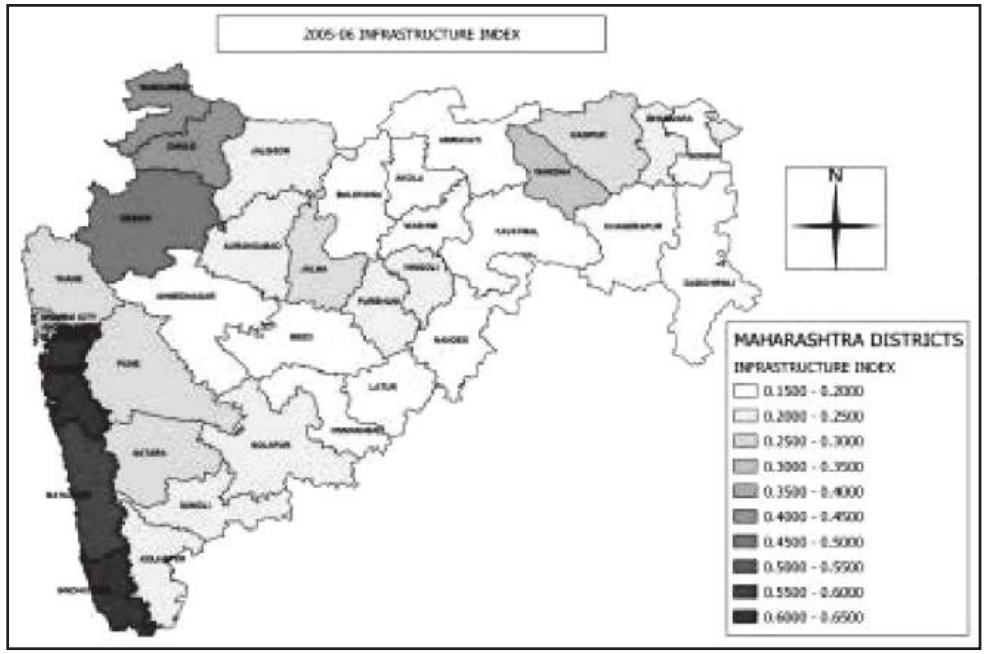
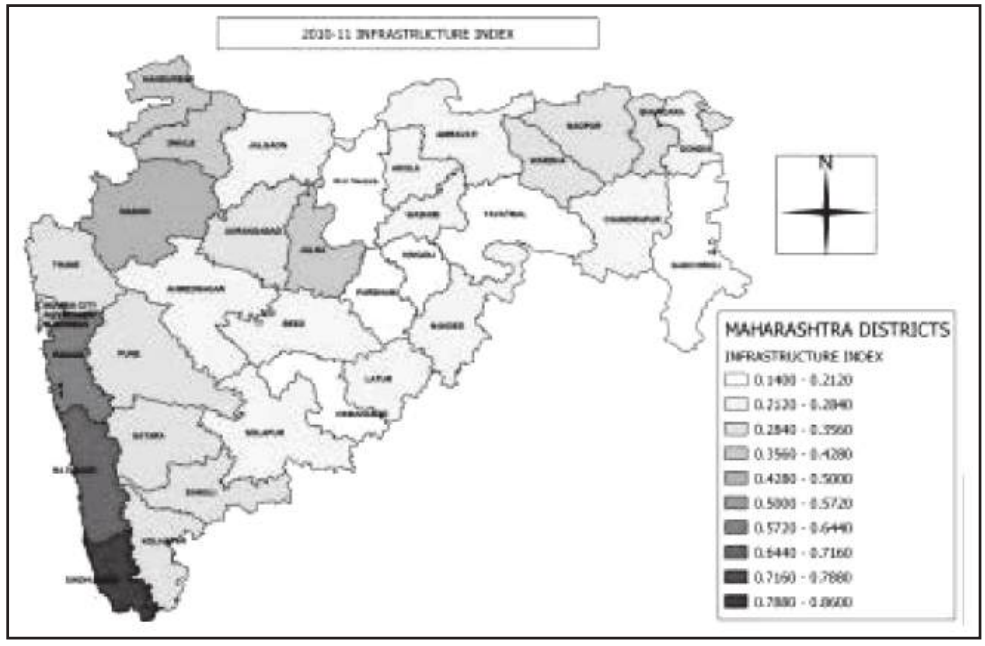


Figure 6: District-wise Infrastructure Index Status (2010-11)



5. Conclusions

This study has provided a comprehensive analysis of the regional infrastructure disparities across Maharashtra from 1990–1991 to 2010–2011 using a composite infrastructure development index. The findings clearly demonstrate that Maharashtra continues to experience significant interdistrict imbalances in infrastructure, with certain regions showing marked improvement while others lag behind. The Konkan division, in particular, has consistently outperformed other regions, maintaining the highest infrastructure index throughout the period studied. In contrast, the divisions of Marathwada and Vidarbha, including districts such as Gadchiroli, Amravati, and Yavatmal, continue to face persistent infrastructure deficits, reflecting the state's failure to bridge these development gaps. The analysis reveals that while areas like Mumbai, Thane, and Pune have seen substantial infrastructural growth, their relative positions in the index have declined due to increasing pressure from rapid urbanization and population growth. In particular, Mumbai, despite being the economic powerhouse of the state, faces severe infrastructural constraints, with its infrastructure index dropping over the two decades. This paradox highlights the challenge of sustaining infrastructure development in rapidly growing urban centres.

On the other hand, districts in the Konkan region, such as Sindhudurg and Raigad, have shown considerable improvements, benefiting from better infrastructure investment and planning. These regions are now ranked among the higher-performing districts in Maharashtra, suggesting that targeted infrastructure development can lead to noticeable progress, even in areas historically disadvantaged in terms of economic and social indicators. However, many other districts, particularly in the backward regions of Vidarbha and Marathwada, have experienced little to no improvement, with some districts like Gadchiroli and Amravati even witnessing a decline in their infrastructure indices. This highlights the persistence of deep-rooted regional disparities that continue to hinder equitable development.

The disparities in infrastructure across Maharashtra underline the complex nature of regional development. While financial resources and policy interventions have been directed towards infrastructure development, the benefits have not been equitably distributed across all districts. This study also points to the fact that the allocation of funds and administrative decisions, though made at the divisional level, fail to address the specific

needs of districts that are most in need of development. As a result, areas with poorer infrastructure continue to be left behind, reinforcing existing socio-economic inequalities. To address these disparities, it is critical for policymakers to prioritize targeted investments in infrastructure, particularly in the lagging districts of Marathwada and Vidarbha. Investments in education, healthcare, transportation, irrigation, and banking infrastructure will be key to fostering sustainable development in these regions. Additionally, the unique challenges faced by urban centres like Mumbai—such as population pressure, inadequate housing, and congestion—must be tackled through more focused urban planning and infrastructural interventions. The results of this study emphasize the need for a more nuanced approach to regional planning and development in Maharashtra. Future efforts must focus not only on boosting the infrastructure of already developed areas but also on ensuring that the growth in infrastructure is inclusive and reaches the most disadvantaged districts. By addressing the infrastructure deficits in these areas, Maharashtra can create a more balanced and equitable development model, one that benefits all regions of the state and contributes to broader national growth goals.

In conclusion, the findings underscore the importance of infrastructure development as a key driver of regional economic growth and social well-being. The persistence of infrastructure gaps in Maharashtra reflects broader issues of regional inequality that require immediate attention. Bridging these gaps will not only improve the quality of life for millionsof residents but also unlock the full economic potential of Maharashtra, ensuring that no district is left behind in the state's development trajectory.

Appendix

Table 4: PCA Component matrix (District- level)

1990-91

Rotated Component Matrix[a]

	Component		
	1	2	3
LRO	-.012	.034	.572
LRA	.099	.847	-.112
% VE	-.259	.084	-.862
PER CAPITA CE	.837	.144	.016
II	-.709	-.058	-.021
BO/LAKH POP	.797	.217	.421
P/S/LAKH POP	.093	.373	.739
HOSPITAL/LAKH POP	.117	.797	.281
BEDS/LAKH POP	.533	.636	.181

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

1995-96

Rotated Component Matrix[a]

	Component		
	1	2	3
LRO	-.782	.117	-.151
LRA	-.169	-.253	.859
% VE	.188	.352	.848
PER CAPITA CE	-.755	-.369	.304
II	.903	.012	.078
BO/LAKH POP	-.244	-.868	-.040
P/S/LAKH POP	.748	-.016	-.059
HOSPITAL/LAKH POP	-.244	.748	.006
BEDS/LAKH POP	.583	.451	-.312

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

(Contd...)

(Table 4 Contd...)

2000-01

Rotated Component Matrix[a]

	Component		
	1	2	3
LRO	.161	.171	.639
LRA	.124	.631	-.566
% VE	-.005	-.866	-.147
PER CAPITA CE	.833	-.020	-.178
II	-.094	.031	-.619
BO/LAKH POP	.707	.500	.359
P/S/LAKH POP	.689	.319	.351
HOSPITAL/LAKH POP	.833	-.153	.168
BEDS/LAKH POP	.893	.166	.193

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

2005-06

Rotated Component Matrix[a]

	Component	
	1	2
LRO	-.049	.681
LRA	.368	.595
% VE	-.004	.770
PER CAPITA CE	.931	.237
II	-.486	.248
BO/LAKH POP	.910	.263
P/S/LAKH POP	.843	.119
HOSPITAL/LAKH POP	.699	.548
BEDS/LAKH POP	.763	-.074

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations .

2010-11

Rotated Component Matrix[a] (Table 4 Contd...)

	Component		
	1	2	3
LRO	.913	.237	.114
LRA	.933	.155	-.108
% VE	.117	.722	-.360
PER CAPITA CE	.106	.870	-.114
II	-.201	.241	-.642
BO/LAKH POP	.508	.715	.197
PS/LAKH POP	-.690	-.026	.560
HOSP/LAKH POP	-.359	-.028	.718
BEDS/LAKH POP	.046	.584	.585

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Table 5: Weights of PCA

VARIABLES	1990-91	1995-96	2000-01	2005-06	2010-11
LRO	1.19	2.88	1.73	1.49	2.41
LRA	2.11	2.43	2.23	2.56	3.22
%VE	2.39	2.66	1.60	1.49	1.39
PER CAPITA CE	2.18	3.52	2.97	4.04	2.19
II	1.73	2.93	1.27	2.35	1.31
BO/LAKH POP	3.01	2.43	3.59	4.01	3.77
P/S/LAKH POP	2.36	2.43	3.24	3.47	3.77
HOSP/LAKH POP	2.37	2.15	3.16	3.74	3.38
BEDS/LAKH POP	2.79	3.16	3.42	3.08	3.50
∑W	20.13	24.60	23.22	26.23	24.98

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Linking Priority Sector Lending to Economic Growth Special Reference to NE State-Tripura

Basudeb Bhattacharya*, Sujit Das**

Abstract

Banks exert a major influence on the rural and economic growth of the region. Lending to a range of sectors, especially priority sector lending that is closely tied to agriculture and MSME in order to boost rural development and employment, is the main function of the banking industry. Agriculture, micro and small enterprises, and infrastructure have all had increased access to financing in India thanks to Priority Sector Lending (PSL). But as the sector's formal credit disbursement and Gross Domestic Product (GDP) contribution have recently improved, it is clear that it may benefit from the increased availability of formal credit.

The increase in bank credit deployment in India's priority sector over time has a direct effect on the country's GDP and particular states Gross State Domestic Product (GSDP) and Per Capita Income (PCI). However, directed lending also increases bank costs and causes to increase Non Performing assets (NPAs) by raising loan losses, defaults, and payment delays. This study examines the performance and identifies important areas to improve lending to priority sectors in the NE State-Tripura.

Keywords: *Banking, PSL, GSDP, PCI, NPA, Economic Growth.*

JEL Classification: E2,G21, Q1

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1. Introduction

The goal of priority sector lending (PSL) has included, among other things, ensuring that credit is available to disadvantaged groups in society and facilitating a sufficient flow of resources to fiscal sectors with greater potential for creating jobs and economic growth. As a result, the sectors that are considered priority are those that significantly affect large populations, the most vulnerable groups in society, and sectors that provide a lot of jobs, such as agriculture and micro and small enterprises. The Government and Reserve Bank of India makes the decision to allocate funds to predefined priority sectors that may need immediate intervention for credit and financial support particularly economic sectors like agriculture and allied activities, education, housing, infrastructure etc.Priority sector financing gives industries like housing, education, MSMEs, and agriculture the much-needed financial help they require. As these industries expand, they add to the state's total economic production, which has a direct effect on the Gross State Domestic Product (GSDP).By spreading economic activity more widely and reducing reliance on a small number of conventional sectors, priority sector financing causes a structural change in the economy. Better economic stability and steady increase in both GSDP and Per Capita Income (PCI) are the long-term effects of this.

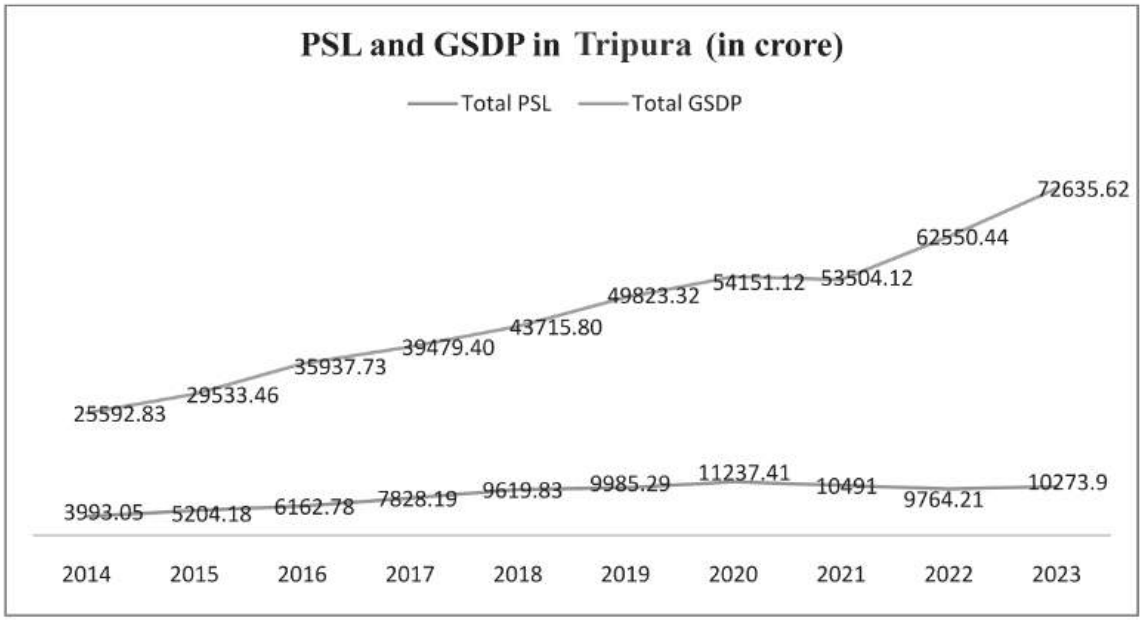
PSL dates back to 1966, when it was recognised the importance of expanding loans to agriculture and small businesses.It was introduced in response to declines in agricultural productivity and a downturn in industry that led to serious economic imbalances. Right after the National Credit Council urged commercial banks to place more attention on the priority sector, the priority sector began to gain prominence.Initially, in 1974, it was mandated for the commercial banks to direct 33.33% of their total loan towards the priority sector.The Dr. K. S. Krishnaswamy Committee's recommendations led to a revision of this goal, which was later set at 40% of all bank loans.

Bank credit deployment in India's priority sectors increased by 8.25% in 2023 to Rs 55.62 lakh crore over the previous year which has a direct impact on the Gross Domestic Product (GDP).The percentage of credit allocated to agricultural and related businesses increased from 10.6% to 16.7% (y-o-y) in April 2023.In the report of (Nathan, 2013) it has analysed that the export GDP rises by 76% with a 100% increase in the PSL to the export industry. Manufacturing GDP rises by 41% with the similar growth in PSL to MSME sector. Nevertheless, in the case of agriculture, a 100% increase in the PSL to the sector only results in an 11% increase in Agricultural GDP, demonstrating the industry's incapacity to generate returns commensurate with the expanded availability of credit.

However, Tripura's PSLgrowth in 2023 is 5.21% over 2022 despite having accomplished

103% under the yearly credit plan. The sectors that make up the plan for 2022–2023 are Agriculture & Allied (39%), MSME (37%), and Other Priority Sector (24%). Nonetheless, Tripura's overall sector advances which comprise both priority and non-priority sector advances grew by 7% in 2023 over previous year. The proportion of gross advances Non Performing Assets (NPA) went up from 6.32% to 7.12% in March 2023 but, the NPA for advancements in the priority sectors in Tripura is 13.85%, which presents the State with grave concerns.

Graph-1



Source: SLBC and Directorate of Economics &Statistics Tripura

The PSL in Tripura is significantly increased over the year in all the categories. In Tripura, PSL increased by 157.29% between 2014 and 2023, rising from Rs 3993.05 crore to Rs 10273.90 crore. However, the agriculture and allied industry saw a growth of 213.03%, followed by the MSME sector at 139.59% and the other priority sector at 118.92%.Comparatively, Tripura's GSDP increased by 183.81% over the previous ten years, demonstrating a remarkable rising trend.The most recent data indicates that the primary sector contributed 44.92% of the State's total GSDP in 2021–2022, despite the comparatively small amount of land accessible for agricultural agriculture.The state's overall economic success is reflected in the GSDP and PCI. Generally referred to as "State Income," or GSDP, is a crucial metric for evaluating the State's economic performance

over a certain time period since it shows the magnitude and direction of shifts in the levels of economic growth.

2. Objectives of the Study

1. To examine the origins of priority Sector Lending and its role in Economic growth.
2. To analyse the contribution of Priority Sector Lending to Gross State Domestic Product in Tripura.
3. To analyse the impact of Priority Sector Lending in Per Capita Income in Tripura.
4. To examine the movement of priority sector lending's sector-specific nonperforming assets.

3. Research Methodology

The research is predicated on secondary data collected from the State Level Banker's Committees published report in Tripura and Directorate of Economics and Statistics, Govt. of Tripura. The study covered 10-year reference period from 2014 to 2023. Total 30 banks operating in Tripura (including public, private, RRB, Co-operative and small finance banks) have taken into consideration.

In this study statistical tools like Analysis of Variance (ANOVA), Co-efficient, and trend analysis used to check the statistical significance. The relationship between a dependent variable and independent variables is described by regression analysis. In this study, lending to Agriculture, MSME, and Other priority sector loan are taken as independent variable where as GSDP and PCI are taken as the dependent variable(Goyal, 2018). In a regression model, multicollinearity occurs when two or more independent variables have a high degree of correlation with one another. The accuracy of estimating the regression model's coefficients may be hampered by this high correlation. Since the data is cross sectional hence in addition of R^2 analysis, multicollinearity analysis has also been performed to examine the Tolerance and Condition Index.

4. Hypothesis

Considering the objectives of the study framed on this research paper, therefore following are the research hypotheses which have been proposed for this research paper to test the variables:

H_{01} : There is no significant association between PSL and GSDP.

H_{A1} : There is a significant association between PSL and GSDP.

H_{02} : There is no significant impact of PSL on PCI in Tripura.

H_{A2} : There is a significant impact of PSL on PCI in Tripura.

H_{03} : There is no significant impact of PSL for increasing of NPAs in Tripura.

H_{A3} : There is a significant impact of PSL for increasing of NPAs in Tripura.

5. Survey of Literature

The study of (Sweetline, 2017) determined that one of the most important and vital services offered by all commercial banks to support and expand those sectors is lending to priority sectors, which are basically the weaker segments of society as a result of a lack of financial assistance and credit facilities. The nationalisation of banks was a significant turning point in banking history that helped these sectors. (Satyasai, 2008) and (Devaraja, 2011) in their study noted that banks in India are a major part of the financial system and lend heavily to numerous economic sectors, even if informal sources of credit remain the main rival, especially in rural India. According to research by (Roy, 2006), (Rao, Das, & Singh, 2006), (Uppal, 2009) and (Raman, 2013) that certain banks might be more willing to lend in PSL to more profitable industries with higher creditworthiness and an emphasis on cities, such as housing, education, export credit, etc. In the financial system, a select few bank types might perform PSL better than the others. Numerous studies have been examined by (Peek & Rosengren, 1995) (Berger, Miller, Petersen, Rajan, & Jeremy, 2005) that the relationship between bank size and lending, with smaller banks enjoying a competitive edge when funding smaller borrower businesses.

The banking industry has broad macroeconomic significance since it has the ability to positively impact the economy as a whole (Bonin & Wachtel, 1999) (Jaffe & Levonian, 2001) (Rajan & Zingales, 1998). It is acknowledged by (Swamy, 2010) in their study that inclusive growth, which can result in sustainable growth, depends on equitable growth. In order to reduce poverty and promote sustainable economic growth, the impoverished must have access to financing. In the findings of (Hadiza & Philip, 2017) implies that although Agriculture, MSME plays a significant role in fostering inclusive growth, both GDP and per capita income. Similar study of (ZAAGHA & Sulaiman, 2021) in Nigeria finds that the per capita income is positively and significantly impacted by the distribution of microcredit to the agriculture sector.

But the problem of NPA is growing in the priority sector as a result of the banks being

required to lend a predetermined portion of their total advances to this sector which has been identified in the study of (Desai, 2017) and banks' profitability and credibility are negatively impacted by higher NPAs.The study of (Mirkovic & Knezevic, 2013) documented that it is obvious that a high level of non-performing loans cannot be sustained over the long term, the timing of when the problem is identified and a plan for resolving it is critical. For emerging nations, in contrast to developed nations, this issue is almost unique, thus they need some time to devise solutions for its resolution. Developed nations, on the other hand, have extensive experience with non-performing treatments.This type of lending by banks is discouraged since loans to the weakest parts of society are frequently granted without enough collateral and for purposes that generate little incremental income and cannot be repaid. Several of them countered that using the microfinance system, whose institutions are better equipped to handle the particular problems of this type of loan, is a more successful alternative (Kumar & Batra, 2016).

The Committee report of (Murthy, 2005) observed that the asset quality will decline as a result of the increasing default risks brought on by the low payback rates in priority sector advances. As a one-step approach for cleaning up, a few governments were forced to employ the option of recapitalization to revive banks, which came at a significant financial cost. Accordingly another committee of (Nair, 2011) formed to review the current classification and propose amended recommendations regarding the Classification of Lending in the Priority Sector and Related Matters.

6. Data Analysis

To examine the contribution of PSL to GSDP and PCI, regression analysis is performed using the methodology as stated below. The model can be expressed as:

$$Yi = \beta 0 + \beta i\ xi + \varepsilon$$

Where Yi indicates dependent variable, Xi indicates independent variable, β0 indicates intercept, βi indicates coefficient to be estimated.

The following equation represents the suggested regression model for this research study:

Model 1 $\Delta GSDP = \beta 0 + \beta i \Delta PSL + \varepsilon$

Model 2 $\Delta PCI = \beta 0 + \beta i \Delta PSL + \varepsilon$

Model 3 $\Delta NPA\_PSL = \beta 0 + \beta i \Delta PSL + \varepsilon$

Where, Δ indicates first difference, GSDP indicates Gross State Domestic Product, PCI indicates Per Capita Income, NPA_PSL indicates Non Performing Assets on Priority Sector Lending, PSL indicates Priority Sector Lending, β0 indicates intercept, βi indicates coefficient, and ε indicates error term.

Lending to Agriculture and MSME and Lending to Other Priority Sector both have acceptable tolerance values (0.563) and low VIFs (1.777). This implies that the independent variables in your model do not significantly exhibit multicollinearity. When it comes to predicting the coefficients for these variables, the regression model should be dependable and steady.Since these two predictors' VIF values are far below the threshold (often 5 or 10), therefore may move forward with this model without disquieting about multicollinearity. This means that the model is perform well in terms of coefficient estimates and interpretation.

Table-1
Regression Model 1

Sl. No.	Independent Factor	Dependent Factor	R Square	F Value	P Value	Result
1	Lending to Agriculture	GSDP from Agri & Allied Sector	0.623	13.22	.007	p <0.05 prove statistical significance.
2	Lending to MSME	GSDP from Manufacturing Sector	0.671	16.31	.004	p < 0.05 prove statistical significance.
3	Lending to Other Priority Sector	GSDP from Other Sector	0.685	17.36	.003	p < 0.05 prove statistical significance.
4	Total PSL	Total GSDP	0.974	297.98	.000	p < 0.05 prove statistical significance.

Data Source: SLBC Tripura

The R^2 value here represents how well a model matches the data. In the context of regression, it is a statistical indication of how closely the regression line fits the real data. According to (Ozili, 2023) the value of R-square which lies between 0.50 to 0.99 is appropriate for use in social science research, particularly when the majority of the explanatory variables are statistically significant. The values of R^2 in the above analysis are (0.623), (0.671), (0.685) and (0.974), indicating a strong effect on the dependent variable.

In the above regression analysis, dependent variables taken as Lending to Agriculture, Lending to MSME, Lending to Other Priority Sector and Total PSL whereas dependent variables taken as GSDP from Agri & Allied Sector, GSDP from Manufacturing Sector, GSDP from Other Sector and Total GSDP. At the 95% significance level, the analysis revealed p-values of (0.007), (0.004), (0.003), and (0.000). The results show that lending to the priority sector in Tripura significantly increased the state's gross domestic product. Since the beta coefficient is positive, it can be concluded that there is a substantial relationship between PSL and the GSDP; so, therefore, we accept the alternative hypothesis (H_{A1}) and reject the null hypothesis (H_{01}).

Table-2

Regression Model 2

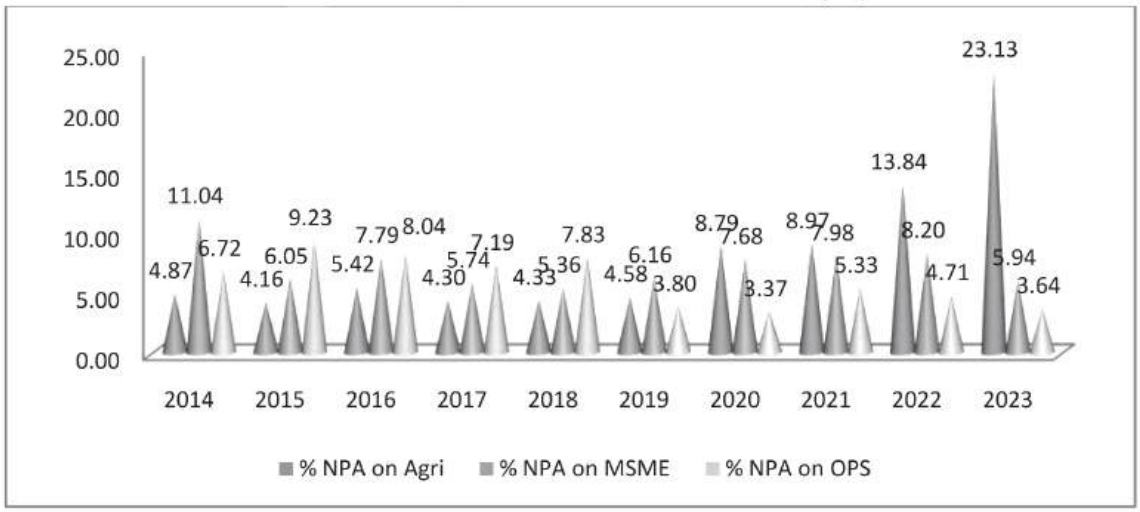
Sl. No.	Independent Factor	Dependent Factor	R Square	F Value	P Value	Result
1	Total PSL	PCI	0.978	348.63	.000	p <0.05 prove statistical significance.

Data Source: SLBC Tripura

Again in the regression analysis, independent variable is taken as Total PSL whereas PCI is taken as dependent variable. The analysis above yielded a p-value of (0.000), which is less than 0.05 at 95% confidence level. The findings reveal that PSL contributed significantly to increase PCI in Tripura. Therefore there is significant impact of PSL on PCI in Tripura since the beta coefficient is positive; therefore, we accept the alternative hypothesis (H_{A2}) and reject the null hypothesis (H_{02}).

Graph-2

Non Performing Assets on Agri, MSME & OPS



Data Source: SLBC Tripura

Under the impact of COVID-19, the NPA on agriculture, which was only 4.58% in 2019, began abruptly to rise in 2020 and reached 23.13% in 2023. While NPA on MSME and OPS is under control, the graph above makes it evident that the agribusiness sector is primarily responsible for NPA on priority sectors.

Table-3

Regression Model 3

Sl. No.	Independent Factor	Dependent Factor	R Square	F Value	P Value	Result
1	Total PSL	NPA on PSL	0.523	8.783	.018	p <0.05 prove statistical significance.

Data Source: SLBC Tripura

The results reveal a statistically significant and positive relationship between Total PSL and NPA on PSL for all the three sectors considered – Agriculture, MSME and Other Priority Sector. However, the strength of the impact of PSL for the increase of NPA is only 52.30%. The rate NPAs on agricultural loans has increased significantly since 2020,

has the reason to increase NPA in total priority sector.On the other hand, NPA on MSME is quite low and declined over time.

Although the outstanding advances to the non-priority sector in Tripura amount to Rs 9611.42 crore, which is nearly equal to the lending to the total priority sector, the unexpectedly stumpy NPA on Non-PSL which is only 0.01%, suggesting that advances to this sector constitute a secure lending area in Tripura. Collateral security charges on loans under non-priority sectors are one of the causes, as they put pressure on borrowers to make loan repayments on schedule. There is, nevertheless, enough room for more research on the agriculture sector to produce recommendations that are appropriate for fostering bank confidence to expand lending in order to boost GSDP.

7. Conclusions

According to this research analysis findings, there is a positive association between PSL and GDP, which implies that PSL promotes overall economic growth in the NE State-Tripura.In order to give the poorer segments of society access to adequate finance, PSL has developed and is being encouraged.By promoting growth in vital industries including infrastructure, MSMEs, housing, and agriculture, all of which are vital for equitable and sustainable economic development can boost GDP. PSL contributes significantly to expanding the economic base and raising national income by encouraging financial inclusion, job development, and productivity improvements. It is essential for improving the quality of life for a sizable portion of the populace, especially in rural and impoverished areas. However, how skilfully credit is used and how risks like defaults and over indebtedness are managed will determine how much of an impact it has on PCI. Its efficacy, however, hinges on controlling the risks connected with increased lending in priority industries and making sure the credit reaches productive areas and is utilised effectively.

Side by side fewer unevenness loan values, non-compliant borrowers, reduced agricultural productivity, and government interventions, disproportion targets are among the factors that make PSL less tempting for the banks and increasing bad loan in respect to NPA; this suggests that unwillingness from the part of the bank for PSL with unavoidable factors has significantly enhanced banks' bad loan portfolios.By lowering credit availability, raising borrowing costs, and impeding economic growth in important industries including housing, education, MSMEs, and agriculture, NPAs negatively affect lending to priority sectors. High NPAs cause banks to become risk averse, tighten lending guidelines, and raise borrowing costs, all of which impede the expansion of industries that are essential

to equitable economic growth. Furthermore, the banks' capacity to lend is diminished by the higher provisioning requirements for NPAs, which exacerbates the credit gap in key sectors. Strong credit management, government assistance, and financial literacy initiatives for borrowers in these sectors are crucial to reducing the detrimental effects of NPAs on priority loans.

8. Recommendations

Because of many and complex classifications that cover several objectives, including employment, growth, and equity, the existing priority sector criteria are faulty. There should be beneficiary-oriented and sector-specific classifications. Reprioritizing finance directed towards the micro, small, and medium-sized business, export, and agricultural sectors strategically can help to reduce NPA with mitigating the adverse redistributive effects therein.A multifaceted strategy including improved credit risk management, borrower education, technology developments, proactive monitoring, and solid collaborations between banks, the government, and borrowers is needed to lower NPAs in PSL. Banks can guarantee that priority sectors continue to receive the funding they require to promote inclusive economic growth, combat poverty, and enhance overall national development by tackling the underlying causes of NPAs, such as inadequate credit evaluation, a lack of financial literacy, and sector-specific risks.

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Kerala's International Tourism Demand: An Inquiry into The Validity of The Standard and Regular Determinants

Muhammed Salim Anappattath*, **Shiby M Thomas****

Abstract

International tourism demand is shaped by various factors, categorized as standard and regular determinants. Income and price-related variables are standard economic determinants, while climatic factors fall under regular variables. This study examines the impact of these determinants on tourist arrivals in Kerala using monthly data from January 2002 to December 2019. The auto-regressive distributed lagged (ARDL) method was applied to seasonality-adjusted data.Findings revealed that none of the four predictors—income of source markets, nominal exchange rate (₹), rainfall in Kerala, and tourism seasonality—showed a significant long-term relationship with tourist arrivals. However, in the short run, the nominal exchange rate played a key role, with more tourists arriving during Rupee depreciation. The other three factors were not significant in the short term. Despite this, all four variables displayed relationships with tourism demand consistent with expected trends.The study highlights that differences among destinations or potential data inaccuracies could influence outcomes. It does not reject the universal importance of standard factors in shaping tourism demand.

Keywords: *International Tourism Demand, Standard Determinants, Income, Nominal Exchange Rates, Rainfall, Seasonality*

JEL Classification: Z3

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1. Introduction

Over the past few decades, Kerala has evolved into one of the most sought-after international tourism destinations in India. The South Indian state has recently gained acclaim for its perfect blend of diverse scenic landscapes and rich cultural distinctiveness. The state's lush backwaters, pristine beaches, mist-clad hills and lush greenery create a picturesque backdrop that lures tourists from around the world. Tourists arrive in large numbers in the South Indian state to experience its diverse tourism resources. Renowned as "God's Own Country," Kerala has captured the imagination of travellers worldwide with its rich cultural heritage, diverse landscapes and unique tourism offerings (Anappattath & Thomas, 2023). Proving this, Kerala has increasingly become one of the most sought-after destinations in the country, attracting a larger share of overseas visitors compared to many other states, according to data from 'Kerala Tourism Statistics' as referenced by Anappattath and Thomas (2023), based on pre-Covid figures.On an aggregate basis, number of foreigntourists who arrive in Kerala rose to over one million in 2019 from mere one lakh in the late1980s according to different issues of 'Kerala Tourism Statistics' being published by Department of Tourism, Government of Kerala (2022).

It is obvious that only tourism resources cannot make tourist arrivals a reality (Yale, 1991). As pointed out by Heath & Wall (1992) and Bunghez (2016), growth of tourist destinations can be associated with natural, cultural and historical factors. Furthermore, economic determinants are primary in the study on tourism demand of a destination. Hence it is important to find out the determinants of foreign tourist arrivals in Kerala where foreign tourist footfalls are vital when compared to many other states in the country. Identifying the factors driving foreign tourist arrivals could throw light on the problems and prospects associated with Kerala's international tourism. It could help Kerala's international tourism management more effective. The present study makes an attempt to develop ARDL (Autoregressive distributed lag) model on overall foreign tourist arrivals in Kerala (from Jan 2002 to Dec 2019).

2. Seasonality and trend of Kerala's overseas tourist arrivals (Jan 2002 to Dec 2019)

Before delving into the time series regression analysis, a line diagram illustrating month-wise foreign tourist arrivals in Kerala (Figure 1) provides a quick understanding of the trends, seasonality and magnitude of international tourist arrivals. While Kerala has experienced overall positive growth in foreign tourist arrivals over the past few decades, detailed year-wise and month-wise data reveal a nuanced picture.

The seasonality and trend in month-wise tourist arrivals highlight significant fluctuations. Approximately 60% of Kerala's foreign tourists visit during January, February, March, November, and December each year, according to data from 'Kerala Tourism Statistics'. Conversely, the months of May, June, and July register the lowest footfalls, contributing only about 13% of the total arrivals on average. Despite these seasonal variations, foreign tourist arrivals show an overall upward trend.

Between 2002 and 2010, peak season arrivals (November-March) ranged from 40,000 to 80,000 per month. However, post-2010, this figure increased to 100,000–160,000 per month. Similarly, off-season arrivals (May-July) grew from 10,000–20,000 before 2010 to 20,000-40,000 after 2010 (see Figure 1).

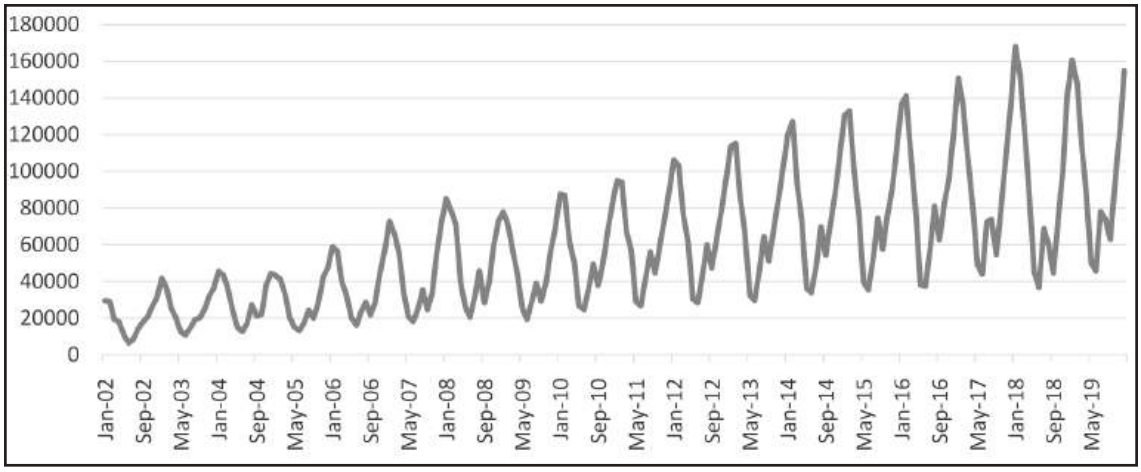

Figure 1.Kerala's month-wise overseas tourist arrivals (Jan 2002-Dec 2019)
Source: Department of Tourism, GoK (2022)

3. Review of literature

The literature on tourism economics is abundant with empirical studies examining tourism demand. Numerous efforts have been made to develop tourism demand models for various regions and countries, often using tourist arrivals as a proxy for demand. Notable examples include the works of Narayan (2004), Song et al. (2003), Naude and Saayman (2005), and Zamparini et al. (2017).

3.1. An Overview of Literature on of Tourism Demand Estimation

Although tourism demand studies generally use some typical determinants such as income and price related variables, factors affect the demand differently depends on destination

or source market. As pointed out by Naude and Saayman (2005), cultural and natural resources of Africa helped attract foreign visitors abundantly. They observe that standard tourism demand determinants such as income and prices are the factors driving tourist arrivals in developed countries. It implies that there are several other factors impacting the tourism demand of developing countries majorly, apart from standard factors. Naude and Saayman (2005) suggest that traditional factors influencing tourism demand, such as the income level in the source country, destination pricing relative to the origin, and transportation costs, do not play a significant role in explaining the demand for Africa as a tourism destination.They are regarded as "developed country determinants of international tourism demand", according to Naude and Saayman (2005). However, prices or cost of living has significant negative impact on tourist arrivals according to various studies (Narayan, 2004 and Divisekara & Kulendran, 2006). In the case of each destination, tourism prices may not always move inversely to tourism demand, even though prices have been found to negatively impact tourism demand in the Philippines, as noted by Deluna and Jeon (2014). Similarly, Dhariwal (2005) discovered that the cost of living does not significantly influence international tourist arrivals in India.It does not mean prices are not at all related to tourism demand as tourism demand in certain regions and circumstances may be differently related to different variables. Song et al. (2003) found that the so-called "developed country determinants" (income and tourism prices) were significantly related to international tourist arrivals in Thailand with correct signs. It implies that income and prices have still some room to explain the role of standard determinants of tourist arrivals in developing regions despite the arguments of Naude and Saayman (2005).

This research article seeks to add existing tourism demand literature by providing insights on intricate interplay between international tourism, socio-economic dynamics, and seasonality of major source markets(Europe) in the context of Indian state of Kerala.

3.2. Literature on factors driving Kerala's Overseas Tourism Demand

This study was carried out to identify the factors driving Kerala's overseas tourism demand in Kerala by relying entirely on the tourist arrivals segment. Several such attempts were available for the review (examples: Naude & Saayman, 2015, Gani & Clemes, 2017, Sharma & Pal, 2019, and Narayan, 2004). Researchers have inter-changeably used tourist arrivals as a proxy to tourism demand along with other segments of tourism demand viz. tourism nights and tourist expenditure. All the potential variables re-grouped as three type of variables viz. origin-based variables, destination-based variables and

origin-cum-destination based variables (Anappattath & Thomas, 2023). The variables are either economic or non-economic in nature as well.

3.2.1. Origin-based Variables

The variables directly linked to the origin countries of Kerala's overseas tourism, or the source countries for Kerala's overseas visitor arrivals, can be regarded as push factors or external determinants of international tourism demand in Kerala (Anappattath & Thomas, 2023). This category includes factors such as the income levels and tourism seasonality in the source markets.

Effect of Income: The income of tourists or their source countries is among the most frequently cited independent variables in tourism demand literature. Several studies, such as those by Kim et al. (2011), Naude and Saayman (2005), Song et al. (2003), Narayan (2004), Lee (1996), Malec and Abrham (2016), Alegre and Pou (2004), Gani and Clemes (2017) and Zamparini et al. (2017) provide notable examples.While many studies have identified a significant positive effect of income on international tourism demand, others have failed to establish such an effect. For instance, Narayan (2004), Lee (1996), Roget and Gonzalez (2006), Malec and Abrham (2016), Tang and Tan (2015) and Gani and Clemes (2017) confirmed the positive influence of income on tourism demand. However, Naude and Saayman (2005) found no statistically significant effect of income in certain contexts. Specifically, they argued that income is a determinant of tourism demand primarily in developed countries, noting its lack of significance in influencing tourist arrivals to African nations from the rest of the world.Tang and Tan (2015) observed that income is positively and statistically significant (at least at the 10% level) in most studies. However, there is still potential for additional research on how income influences tourism demand in developing regions, including the Indian state of Kerala. This is especially important considering Naude and Saayman's (2005) claim that income primarily serves as a determinant of international tourism demand in developed countries.

Role of Source Market's Tourism Seasonality: "Tourism seasonality remains a chronic problem for the global tourism industry due to the uneven nature of tourism demand and the fixed nature of tourism supply" (Connel et al., 2015; Yildirim & Coskun, 2016). Seasonality should be considered a potential determinant of tourism demand, either from a destination-based or origin-based perspective. Additionally, several other factors contribute to tourism seasonality. Corluka (2018) highlighted that seasonality is influenced by weather, the timing of religious festivals, decisions regarding employee bonuses,

academic vacations and industry-specific holidays. According to Corluka, seasonality has garnered significant attention in tourism literature. Andriotis et al. (2007) found that the season of visit significantly affects tourists' preferences.

Departing from most studies, the current study aims to analyze tourism seasonality from the perspective of source markets. As Europe is a major source market for Kerala's international tourism, its tourism seasonality is a key factor influencing tourist arrivals in Kerala, which is explored in this study. This focus is particularly relevant since Europe remains a crucial source market for Kerala's international tourism. Moreover, Europe is characterized by Arctic weather conditions, similar to North America, another major source market for Kerala. It is plausible that Europe and North America exhibit comparable tourism seasonality patterns due to their climates. Therefore, Europe's seasonality, which parallels that of North America, can have a similar impact on Kerala's tourism.

3.2.2. Destination-Based Variable: Rainfall

The factors intrinsic to Kerala's international tourism are its pull factors, which attract overseas visitors to its destinations. Among these, rainfall is the sole climatic variable considered in the present study. Numerous studies have explored the impact of non-economic variables, including climatic factors, on tourism seasonality. These studies often reveal that cyclones and rainfall negatively affect tourism demand, whereas temperature and sunshine hours have a positive correlation. Research by Fauzel (2019), Chen et al. (2017), and Chen & Lin (2014) supports these findings.Xie (2020) and Salman et al. (2021), along with Alegre et al. (2011), identified climate as a crucial factor affecting the tourist turnout. Specifically, Alegre et al. (2011) highlighted that in Spain, climate plays a pivotal role in shaping tourism demand, with rainfall significantly influencing tourist arrivals. Despite its varied impact, climate has undeniably played a crucial role in influencing tourist arrivals, highlighting the tourism industry's vulnerability to climate change and climatic events. The monsoon season from June to September is widely regarded as the off-season for international tourism in the state of Kerala. Given its importance, including rainfall as a predictor variable that directly influences seasonality is both relevant and justified, especially for a study based on a seasonality-adjusted monthly dataset. This is particularly relevant given the increasingly erratic rainfall patterns observed in recent years across India, especially in Kerala.

3.2.3. Origin-cum-Destination based Variable: Nominal Exchange Rates

Certain variables are influenced by both the origin countries and the destination in tandem.

These variables typically reflect comparative features between the origin markets and the destination. The nominal exchange rate (e.g., US Dollar/Indian Rupee) stands out as a key determinant in this category. Depreciation or devaluation of a nation's currency tends to boost tourism exports, while appreciation or revaluation can dampen international tourism demand, provided the country can effectively capitalize on increased exports (Algieri, 2006). This relationship is supported by studies such as Song et al. (2003), Dhariwal (2005), Tavarez and Leitao (2016), and Sharma and Pal (2021). Song et al. (2003) highlighted how the depreciation of the Thai Baht significantly increased foreign tourist arrivals to Thailand over time. In a similar vein, Dhariwal (2005) and Sharma & Pal (2021) found that the nominal exchange rate had a significant negative effect on foreign tourist arrivals in India. Moreover, exchange rate volatility has a particularly pronounced effect on the major source countries of India's international tourism compared to its impact on overall tourist arrivals (Jena & Dash, 2020).

4. Objectives and Hypotheses

This study was undertaken to estimate and analyze Kerala's overseas tourism demand. To achieve this, the research will examine the role of income, the nominal exchange rate (USD/₹), Europe's tourism seasonality and Kerala's rainfall on foreign tourist arrivals in Kerala, India. While income is anticipated to have a positive influence on overseas tourist arrivals in Indian state of Kerala, factors such as the nominal exchange rate (USD/₹), Europe's tourism seasonality and Kerala's rainfall are expected to reduce the tourist arrivals.

5. Methodology and Analytical Framework

This study explicitly employs the Autoregressive Distributed Lagged (ARDL) approach to analyze the relationship between Kerala's overseas tourism demand and its determinants. This is complying with Pesaran et al. (2001) and Narayan (2004).The ARDL method was chosen to simultaneously estimate the relationship of selected variables in the short and long periods. Moreover, the ARDL Bounds Testing approach facilitated the identification of cointegration among the variables, which is a prerequisite for estimating the long-run model. This makes ARDL the most appropriate choice for the current study attempting to estimate Kerala's overseas tourism demand. The estimation was made using seasonality-adjusted data of overall overseas visitors in Kerala from January 2002 to December 2019.

Model specification: The demand model for overseas tourism demand in Indian state of Kerala is written as:

$$In\text{FTA}_{ij,t} = \beta_0 + \beta_1 In\text{Inc}_j + \beta_2 In\text{Exc}_j + \beta_3 In\text{Rain}_j + \beta_4 In\text{EUN}_j + \varepsilon_j \quad ...(1)$$

Where i = source countries of overseas tourist arrivals in Kerala; FTA_{ij} is the log of monthly foreign tourist arrivals in Kerala during Jan 2002 to Dec 2019; Inc_j is the log of income of the source markets measured by US imports; Exc_j is the log of nominal exchange rates (USD/₹); Rain_j is the log of rainfall in Kerala (mm). Rainfall recorded in Kochi is taken as the proxy for the rainfall in Kerala as Kerala experiences similar climate almost across the state. Another predictor EUN_j is the log of tourist overnight stays of Europe which is Kerala international tourism's major market; e_j is the error term; and β_1, β_2, β_3 and β_4 are the elasticities to be estimated.

The data on overall tourist arrivals in Kerala from abroad from January 2002 to December 2019 are collected from 'Kerala Tourist Statistics'. 'Eurostat' was depended for Europe's tourist overnight stays while exchange rates are collected from the web link availed from bookmyforex.com. Kerala's rainfall data were collected from India Meteorological Department (2021).

Cointegration Test: It is supposed that there is a long-run relationship between Kerala's overseas tourism demand and InFTA_j, $In\text{Inc}_j$, $In\text{Exc}_j$, $In\text{Rain}_j$, and $In\text{EUN}_j$(Narayan, 2004). The following unrestricted error adjustment regressions were estimated, with each variable alternately considered as the dependent variable, following the approach of Narayan (2004):

$$\Delta In\text{FTA}_{ij,t} = \beta_{0\text{FTA}} + \sum_{p=1}^{n} bpFTA\Delta In\text{FTA}_{ij,t-p} + \sum_{p=0}^{n} cpFTA\Delta 1In\text{Inc}_{i,t-p} + \sum_{p=0}^{n} dpFTA\Delta 1In\text{Exc}_{ij,t-p} + \sum_{p=0}^{n} epFTA\Delta 1In\text{Rain}_{t-p} + \sum_{p=0}^{n} fpFTA\Delta 1In\text{EUN}_{i,1-p} + \lambda 1\text{FTA}In\text{FTA}_{ij,\,t-1} + \lambda 2\text{FTA}In\text{Inc}_{j,\,t-1} + \lambda 3\text{FTA}In\text{Exc}_{ij,\,t-1} + \lambda 4\text{FTA}In\text{Rain},_{\,t-1} + \lambda 5\text{FTA}In\text{EUN}_{i,\,t-1} + \in_{1t} \quad ... (2a)$$

$$\Delta In\text{Inc}_j = \beta_{0\text{Inc}} + \sum_{p=1}^{n} bp\text{Inc}\Delta 1In\text{Inc}_{i,t-p} + \sum_{p=0}^{n} cp\text{Inc}\Delta 1In\text{FTA}_{ij,t-p} + \sum_{p=0}^{n} dp\text{Inc}\Delta 1In\text{Exc}_{ij,t-p} + \sum_{p=0}^{n} ep\text{Inc}\Delta 1In\text{Rain}_{i,t-p} + \sum_{p=0}^{n} fp\text{Inc}\Delta 1In\text{EUN}_{j,1-p} + \lambda 1\text{FTA}In\text{FTA}_{ij,t-1} + \lambda 2\text{Inc}In\text{Inc}_{i,t-p} + \lambda 3\text{Inc}In\text{Exc}_{ij,\,t-p} + \lambda 4\text{Inc}In\text{Rain}_{i,\,t-p} + \lambda 5\text{Inc}In\text{EUN}_{j,1-p} + \in_{2t} \quad ... (2b)$$

$$\Delta InExc_{ij,t} = \beta_{0Exc} + \sum_{p=1}^{n} bp\text{Exc}\Delta 1InExc_{ij,t-p} + \sum_{p=0}^{n} cp\text{Exc}\Delta 1InInc_{i,t-p} + \sum_{p=0}^{n} dp\text{Exc}\Delta InFTA_{ij,t-p} + \sum_{p=0}^{n} ep\text{Exc}\Delta 1InRain_{j,t-p} + \sum_{p=0}^{n} fp\text{Exc}\Delta 1InEUN_{j,1-p} + \lambda 1\text{Exc}InFTA_{ij,t-1} + \lambda 2\text{Exc}InInc_{i,t-1} + \lambda 3\text{Exc}InExc_{ij,t-1} + \lambda 4\text{Exc}InRain_{i,t-1} + \lambda 5\text{Exc}InEUN_{j,t-1} + \in_{3t} \quad \ldots (2c)$$

$$\Delta InRain_{j,t} = \beta_{0Rain} + \sum_{p=0}^{n} bp\text{Rain}\Delta 1InRain_{j,1-p} + \sum_{p=0}^{n} cp\text{Rain}\Delta 1InExc_{ij,t-p} + \sum_{p=0}^{n} dp\text{Rain}\Delta 1InInc_{i,t-p} + \sum_{p=0}^{n} ep\text{Rain}\Delta 1InFTA_{ij,t-p} + \sum_{p=0}^{n} fp\text{Rain}\Delta 1InEUN_{j,1-p} + \lambda 1\text{Inc}InFTA_{ij,t-1} + \lambda 2\text{Rain}InInc_{i,t-1} + \lambda 3\text{Rain}InExc_{ij,t-1} + \lambda 4\text{Rain}InRain_{i,t-1} + \lambda 5\text{Rain}InEUN_{j,t-1} + \in_{4t} \quad \ldots (2d)$$

$$\Delta InEUN_{i,t} = \beta_{0EUN} + \sum_{p=1}^{n} bp\text{EUN}\Delta 1InEUN_{i,1-p} + \sum_{p=0}^{n} cp\text{EUN}\Delta 1InRain_{j,t-p} + \sum_{p=0}^{n} dp\text{EUN}\Delta 1InExc_{ij,t-p} + \sum_{p=0}^{n} ep\text{EUN}\Delta 1InInc_{i,t-p} + \sum_{p=0}^{n} fp\text{EUN}\Delta 1InFTA_{ij,t-p} + \lambda 1\text{EUN}InFTA_{ij,t-1} + \lambda 2\text{EUN}InInc_{i,t-1} + \lambda 3\text{EUN}\ InExc_{ij,t-1} + \lambda 4\text{EUN}\ InRain_{i,t-1} + \lambda 5\text{EUN}\ InEUN_{j,t-1} + \in_{5t} \quad \ldots (2e)$$

The attempt on cointegration among various variables could reach by using F-tests. It helps us know whether there exists long-run relationships. The study wants to test whether there exists any cointegration amongst the variables in the equations (2a to 2e).

In line with Narayan (2004), equation (1) is estimated using ARDL modelling provided there exists a long-run relationship amongst the variables:

$$\Delta InFTA_{ij,t} = \beta_0 + \sum_{p=1}^{n} \beta 1InFTA_{ij,t-p} + \sum_{p=0}^{n} \beta 2InInc_{i,t-p} + \sum_{p=0}^{n} \beta 3InExc_{ij,t-p} + \sum_{p=0}^{n} \beta 3InRain_{j,t-p} + \sum_{p=0}^{n} \beta 4InEUN_{i,1-p} + w_l \quad \ldots (3)$$

With cointegration, tourism demand elasticities of the predictor variables can also be estimated by developing an error adjustment model as follows:

$$\Delta InFTA_{ij,t} = \beta_0 + \sum_{p=1}^{n} \beta 1\Delta InFTA_{ij,t-p} + \sum_{p=0}^{n} \beta 2\Delta InInc_{i,t-p} + \sum_{p=0}^{n} \beta 3\Delta InExc_{ij,t-p} + \sum_{p=0}^{n} \beta 4\Delta InRain_{j,t-p} + \sum_{p=0}^{n} \beta 5\Delta 1InEUN_{i,t-p} + \varphi ECM_{ij,t-1} + \vartheta t \quad \ldots (4)$$

where $ECM_{ij,t}$ is the error term defined as (Narayan, 2004):

$$ECM_{ij,t} = In\text{FTA}_{ij,t} - \beta_0 - \sum_{p=1}^{n} \beta 1 InFTA_{ij,t-p} - \sum_{p=0}^{n} \beta 2 In\text{Inc}_{i,t-p} - \sum_{p=0}^{n} \beta 3 In\text{Exc}_{ij,t-p} - \sum_{p=0}^{n} \beta 4 In\text{Rain}_{j,t-p} - \sum_{p=0}^{n} \beta 4 In\text{EUN}_{i,t-p} \quad \text{... (5)}$$

In this context, Δ denotes the difference operator, while the beta coefficients capture the short-run dynamics driving the model's progression toward equilibrium. The parameter φ quantifies the rate at which the system adjusts. All the other representations in the equations are already defined.

6. Result and Discussion

6.1. ARDL Estimation of Kerala's International Tourism Demand

Equations (2a–2e) were analyzed as a preliminary step for the cointegration test before proceeding to estimate equation (3). Based on the F-statistics presented in Table 1, a long-run relationship or cointegration is observed among the chosen variables in the dataset. The upper bound critical value of 4.57 is significant at the 5% level, indicating that the null hypothesis of no cointegration among the variables is rejected, and the alternative hypothesis of the existence of a long-run relationship is supported.

Table 1. F-Statistics for Cointegration Relationship

Test statistic	Value	Signif.	*I*(0)	*I*(1)
F-statistic	12.36764	10%	3.03	4.06
K	4	5%	3.47	4.57
		2.5%	3.89	5.07
		1%	4.4	5.72

Source: Authors' estimates

Econometric results for the long-run international tourism demand of Kerala are shown in table 2. The results are obtained after normalising on overall foreign tourist arrivals in Kerala. All variables are correctly related to the tourism demand complying with the theory and expectation. Income is positively related to Kerala's international tourism demand in line with the demand theory. It stands essentially in line with previous studies in tourism demand as well (examples: Xie, 2020; Roget & Gozalez, 2006; Algieri, 2006, and Narayan, 2004). One per cent change in income of source countries could lead to

2.1 per cent change in the arrivals of tourists in Kerala from abroad. However, income measured by US' imports was statistically not significant even at 10 per cent level. It signifies the non-linear and unsmooth relationship between nominal income and Kerala's overseas tourism demand.

Exchange rates remained a negative force of the tourism demand as long-run depreciation of Indian Rupee in terms of US Dollar increased Kerala's export competitiveness of tourism. It is complying with various studies in tourism demand (Sharma, 2016; Xie, 2020; Song et al., 2003 and Dhariwal, 2005). One per cent rise in nominal exchange rate leads to nearly 15 per cent fall in the visitor arrivals in the state. This may not hold true as the same does not have statistical significance even at 10 per cent level. Its estimate is least significant as well amongst other variables. The negligible impact of the exchange rate on overseas tourism demand aligns with the findings of Xie (2020).According to Xie (2020), Japan's exchange rate is related to tourism demand of Norway with no significance. However, the negative relation between exchange rates and Kerala's overseas tourism demand falls in line with the widely accepted presumption of the inverse relation between demand and relative prices. The theoretical connection of lower relative prices and higher the tourism demand are established here.

Rainfall in Kerala and tourist overnight stays of Europe remained negative forces as expected. Europe has been the major source market of overseas tourism of the state of Kerala for a long period of time. One per cent rise in rainfall and Europe's tourist overnight stays could lower Kerala's international tourists by 1.1 per cent and 2.1 respectively. "The negative effect of rainfall on the tourism demand" falls in line with the findings of Alegre et al. (2011) who found that climate played significant effect in driving Spain's tourism demand. As pointed out by Anappattath and Thomas (2023), weather condition of the source market and destination have acted as negative force to Kerala's international tourism demand. It was found in their study that tourists from Kerala's major source markets from Europe (the UK, France and Germany) and North America (the US) turn out massively to Kerala especially at a time when Europe and North America experience extreme winter. The negative relation of Europe's tourist overnight stays implies that Kerala's international tourism season starts when offseason begins in Europe and vice versa. However, none of these variables are statistically significant in the current study even at 10 per cent level. Hence, we do not have statistical proof to make sure that Kerala's international tourism has been affected by income of the source markets, exchange rates, rainfall in Kerala and Europe's overnight stays of the tourists in the long period.

Since all the variables were insignificantly related to the dependent variable of overseas

tourist arrivals in Kerala in the long period, the null hypotheses of no relation between the predictor and predicted variables are accepted in case of the effect of income, exchange rate, rainfall and Europe's tour nights (source market's seasonality). However, all factors are related to tourism demand with expected signs.

Table 2. Long-run model for foreign tourist arrivals in Kerala from Jan 2002 to Dec 2019

Variable	Coefficient	Std. error	t-statistic	Prob.
Income (Inc)	2.083249	2.189179	0.951612	0.3424
Exchange rate (Exc)	-14.74503	117.4243	-0.125571	0.9002
Rainfall (Rain)	-1.071411	2.277218	-0.470491	0.6385
Europe's tour nights (EUN)	-2.09E-05	3.22E-05	-0.648089	0.5176

Source: Authors' estimates

The econometric estimation of the error adjustment model for overall foreign tourist arrivals in Kerala are presented in table 3. Exchange rates remained the only factor being impactful in affecting Kerala's overseas visitor arrivals in the short period, as per the ARDL estimation among the selected variables. It makes some impact on Kerala's international tourism demand in the short run while other variables do not make any impact. It is proved that fluctuation in exchange rate was statistically significant in impacting the overseas tourist arrivals in Kerala in the short period at 5 per cent level, complying with Tavarez and Leitao (2016). It clearly implies that the tourism export competitiveness of Kerala, where tourists from advanced economies in the West and emerging economies in the Middle East largely choose to spend their vacations, has been enhanced by the depreciation of the Indian Rupee.The R-squared value of 0.25 indicates that 25% of the short-term variation in Kerala's international tourism demand can be attributed to exchange rates. The error adjustment analysis suggests that there is no significant relationship between the dependent variable and most independent variables, except for the nominal exchange rate, where the null hypothesis is rejected.

The tests for the error adjustment model reveal no autocorrelation, as the Durbin-Watson statistic is close to 2. The F-statistic of 23.8 is highly significant at the 1% level. The lagged error correction term, Coint Eq(-1), is negative and statistically significant at the 10% level, indicating a stable long-run relationship between the variables.Its coefficient,

-0.4672, indicates a reasonable rate of adjustment toward equilibrium, falling within acceptable limits, with a 1% level of statistical significance as mentioned by Narayan (2004). Model selection is guided by three criteria: the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC) or Schwarz Criterion, and the Hanna-Quinn Criterion, where lower values suggest a better-fitting model.

Hypothesis Testing Result: No variables (except nominal exchange rates in the short run) as per the ARDL estimation were significantly related to overseas tourism demand of Kerala. Hence, null hypotheses stand accepted on all the cases except nominal exchange rate as per the short period error adjustment model. It implies that only origin-cum-destination based variables are relevant among the predictor variables used to develop ARDL model on overall foreign tourist arrivals in Kerala.

Table 3. Error Adjustment Model for Kerala's Overall Overseas Tourist Arrivals

Variable	Coefficient	Std. error	t-statistic	Prob.
C	7749.252	1076.050	7.201574	0.0000
@TREND	173.7602	21.96574	7.903315	0.0000
D(EXC)	-548.0329	219.3997	-2.497874	0.0133
Coint.Eq(-1)	-0.467205	0.058847	-7.939341	0.0000
R^2	0.252989		SD	4320.109
S.E of regression	3760.311		Akaike criterion	19.32082
Sum squared resid.	2.98E+09		Schwarz criterion	19.38353
Log likelihood	-2072.988		Hannan-Quinn criter.	19.34616
F-statistic	23.81971		Durbin-Watson stat	2.059498
Prob (F-statistic)	0.0000			

Source: Author's estimates

7. Conclusions

Income is arguably not a key factor in explaining Kerala's overseas tourist arrivals, which is unsurprising given that, despite most tourism demand studies confirming a positive and significant relationship, some research has failed to establish such a link (Anappattath & Thomas, 2023). This anomaly aligns with the findings of Naude and Saayman (2005), who observed that income serves as a "determinant of tourism in developed countries, while it was not significantly related to tourist arrivals in Africa".

Likewise, this study observed a positive but statistically insignificant relationship between the income levels of source countries and foreign tourist arrivals in Kerala. However, the negligible impact of income on Kerala's international tourism demand contrasts with the findings of Tang and Tan (2015).

The ARDL analysis indicates that Kerala's overseas tourism demand is more strongly influenced by lower relative prices than absolute income, with nominal exchange rates showing a significant short-run impact. This highlights that the depreciation of the Indian Rupee against the US Dollar enhances Kerala's international tourism competitiveness by increasing its affordability as a destination.The greater relevance of nominal exchange rates over absolute income (at least in the short run) indicates that foreign tourists visit Kerala not because of their wealth but because Kerala offers a more competitive alternative compared to developed country destinations. For a developing country like India, the affordability of destinations plays a more significant role in attracting visitors from advanced economies than nominal income levels alone.

Two other factors, rainfall in Kerala and Europe's tourism season, were negatively related to Kerala's foreign tourist arrivals. Rainfall disrupts the free movement of tourists, especially foreign visitors, across destinations in Kerala. Additionally, higher overnight stays in Europe, Kerala's major source market, are associated with lower tourist arrivals in Kerala and vice versa. However, according to the ARDL estimation, neither of these factors was statistically significant in the short or long run.

By enhancing its tourism competitiveness, Kerala can strengthen its position as a sought-after destination, where the warmth of its hospitality and the allure of its unique experiences transcend economic boundaries. This insight is not only applicable to Kerala but also to other parts of India and developing regions worldwide. The minimal impact of factors such as income, rainfall, and source market seasonality on international tourism demand highlights Kerala's distinctive appeal as an international tourist destination. Further research is needed to comprehensively understand the dynamics of Kerala's international tourism demand.

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An Evaluation of Key Determinants Shaping the Success of Technology-Based Startups in Delhi, India

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Abstract

Technology startups have become key drivers of innovation, economic expansion, and employment in the digital age. However, understanding the factors that determine their success remains a complex challenge. In this study, success is measured in terms of revenue growth and venture capital acquisition. The analysis identifies five critical factors influencing startup success i.e. sales and marketing capability, the number of startups previously founded by entrepreneurs, the choice between innovating or purchasing technology, the gender composition of the founding team, and the percentage of employees with a STEM background. Results indicate that strong sales and marketing strategies significantly enhance both revenue and funding potential. Prior entrepreneurial experience positively correlates with venture capital acquisition, suggesting that investors favor founders with a proven track record. Startups that innovate their own technology tend to achieve higher profitability, whereas those relying on purchased technology may scale faster but struggle with differentiation. A higher proportion of STEM employees fosters technical robustness, improving investor confidence. Interestingly, gender composition plays a nuanced role—female representation in founding teams is associated with increased revenue but presents challenges in securing venture capital. These findings provide actionable insights for entrepreneurs, investors, and policymakers aiming to strengthen the startup ecosystem. By understanding these success determinants, stakeholders can design better support mechanisms to enhance startup performance, ensuring sustainable growth in emerging markets like India.

Keywords: *Technology, Startups, Revenue, Venture Capital, Success*

JEL Classification: L26

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1. Introduction

Technology-driven innovation is key to enhancing productivity, efficiency, and global competitiveness. As countries shift towards knowledge-based economies, tech entrepreneurship has emerged as a crucial tool for creating wealth, jobs, and fostering innovation, ultimately contributing to improved social conditions. Entrepreneurial leaders are central to this transformation, utilizing innovative business models to adapt to changes in the external environment. Over the past five decades, there has been a rapid rise in the adoption of new ideas and technologies.

Technology entrepreneurship is defined as an investment in ventures that assemble specialized individuals and diverse scientific and technological assets to create and capture value for a firm (Bailetti, 2012). With the onset of the information age and the digital shift brought about by Industry 4.0, a large number of technology-driven startups have emerged globally, working to turn their ideas into innovative products and services.

India is part of this global shift. While still in its early stages, India has become the third-largest startup ecosystem globally, after the US and China, according to the Economic Survey of India, 2023. The country has become one of the best places to start a business, ranking second among 49 countries in the Global Entrepreneurship Monitor (GEM) 2023-24. Over the years, India's position in the Global Innovation Index has improved significantly, moving from 81st in 2015 to 40th in 2023. This progress is attributed to India's growing knowledge capital and a thriving startup ecosystem, supported by both public and private research institutions.

However, while technological entrepreneurship holds great promise at the macro level, the high failure rate among such startups cannot be overlooked. Many tech-based ventures struggle to survive beyond the initial years of operation (Certo, 2003). Maintaining high success levels is crucial for the survival and success of these startups. Key traits of technology startups include their technological foundation, independent ownership (mainly by the founders), novelty (in terms of technology used and products/services offered), small or medium size, and the pursuit of scalable and replicable business models (Ethan et al., 2021). These firms also aim to secure funding to transition from the conceptualization phase to commercialization (Mary et al., 2019). Understanding the factors that impact the success of tech startups is essential for informed decision-making, optimizing resources,

gaining a competitive edge, managing risks, fostering innovation, and building investor confidence.

The primary objectives of this research are to establish widely accepted metrics for startup success and identify the key variables that most significantly affect success. To achieve these goals, we conducted a comprehensive literature review to develop an integrated model of potential factors influencing the success of technology startups and analyzed how success is defined in existing research. We then examined data from 350 tech startups in Delhi-NCR to identify the factors that influence startup success. The findings are discussed with recommendations for policymakers, entrepreneurs, and companies to enhance the success of startups.

2. Literature Review

The success of technology startups is multifaceted, determined by factors such as profitability, funding acquisition, and navigating uncertainty (Sarath, 2018). Several elements, including the firm's location, the dedication of its founders, the business's age, and the presence of non-founder partners, significantly impact startup success (Jinze, 2020). Moreover, analysis of failed businesses reveals that a lack of a clear business development strategy is often a key reason for their downfall (Marco, 2018).

Entrepreneurial profiles and traits are crucial to the success of tech startups. Numerous studies have examined the characteristics, skills, and motivations of entrepreneurs to understand their impact on the startup's trajectory.

For instance, research shows that gender diversity on the boards of tech startups is positively linked to their success (Tade, 2023). The study highlights that female representation on startup boards correlates with more efficient asset use, as reflected in Return on Assets (ROA). Furthermore, higher numbers of female shareholders and board members contribute to more effective capital deployment, indicated by Return on Equity (ROE). Interestingly, female-led startups show comparable financial performance to male-led ones in terms of size, profitability, efficiency, and financial management. However, research also indicates that venture capital (VC)-backed startups led by women perform worse compared to male-led counterparts, which can be attributed to biases in the VC evaluation process (Matz, 2023). Conversely, women-led creative firms outperform those led by men in profitability, scale, and financial management (Roman, 2019), though

these businesses tend to receive less funding. When financing is provided by syndicates led exclusively by male general partners, women-led businesses tend to face initial performance challenges (Sofia, 2022). Additionally, social networks among female tech entrepreneurs positively impact new venture performance, with gender bias and entrepreneurial awareness acting as moderating factors (Xie, 2017). These findings highlight the importance of gender diversity on startup boards and the need to address gender-related barriers in the entrepreneurial ecosystem.

In terms of age, successful tech startups are often founded by entrepreneurs in their middle years. Researcher (Kerstin, 2020) shows that ventures led by co-founders of differing ages—particularly when one is younger and the other older—are more likely to be innovative. However, this effect is moderated when there is a gender discrepancy among co-founders. Experience in the relevant industry is a strong predictor of entrepreneurial success (Chandler, 2022). Nevertheless, there is debate over the role of age versus experience in high-tech entrepreneurship. Some studies suggest the average age of successful entrepreneurs is around forty, and while age may influence decisions about hiring and scaling, factors like risk tolerance and entrepreneurial skills also play a significant role (Eric, 2018). While age is an important factor, it is not the sole determinant of tech startup success, as prior experience and industry knowledge are also crucial.

Prior professional experience is a key driver of tech startup performance. A study (Panelli, 2022) explored how entrepreneurs' previous managerial or entrepreneurial experiences influence decision-making in startups. Research (Florence, 2014) suggests that these prior experiences shape the way decisions are made, impacting startup performance. Startups led by individuals with prior experience in well-established organizations often perform better. Furthermore, a strong correlation exists between the total amount of prior work experience, encompassing both industry and startup exposure, and the early success of new tech ventures (Colombo, 2008). Founders' experience in management or entrepreneurship can influence the startup's strategic decisions, ultimately affecting performance (Roman, 2019). The interplay between past experience and decision-making is complex, yet prior work experience remains a critical factor in achieving success in the tech startup space, providing valuable insights and strategies for navigating competitive markets.

Experience as a previous startup founder significantly affects tech startup success. Founders

with prior startup experience, particularly in the same industry, tend to see diminishing performance, especially in high-tech sectors (Allison, 2019). However, a combination of different founder experiences—such as startup involvement alongside academic work—generally correlates with positive outcomes, including survival and growth (Ethan, 2021). Industry-specific experience also boosts performance, though its influence decreases, if there are changes in the leadership team early on (Chang et al., 2020). Therefore, while previous startup experience is crucial for success, its impact can be influenced by factors like team composition and industry dynamics (Anne, 2019).

The age of a startup plays a key role in its success. Research suggests that the link between entrepreneurial experience and success is stronger in the early stages of a business compared to later stages (Yang, 2020). Additionally, the radicalness of technological innovations significantly drives sales growth in young ventures, especially when competing in a fast-evolving tech landscape (Walter, 2013). Effective resource allocation, particularly intellectual capital, is a critical success factor in early-stage ventures focusing on technological innovation (Park, 2020). These findings suggest that the age of a startup can influence its performance, with younger startups benefiting more from entrepreneurial experience, innovative technologies, and strategic resource management.

Studies also show that a technical academic background positively influences the performance of tech startups, especially in industries where profitability is uncertain (Nielsen, 2015). Entrepreneurs motivated by opportunities tend to excel in innovation and business expansion, while those driven by career ambitions show higher survival rates and income levels (Spranger, 2023). Entrepreneurial experience plays a key role in startup performance, particularly in high-tech sectors and early-stage ventures (Rosano, 2018). Experimentation, such as A/B testing, further enhances performance by enabling organizational learning and the introduction of new products in high-tech startups. Academic startups, while prioritizing technical activities, often face challenges in bridging the commercial knowledge gap (Piva, 2008).

Startups led by founders with STEM (Science, Technology, Engineering, and Mathematics) backgrounds often have advantages in innovation and overall performance. Scientists play an essential role in fostering innovation through open collaboration and leveraging valuable career experiences within the startup environment (Roman, 2019). However, the presence of multiple scientist founders is key to fully realizing these advantages.

Furthermore, the integration of business practices into scientific ventures enhances the overall impact (Kerstin et al., 2020). Unfortunately, visa policies may limit the participation of foreign STEM PhDs in startups, restricting access to a significant pool of talent and potentially hindering innovation (Davide, 2020). Addressing the gender gap in STEM entrepreneurship is also crucial, as women with STEM backgrounds are underrepresented in innovation-driven startup ventures. Closing this gap can improve diversity and bring new perspectives, benefiting the entrepreneurial ecosystem (John, 2019).

3. Methodology

The purpose of this study was to identify the variables that affect the success of technology-based startups. At first, we conducted a comprehensive review of literature and discussed with entrepreneurs in order to understand most commonly considered measures of success in tech-startups.

Next, we developed a questionnaire that was distributed to various companies to identify the variables influencing the performance indicators identified in the initial phase. The questions were tailored to each entrepreneur's profile, focusing on aspects such as their educational background, professional experience, the type of technology firm they were establishing, target market, and funding sources. A pretest of the questionnaire was conducted with 30 tech startups. This allowed us to refine the questionnaire and remove questions that had discouraged business owners from participating, which had previously resulted in a lower response rate.

A centralized database or repository for information on technology-based startups in the selected study areas was not available. Therefore, we contacted a total of 1,673 technology-based startups using data from credible sources such as the Indian Software Product Industry Round Table (iSPIRT), the National Association for Software and Services Companies (NASSCOM), and the Start-up India website. Additionally, information from government-supported corporate accelerators and incubators was incorporated into the data collection process. Founders who agreed to participate were contacted directly by the authors, either in person or by phone, to administer the questionnaire and gather responses. We received a total of 385 responses, and analysis was performed based on data from 350 startups, with the rest discarded due to missing information.

Table 1: Variables and Measures used in the study.

Variable	Description
Revenue Growth	Measured by year-on-year revenue increase of the startup.
Venture Capital Acquisition	Measured by whether the startup has secured venture capital funding.
Sales and Marketing Capability	Evaluated by the startup's ability to create and implement effective sales and marketing strategies.
Prior Startup Experience	Number of previous startups founded by the entrepreneur(s).
Type of Technology Adoption	Whether the startup develops its own technology or purchases existing solutions.
Gender composition of the founding team	Proportion of male and female founders in the team.
Academic background	Percentage of employees with a background in Science, Technology, Engineering, or Mathematics.

4. Result and Discussion

The first step of the study gave us two variables as the indicators of startup success i.e. having attained an annual revenue growth rate above 50% and having attained funding for venture capitalists. The first dependent variable i.e. revenue growth rate was coded as 1 for startups with more than 50% growth in revenue over 2022-2023. Only one fourth of the startups in our sample met this condition. The study used complimentary log-log model because of asymmetry in the distribution.

$$\textit{Revenue Growth} = \alpha + \beta_1 \bullet (\textit{Sales \& Marketing Capability}) + \beta_2, (\textit{No. of Startups Previously Founded}) + \beta_3 (\textit{Innovation}) + \beta_4 (\textit{Gender Composition}) + \beta_5 (\textit{\% STEM Employees}) + \varepsilon$$

Table 2: Estimates for Revenue Growth

Variables	Coefficient (β)	Standard Error	t-Statistic	p-Value
Sales and Marketing Capability	0.35	0.08	4.38	0.000***
Number of Startups Previously Founded	0.22	0.05	4.40	0.000***
Innovated Technology (Dummy: 1 = Innovated, 0 = Purchased)	0.18	0.07	2.57	0.011**
Gender Composition (Proportion of Female Founders)	0.12	0.06	2.00	0.046**
Percentage of Employees with STEM Background	0.28	0.09	3.11	0.002***
Constant	1.50	0.20	7.50	0.000***

Note: *** 1 % , ** 5 %, *10% significance

The results above provide critical insights into the key factors influencing revenue growth among technology startups in the National Capital Region (NCR) of Delhi, India. The sales and marketing capability variable exhibits the strongest positive effect ($\beta = 0.35$, $p < 0.001$), suggesting that startups with well-developed marketing strategies and sales execution tend to experience higher revenue growth. This aligns with the understanding that an effective go-to-market strategy is essential for scaling operations and achieving market penetration in competitive industries. The number of startups previously founded by an entrepreneur also has a significant and positive impact on revenue growth ($\beta = 0.22$, $p < 0.001$), indicating that prior entrepreneurial experience enhances business acumen, investor confidence, and strategic decision-making. Founders who have previously launched startups likely benefit from established networks, improved risk management, and better operational efficiency, which contribute to sustained growth.

The choice between innovating or purchasing technology plays a crucial role in shaping

startup performance. The results show that startups developing their own technology experience higher revenue growth ($\beta = 0.18$, $p = 0.011$), possibly due to the competitive advantage gained from proprietary innovations. However, purchasing technology can still enable rapid scalability, even if it may limit differentiation in the long run. The gender composition of the founding team presents an interesting dynamic. A higher proportion of female founders is associated with increased revenue growth ($\beta = 0.12$, $p = 0.046$), reinforcing the growing evidence that diverse leadership teams contribute to better decision-making, creativity, and business resilience. However, prior research suggests that female-led startups often face challenges in securing venture capital, which could partially offset their revenue advantages.

Lastly, the percentage of employees with a STEM background has a substantial positive impact on revenue growth ($\beta = 0.28$, $p = 0.002$). This finding highlights the importance of technical expertise in driving innovation, product development, and operational efficiency. Startups with a higher concentration of STEM professionals are more likely to leverage emerging technologies, optimize processes, and create high-value products, which enhances their revenue potential. Overall, the model exhibits strong explanatory power ($R^2 = 0.67$, Adjusted $R^2 = 0.65$), indicating that the selected variables account for a significant portion of revenue variability among the sampled startups. The high F-statistic (42.15, $p < 0.001$) confirms the overall statistical significance of the model. These findings provide valuable implications for entrepreneurs, investors, and policymakers. Entrepreneurs should focus on strengthening their sales and marketing capabilities, leveraging prior experience, and fostering technical expertise within their teams. Investors may benefit from recognizing the growth potential of female-led startups and companies prioritizing innovation. Finally, policymakers can use these insights to design targeted support programs that enhance startup success in emerging markets.

In order to understand the factors that impacts the probability for startup to obtain venture capital funding, we have used logistic regression model. It gives us the probability of each dependent binary variable as both the events i.e. obtaining venture capital funding and not obtaining venture capital funding hold similar weight.

$$\textit{Venture Capital Acquisition} = \alpha + \beta_1 (\textit{Sales \& Marketing Capability}) + \beta_2 (\textit{No. of Startups Previously Founded}) + \beta_3 (\textit{Innovation}) + \beta_4 (\textit{Gender Composition}) + \beta_5 (\textit{\% STEM Employees}) + \varepsilon$$

Table 3: Estimates of Venture Capital Acquisition

Variables	Coefficient (β)	Standard Error	Z-Statistic	p-Value	Odds Ratio
Sales and Marketing Capability	0.80	0.15	5.33	< 0.0001	2.22
Number of Startups Previously Founded	0.60	0.20	3.00	0.003	1.82
Innovated Technology (Dummy: 1 = Innovated, 0 = Purchased)	0.10	0.18	0.56	0.574	1.11
Gender Composition (Proportion of Female Founders)	-0.25	0.14	-1.79	0.073	0.78
Percentage of Employees with STEM Background	0.45	0.13	3.46	0.001	1.57

The logistic regression analysis conducted in this study provides valuable insights into the factors that influence venture capital acquisition among tech startups in Delhi NCR. The findings reveal that while some factors significantly enhance the likelihood of securing investment, others have a more complex or negligible impact. One of the most crucial determinants of venture capital acquisition is the strength of a startup's sales and marketing capability. The analysis indicates that startups with robust sales and marketing strategies are more than twice as likely to secure funding compared to those with weaker strategies ($p < 0.0001$). This suggests that investors prioritize a startup's ability to effectively position and sell its product or service in the market. A well-developed marketing strategy signals strong market demand, competitive positioning, and potential for revenue growth, all of which make the startup more attractive to venture capitalists. This finding underscores the importance of not only having a great product or technology but also the ability to commercialize it successfully.

Another critical factor that significantly influences venture capital acquisition is the prior entrepreneurial experience of the founders. The study finds that for every additional startup previously founded by an entrepreneur, the odds of securing venture capital

increase by 82% ($p = 0.003$). This indicates that investors strongly favor founders with a track record of launching and managing startups, as prior experience is often associated with enhanced business acumen, risk management, and the ability to navigate challenges effectively. Entrepreneurs who have previously led startups, regardless of their success or failure, are perceived as more competent in scaling a business, understanding market dynamics, and making strategic decisions, thereby reducing the investment risk for venture capitalists. This preference for experienced entrepreneurs highlights the importance of mentorship, networking, and learning opportunities for first-time founders who may face greater challenges in attracting investment.

Interestingly, the analysis reveals that the choice between developing proprietary technology and purchasing existing technological solutions does not significantly impact venture capital acquisition ($p = 0.574$). This finding challenges the common perception that deep-tech or innovation-driven startups have a distinct advantage in securing funding. It suggests that investors do not inherently prioritize technological innovation over other key aspects such as market potential, scalability, and execution capability. While developing proprietary technology may offer competitive differentiation, startups that rely on integrating or adapting existing technologies can still be highly attractive to investors if they demonstrate strong business models and growth potential. This insight is particularly important for startups operating in sectors where technology is rapidly evolving, as it indicates that success is not solely dependent on innovation but also on how effectively the technology is deployed in the market.

The gender composition of the founding team presents a more nuanced and complex relationship with venture capital acquisition. The study finds a marginally negative association, indicating that a higher proportion of female founders slightly decreases the likelihood of securing funding, although the result is not statistically significant ($p = 0.073$). This finding aligns with broader global trends, where female entrepreneurs often face structural barriers and biases in accessing venture capital. Despite increasing efforts to promote gender diversity in entrepreneurship and investment, women-led startups continue to receive disproportionately lower funding compared to their male counterparts. The reasons for this disparity are multifaceted and may include unconscious biases among investors, limited representation of women in leadership roles within venture capital firms, and differences in networking opportunities. While the statistical insignificance suggests that gender alone may not be a decisive factor, the trend highlights the ongoing need for targeted initiatives to bridge the gender gap in startup funding and support the growth of women-led ventures.

A particularly strong predictor of venture capital acquisition is the percentage of employees with a background in Science, Technology, Engineering, and Mathematics (STEM). The analysis reveals that for every additional percentage point increase in STEM employees, the odds of securing venture capital funding rise by 57% ($p = 0.001$). This finding underscores the importance of a technically skilled workforce in attracting investment, as a high proportion of STEM employees signals strong product development capabilities, innovation potential, and long-term scalability. Investors likely view startups with a strong technical team as more capable of executing their vision, adapting to technological advancements, and maintaining a competitive edge in the market. This insight highlights the importance of talent acquisition strategies for startups, emphasizing the need to attract and retain highly skilled professionals in order to enhance investor confidence and improve funding prospects.

Overall, these findings provide critical insights for entrepreneurs, investors, and policymakers seeking to strengthen the startup ecosystem in emerging markets like India. The results clearly indicate that sales and marketing capability is a fundamental driver of investment success, reinforcing the need for startups to develop strong go-to-market strategies. Prior entrepreneurial experience significantly boosts funding prospects, emphasizing the value of learning from previous ventures and engaging in mentorship programs. The lack of significance in the innovation-versus-procurement debate suggests that execution, scalability, and business viability are more important than the specific technology development approach. The nuanced role of gender in venture capital acquisition highlights the persistent challenges faced by female entrepreneurs, necessitating continued efforts to promote inclusivity and equitable funding opportunities. Lastly, the strong positive impact of a technically skilled workforce underscores the need for startups to build robust teams with specialized expertise to enhance their credibility and appeal to investors. By understanding and leveraging these success determinants, startups can better position themselves for venture capital funding, ensuring sustainable growth and long-term success in the competitive technology landscape.

Conclusions

The results of this analysis provide a nuanced understanding of the critical factors driving both revenue growth and venture capital acquisition among technology startups in the National Capital Region (NCR) of Delhi, India. Among the most influential factors, sales and marketing capability stands out as the most powerful predictor of revenue growth, with startups that demonstrate strong marketing and sales execution exhibiting

significant growth potential. This finding underscores the importance of a well-crafted go-to-market strategy, as it enables startups to capture market share, build brand recognition, and scale operations effectively in highly competitive and dynamic environments. Additionally, prior entrepreneurial experience plays a vital role in fostering revenue growth, with entrepreneurs who have previously founded other startups being better positioned to leverage their business acumen, decision-making expertise, and investor networks. These founders are often more adept at managing risks, optimizing operations, and securing strategic partnerships, all of which contribute to sustained growth. Another noteworthy finding pertains to the choice between developing proprietary technology versus purchasing existing solutions. Startups that invest in technology innovation and develop their own solutions tend to experience higher revenue growth, as proprietary technologies offer a unique competitive advantage, enable differentiation, and open doors to new markets. However, while purchasing technology can be an expedient way to scale rapidly, it may not provide the same long-term value proposition in terms of differentiation and market positioning. Gender composition within founding teams is another significant factor, with a higher proportion of female founders being positively associated with revenue growth. This supports the growing body of research suggesting that diverse leadership teams tend to make better decisions, foster innovation, and enhance organizational resilience. However, despite these advantages, female-led startups often face challenges in securing venture capital, which may reduce the overall impact of their gender diversity on revenue growth. Furthermore, the percentage of employees with STEM (Science, Technology, Engineering, and Mathematics) backgrounds proves to be a key determinant in driving revenue growth, as technical expertise is crucial for fostering innovation, developing high-quality products, and optimizing business processes. A workforce with a higher concentration of STEM professionals is more likely to develop cutting-edge technologies, streamline operations, and stay ahead of industry trends, which collectively contribute to enhanced revenue performance.

When examining venture capital acquisition, the analysis reveals that strong sales and marketing capability remains a key driver, with startups excelling in this area being more than twice as likely to secure funding. This indicates that investors prioritize the ability of startups to generate revenue and execute scalable business strategies effectively. Prior entrepreneurial experience also significantly increases the likelihood of obtaining venture capital, as experienced founders are seen as less risky investments, given their proven track record of managing and growing businesses. Interestingly, the choice between innovation and technology procurement does not significantly impact venture capital

acquisition, suggesting that investors place greater emphasis on other factors, such as market potential, operational execution, and the strength of the founding team, rather than the specific technology development model. The role of gender in securing venture capital is more complex, as the findings indicate a marginally negative association between a higher proportion of female founders and the likelihood of obtaining funding, although this result is not statistically significant. This may point to underlying biases in the venture capital industry, where female entrepreneurs face additional barriers despite the strong revenue growth potential their startups may exhibit. Lastly, the presence of a skilled STEM workforce is strongly correlated with venture capital acquisition, with each additional percentage of STEM employees increasing the odds of securing funding by over 50%. This highlights the importance investors place on technical expertise, recognizing that a highly skilled workforce enhances the startup's ability to innovate, scale operations, and compete in the market. Overall, these findings provide actionable insights for entrepreneurs, investors, and policymakers, suggesting that entrepreneurs should focus on strengthening their sales and marketing strategies, leveraging prior experience, and building technical expertise within their teams. Investors may benefit from recognizing the growth potential of female-led startups and companies with strong technological capabilities, while policymakers should create targeted programs to support startup growth by enhancing access to resources, training, and capital. In conclusion, the research highlights the interplay between strategic, operational, and workforce-related factors in driving the success of tech startups in the NCR of Delhi, offering critical insights into how to foster a thriving entrepreneurial ecosystem.

Limitations and Future Scope of Research

While this study provides valuable insights into the factors influencing revenue growth and venture capital acquisition among technology startups in the National Capital Region (NCR) of Delhi, there are several limitations that must be acknowledged. Firstly, the study relies on cross-sectional data, which limits the ability to establish causal relationships between the identified factors and startup performance. Longitudinal studies would provide more robust evidence by tracking the same startups over time, allowing for a clearer understanding of how these factors evolve and influence long-term success. Additionally, the research focuses primarily on startups within the NCR, which may limit the generalizability of the findings to other regions or countries with different economic, cultural, or regulatory environments. Future research could extend the analysis to a broader sample of startups across India or internationally, to examine whether the identified

factors hold true in other contexts. Another limitation is the potential for unobserved variables that could affect revenue growth and venture capital acquisition, such as market conditions, regulatory changes, or external shocks. Future studies could incorporate these factors to create a more comprehensive model. Moreover, while the study highlights the importance of gender composition and the role of female founders, the marginal negative association with venture capital acquisition warrants further investigation into the specific barriers faced by female entrepreneurs in securing funding. Research could explore gender biases in venture capital, along with potential strategies for mitigating these biases. Finally, given the growing importance of digital transformation and emerging technologies, future studies could investigate the impact of digitalization and advanced technologies (such as AI, blockchain, etc.) on startup performance and funding opportunities, adding another layer of depth to the understanding of factors that influence startup success.

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Does Good Governance affect Economic Growth? Evidence from South Asian Countries

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Abstract

Economic growth as measured by Gross Domestic Product is a key indicator of an economy's performance. While some nations have seen rapid economic expansion, others have had difficulty. Good governance is one of the factors that can be used to explain why some nations outperform others economically. Control of corruption, government effectiveness, political stability and absence of violence, regulatory quality, the rule of law, voice, and accountability are prime indications of good governance. The current investigation has a dual purpose. The article has two main purposes. The first is to establish a causal relationship between countries' economic growth and good governance. The second is to show how important six indicators of good governance are in predicting economic growth in a limited group of South-Asian countries using panel regression analysis. The study uses data on the six indicators from the world development indicators for the countries like Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka for the period between 2002 and 2022 using causality analysis and multiple regression analysis. The result of the causality analysis shows that there is a unidirectional and bidirectional causality in the south-Asian countries. It is found from the panel regression that Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Rule of Law have the positive impact on economic growth whereas Regulatory Quality, Control of Corruption and Voice and Accountability have a negative effect on economic growth.

Keywords: *Economic Growth, Good Governance, Rule of Law, Political Stability, South Asian Countries.*

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1. Introduction

Economic growth is a fundamental prerequisite for nations to attain economic development. Countries with elevated economic development, such as the United States and the United Kingdom, have managed to cultivate resilient healthcare, education, transportation and technical sectors due to their formidable economic performance. Conversely, several emerging nations in Sub-Saharan Africa have had difficulties in facilitating their progress as a result of inadequate economic performance. The prevalence of poverty in the area exacerbates the situation, posing a significant obstacle for the governments of these nations in their efforts to raise cash for enhancing economic performance. Moreover, the quality of life in these underdeveloped areas is comparatively impoverished, since a significant number of individuals lack the financial means to access healthcare and education. Developed nations continually exhibit robust economic performance, so consolidating their supremacy in the global economy. In 2021, the United States and China contributed 23.93% and 18.45% respectively to the global economy, amounting to a combined total of 42.38% of the world's economic production (Molinillo et al., 2017). The United States, China, Japan, Germany, and the United Kingdom contributed $23 trillion, $17.7 trillion, $4.9 trillion, $4.2 trillion, and $3.2 trillion respectively to the Gross Domestic Product (GDP) in nominal terms. The growth rates of these countries differed: 5.7% for the United States, 8.1% for China, 1.6% for Japan, 2.9% for Germany and 7.4% for the United Kingdom. As a result, the quality of life in these nations has seen a substantial increase as a result of their elevated GDP per capita. Due to their burgeoning economic prosperity, these five nations possess significant sway in international policy, since several other countries strongly depend on them for financial assistance. The factors driving economic development in several industrialized nations are varied. The service sector is crucial for the economic expansion of both the United States and the United Kingdom, while exports have a substantial influence on the economies of China and Japan. China has seen significant economic growth due to several causes, such as strong consumer demand, the rise of the tertiary industry, developments in finance, and expansion in the industrial sector (Li et al., 2021). Rahman et al. (2019) identified energy use, gross capital creation and remittances as the main elements that influence economic development in South Asian countries and other Asian nations. Public investment on research and development (R&D) is recognized as a crucial factor for economic growth in European nations (Groot et al., 2004).

The impact of governance on economic development is of paramount importance. This impact is especially noticeable in African and south Asian nations, where some countries have had economic advancements as a consequence of effective government, while others still struggle with subpar economic outcomes owing to insufficient governance (Legese Feyisa et al., 2022) provide compelling evidence demonstrating the crucial impact of effective governance on the economic development of 39 Sub-Saharan African nations. The evidence is derived from data collected between 1995 and 2004. Their study further emphasizes that the influence of effective governance is more significant in African nations with high and low incomes, as opposed to middle-income countries. The concept of good governance lacks a broadly agreed-upon definition. The Office for the High Commissioner of Human Rights (OHCHR) defines governance as the systematic procedures, institutions, processes and practices that are used to make decisions and control matters of shared concern. Furthermore, good governance refers to the political and institutional procedures and results that are essential for accomplishing development objectives. The attributes of effective governance are openness, accountability, responsibility, involvement and responsiveness.

The World Bank developed the World Governance Indicators (WGI) as a means to assess and quantify the quality of governance. These six indicators are voice and accountability, political stability, absence of violence/terrorism, government effective, regulatory quality, rule of law and control of corruption (Kaufmaan and Kraay, 2023). Effective governance may enhance economic development via two separate techniques. The first strategy is the market-enhancing method. The focus is on creating a well-functioning market that has less corruption by reducing rent-seeking, protecting property rights and enforcing the rule of law via a strong legal system. A successful legal system guarantees the efficient settlement of conflicts and disputes at a reasonable cost. In addition, it is essential for governments to guarantee the supply of public goods that address the requirements of both the private sector and the general population (Khan, 2007). The establishment of strong governmental institutions is crucial for attaining good governance, regardless of whether it is pursued via market-enhancing or growth-enhancing approaches. The robustness of these institutions is intricately linked to the degree of social and economic advancement inside a nation. Developed countries often have robust governments, but many underdeveloped ones lack this attribute. Hence, nations such as the United States and the United Kingdom are in a favorable position to execute market-enhancing and growth-

enhancing initiatives due to their strong governmental institutions. While many East Asian nations, who are still encountering obstacles in achieving economic expansion, have tackled this issue by constructing robust institutions to propel development initiatives, other emerging countries persist in struggling with the lack of competent governance and effective markets required to foster progress. Developed nations have successfully developed the necessary prerequisites of effective governance to promote economic expansion, whether by adopting market-oriented or growth-oriented strategies but the question remain for developing countries as well as less developed countries like Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. This research seeks to present the scenario of the mentioned South Asian countries and tried to adding values in this field using the updated data for these countries for last two decades. Policymakers in all countries, but notably in developing countries, will benefit from understanding the meaning of the most important governance indicators and developing effective governance policies with the help of this research. This article considers only the representative indicators of good governance to get the sole impact of it on the economic growth. In this way this article is accumulating the existing literature.

2. Review of Literature

Economic growth in South Asian countries has been studied in several papers. It is a crucial factor in enhancing the overall well-being of individuals, particularly in developing nations. Greater employment opportunities, higher incomes, better health and education, and a decline in poverty are all results of inclusive and sustained economic growth. Rodrik (2007) argued that throughout history, economic expansion has been the most effective means of enhancing the opportunities for individuals in countries to improve their lives, including those who are the most disadvantaged. Alesina et al. (1996) examined the correlation between political instability and the development of GDP per capita using data from 113 countries spanning the years 1950 to 1982. They discover that political instability has a detrimental impact on economic progress. Feng (1997) obtains comparable findings for a dataset encompassing 96 countries from 1960 to 1980 governance to per capita income. According to Hall and Jones (1998), government structures and policies have the greatest impact on a nation's long-term production, capital accumulation, and productivity per worker. In a research article of Kaumfan et al. (1999) demonstrating a positive association between development and good governance, numerous research has been conducted, the majority yielding similar findings. Chong and Calderoan (2000)

discovered a substantial causal association between the quality of institutions and the expansion of the economy. Kaufman and Kraay conducted a second study in 2002 that looked at the correlation between the World Guiding Index (WGI) and per capita income. This study included more than 175 nations and covered the years 2000 and 2001. They came to the conclusion that a high income per capita is dependent on having excellent administration. Emara and Jhonsa (2014) identified a positive, strong statistically significant causation from quality of their data show a positive causation from per capita income to quality of governance for 22 Middle East and North Africa (MENA) nations. Lahouij (2016) investigated the influence of governance and other economic growth variables on the economic growth of six chosen oil-importing MENA nations using panel data for the years 2002-2013. He discovered that governance is highly connected with economic development. From the Asian Development Bank, Han et al. (2014) conducted research to determine whether or not nations with above-average governance saw quicker economic growth than those with below-average governance. The research has shown that the efficacy of the government, political stability, the capacity to manage corruption and the quality of regulatory oversight all have a more substantial beneficial influence on the growth performance of a nation than voice and accountability and rule of law in the country. According to the findings of Nguyen et al. (2019), the governance and administration of the provinces, as assessed by openness, accountability and the provision of public services have a substantial impact on the elimination of poverty and the expansion of the economy in the provinces of Vietnam. Furthermore, Thanh et al. (2019) used sequential (two-stage) estimate in order to investigate the issues of public expenditure, public governance and economic development at the province level in Vietnam during the period of 2006–2015. Paitoon (2018) conducted a comparative study to assess the degree of governance in Thailand and a few other Asian nations. The findings demonstrated that one of the key factors that lead to the increase of income per head is effective governance. Based on data collected between 1960 and 1995 for 98 developing nations, Campos and Nugent (2002) conducted an investigation to determine whether or not there is a causal and negative long-run link between political instability and economic development. However, they could not uncover any evidence of such a relationship. By using the linear dynamic panel data models on a sample that included up to 169 countries and five-year periods ranging from 1960 to 2004, Aisen and Veiga (2013) discovered the exact opposite, suggesting that higher degrees of political instability are associated

with lower growth GDP per capita rate. This was discovered by using the system GMM estimator. Acemoglu et al. (2004) presented empirical evidence supporting their claim that variations in economic institutions are the primary driver of disparities in economic progress. When political power is distributed to parties that protect proprietary rights, when economic institutions put effective limitations on power-holders, and when there are relatively few rents to be seized by power-holders, they come to the conclusion that economic institutions are the source of economic development. According to Zubair and Khan (2014), who investigated the link between World Goverance Indicators (WGI) and Gross Domestic Product (GDP) using estimations pertaining to Pakistan, they discovered that political stability is the factor that contributes the most to the economic development of Pakistan. Pelizzo and Stapenhurst (2013) contend that there is a substantial causal relationship between corruption and a nation's degree of socioeconomic development, rather than just a correlation between corruption and lower levels of socioeconomic development. Grindle (2004, 2007), on the other hand, asserts that the concept of "good governance" is not a tool that can be used to investigate what the specific actions that need to be taken in a real-world setting are. The findings of Morita and Zaelke (2007) indicate that the rule of law and good governance are essential components in order to achieve sustainable development.

3. Research Gap

Several studies have been conducted on the topic of good governance and economic growth including south Asian countries like Nasrin and Khan, 2016 and others but there are very few studies that are accessible on the association between these two important pillars through causality and nonlinear regression considers only the representative indicators of good governance to get the sole impact of it on the economic growth using last two decade data. Thus, this study fills in a vacuum in the literature by looking at the connection between economic growth and good governance.

4. Objectives

The current investigation has a dual purpose. The first objective is to establish a causal relationship between countries' economic growth and the indicators of good governance employing Granger causality test. Understanding the causal link between economic growth and good governance helps policymakers design effective strategies, emphasizing governance reforms to promote sustainable economic development and improve national

and institutional performance. The second goal of the article is to show how important six indicators of good governance are in predicting economic growth in a limited group of south-Asian countries using panel regression analysis. This study explores the predictive power of six governance indicators on economic growth in South Asian countries, highlighting their significance through panel regression to inform effective governance strategies for development.

5. Methodology and Data Source

5.1 Methodology

A common practice prior to handling time series data and for performing a co-integration test is to determine the stationarity of the series or its degree of integration, *I*(d). For this Augmented-Dickey-Fuller (ADF) Unit Root Test (Dickey & Fuller, 1979) has been used. It is essential to keep in mind that these tests presuppose the absence of any structural breaks (Gupta et al., 2022).

The present study uses ADF unit root test to examine the stationarity of the data series. It consists of running a regression of first difference of the series against the series lagged once, a constant and a time trend. This can be expressed as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \varepsilon_t$$

The test for a unit root is performed on the coefficient of Y_{t-1} in the regression in this ADF process. If the coefficient deviates considerably from zero, the hypothesis that Y_t has a unit root is rejected. Stationarity is implied by rejecting the null hypothesis(Dickey & Fuller, 1979)

$H_0: \alpha_2 = 0$ i.e., Y_t is a non-stationary series

$H_1: \alpha_2 < 0$ i.e., Y_t is a stationary series.

The null hypothesis, H_0, is accepted and the series is considered nonstationary or not integrated of order zero, I, if the estimated value of the ADF statistic is greater than McKinnon's critical values(Engle & Granger, 1991). If this fails, more differencing must be carried out until stationarity is obtained and the null hypothesis is rejected.

To determine whether or not one time period can be helpful in forecasting another, a statistical hypothesis test that can be called the Granger causality test is performed (Gupta

et al., 2022). It is claimed that a time series X is a Granger cause of another time series Y if it can be shown that the values of the time series X convey statistically significant information about the values of Y in the future. The examination is carried out in the following way:

Let *y* and *x* be stationary time series.

The null hypothesis is H_0: X does not Granger-cause Y,

The following regression should be used to determine the correct value to use for Y after it has been lagged:

This is the limited model that must be purchased in order to receive SSRR.

The next step is to strengthen the autoregression by including the lag values of x, as shown in the following equation:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + ... + a_m y_{t-m} + b_p x_{t-p} + ... + b_q x_{t-q} + \text{residual}_t$$

This is the model that does not have any restrictions for obtaining Sum of Square Residual Unrestricted (SSRUR).

The following serves as the test statistic in order to put the hypothesis to the test:

$F = ((SSR_R - SSR_{UR})/c) / SSR_{UR}/(n - l)$

Where c represents the number of lagging terms that were taken, n represents the sample size, and l is the number of parameters that were estimated using the unconstrained equation.

If there are no lagged values of x that are kept in the regression and then one may accept the null hypothesis that x does not Granger-cause y. This is the only condition under which this hypothesis can be accepted (Maiti & Gupta, 2023). The Granger causality test examines whether one time series can predict another. It checks if past values of one variable (X) improve the forecast of another variable (Y) beyond Y's own past values. If X significantly adds predictive power for Y, X is said to "Granger-cause" Y, implying predictive causality. In this case testing of existence and non existence of both ways causality between good governance and economic growth has been performed.

In the next stage, a non-linear panel regression has been carried out to find out the nexus between economic growth and different indicators of good governance.

$$GDP_{it} = \beta_1 + \beta_2 PV_{it} + \beta_3 RQ_{it} + \beta_4 CC_{it} + \beta_5 GE_{it} + \beta_6 RL_{it} + \beta_7 VA_{it} + \beta_7 RL_{it}^2 + \varepsilon_{it}$$

The calculated equation is discovered to be nonlinear; it should be noted. Therefore, the sign of marginal effects will aid in determining whether a relationship is positive or negative for those factors that have a nonlinear relationship to the dependent variable. The Wald test has been used to determine the statistical significance of these variables (Maiti et al., 2023). Considering the panel structure of the data, endogeneity of the model has been checked (Stat Value: 0.59, Probability: 0.571).

5.2 Data Source

In the present research, seven variables, i.e., Political Stability and Absence of Violence/ Terrorism (PV), Regulatory Quality (RQ), Control of Corruption (CC), Government Effectiveness (GE), Rule of Law (RL), Voice and Accountability (VA), Real Gross Domestic Product (GDP) used as the proxy for economic growth have been used. The study is based on time-series data from 2002 to 2022 for eight countries i.e. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, has been collected from World Development Indicators (WDI) published by the World Bank.

6. Analysis of Data

This section presents the analysis of results in three different tables.

Table 1: Descriptive Statistics of six indicators of Good Governance for South Asian Countries

		Indicators					
Country	**Descriptive Statistics**	**PV**	**RQ**	**CC**	**GE**	**RL**	**VA**
Afghanistan	**Min.**	-2.795	-1.812	-1.672	-1.880	-1.923	-1.752
	Max.	-2.035	-1.019	-1.152	-0.945	-1.437	-0.991
	Mean	-2.489	-1.410	-1.445	-1.439	-1.715	-1.219
	CV	-0.089	-0.163	-0.098	-0.132	-0.086	-0.163
Bangladesh	**Min.**	-1.864	-1.176	-1.597	-0.933	-1.152	-0.775
	Max.	-0.896	-0.811	-0.844	-0.656	-0.568	-0.268
	Mean	-1.281	-0.935	-1.096	-0.778	-0.803	-0.540
	CV	-0.209	-0.102	-0.219	-0.084	-0.205	-0.299

(Contd...)

Table 1 (Contd...)

Bhutan	**Min.**	0.569	-1.159	0.450	0.125	0.069	-1.290
	Max.	1.284	-0.049	1.618	0.702	0.672	0.220
	Mean	0.934	-0.667	1.110	0.441	0.381	-0.388
	CV	0.212	-0.509	0.293	0.358	0.485	-1.265
India	**Min.**	-1.510	-0.481	-0.555	-0.222	-0.108	0.051
	Max.	-0.569	-0.050	-0.229	0.375	0.179	0.462
	Mean	-1.067	-0.316	-0.394	0.024	0.005	0.371
	CV	-0.227	-0.401	-0.244	7.467	16.983	0.339
Maldives	**Min.**	-0.365	-0.657	-0.875	-0.492	-0.748	-1.195
	Max.	1.077	0.940	-0.077	0.835	0.090	-0.048
	Mean	0.315	-0.202	-0.520	-0.064	-0.308	-0.559
	CV	1.358	-2.424	-0.461	-5.668	-0.804	-0.610
Nepal	**Min.**	-2.149	-0.858	-0.953	-1.135	-0.959	-1.147
	Max.	-0.180	-0.414	-0.464	-0.598	-0.449	-0.049
	Mean	-1.208	-0.687	-0.695	-0.910	-0.672	-0.490
	CV	-0.553	-0.179	-0.170	-0.126	-0.216	-0.686
Pakistan	**Min.**	-2.810	-1.049	-1.179	-0.834	-0.994	-1.171
	Max.	-1.549	-0.480	-0.801	-0.384	-0.658	-0.693
	Mean	-2.220	-0.698	-0.921	-0.646	-0.818	-0.871
	CV	-0.187	-0.186	-0.133	-0.207	-0.127	-0.155
Sri Lanka	**Min.**	-1.799	-0.654	-0.489	-0.440	-0.266	-0.667
	Max.	0.083	0.125	-0.146	0.068	0.339	-0.008
	Mean	-0.715	-0.211	-0.310	-0.162	0.026	-0.285
	CV	-0.783	-0.800	-0.296	-0.760	5.626	-0.763

The table above displays the descriptive statistics of six indicators pertaining to good governance in south Asian countries during the study period. The table additionally displays the descriptive data pertaining to good governance. India has the highest mean value of good governance throughout the study period, with a score of .371, while Afghanistan has the lowest mean value of -1.129. In addition to the disparity in the average level of good governance, there is also a notable variation in a specific metric among the countries. Bhutan has the highest mean value (0.934) for the first indicator, political stability and absence of violence, while Afghanistan has the lowest mean value (-2.489). No country is demonstrating superior regulatory quality. Bhutan's superior position in terms of controlling corruption is a crucial indicator of its good governance compared to other countries. Bhutan exhibits superior levels of government performance and rule of law in comparison to other nations. India and Sri Lanka have demonstrates higher levels of voice and accountability.

For the ADF test, the optimum lag is selected based on Schwartz Information Criterion (0–4 lags). It is found that the null hypotheses of unit roots cannot be rejected at conventional significance levels. Therefore, all the series are non-stationary in level but are stationary in first difference (Maiti & Gupta, 2023). Therefore, all the series are integrated in the first difference.

Table 2: Result of Granger Causality Test of Variables for South Asian Countries

Null Hypothesis	Country															
	Afghanistan		Bangladesh		Bhutan		India		Maldives		Nepal		Pakistan		Sri Lanka	
	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.
GDP does not Granger Cause PV	0.148	0.86	1.192	0.35	0.399	0.66	0.205	0.82	0.129	0.88	0.206	0.82	1.352	0.29	3.969	0.05
PV does not Granger Cause GDP	4.365	0.02	4.775	0.02	2.912	0.09	9.657	0.00	6.392	0.01	0.594	0.57	6.477	0.01	3.399	0.05
GDP does not Granger Cause RQ	0.029	0.97	0.054	0.94	0.139	0.89	0.892	0.43	0.415	0.74	7.442	0.01	0.392	0.68	4.173	0.04

(Contd...)

Table 2 (Contd...)

RQ does not Granger Cause GDP	1.364	0.29	3.491	0.06	3.771	0.05	2.826	0.09	7.028	0.01	1.966	0.18	3.475	0.06	2.913	0.09
GDP does not Granger Cause CC	1.220	0.32	3.506	0.06	0.319	0.73	4.343	0.03	0.712	0.53	2.615	0.11	0.512	0.61	4.180	0.04
CC does not Granger Cause GDP	1.830	0.20	4.483	0.03	2.903	0.09	4.353	0.03	3.845	0.04	0.609	0.56	4.788	0.03	2.205	0.16
GDP does not Granger Cause GE	4.231	0.04	2.506	0.11	0.443	0.66	5.390	0.02	2.710	0.12	3.725	0.05	0.008	0.99	5.612	0.02
GE does not Granger Cause GDP	3.443	0.06	4.445	0.03	5.899	0.01	4.025	0.04	8.170	0	2.441	0.12	3.174	0.07	5.495	0.02
GDP does not Granger Cause RL	0.792	0.47	1.793	0.22	0.009	0.99	0.172	0.84	0.675	0.58	4.366	0.03	0.658	0.53	1.119	0.35
RL does not Granger Cause GDP	0.067	0.94	4.679	0.03	5.318	0.01	4.216	0.04	6.310	0.01	0.260	0.77	4.231	0.04	5.459	0.02
GDP does not Granger Cause VA	3.125	0.08	6.220	0.01	1.720	0.22	3.983	0.04	0.149	0.85	0.059	0.94	4.887	0.02	1.227	0.35
VA does not Granger Cause GDP	0.513	0.61	3.449	0.06	1.610	0.22	3.521	0.06	0.394	0.72	0.234	0.79	3.443	0.06	0.353	0.72

Source: Author's calculation

Table 2 shows the Granger causality test between gross domestic product (GDP) and six indicators in South Asian countries. A general rule of thumb is that in causality test when p>.10 then there no causal relationship between the variables or vice versa. Despite that Table 2 also projected the unidirectional causality and bidirectional causality between

the GDP and the indicators. Table 2 shows that in India there is bidirectional causality exists between GDP and political stability and absence of violence (PV). This means when GDP increases political stability increases and vice versa. While in other countries there is unidirectional causality between GDP and PV; For GDP and regulatory quality (RQ) there is unidirectional causality in all the south Asian countries.; for GDP and corruption control (CC), in Bangladesh and India there is bidirectional causality between GDP and CC. For GDP and government effectiveness (GE), there is bidirectional causality in between GDP and GE for Afghanistan, India and Sri Lanka; for GDP and rule of law (RL) there is unidirectional causality in all the countries; for GDP and voice and accountability (VA) there is bidirectional causality between GDP and VA for Bangladesh, India and Pakistan.

The bidirectional and unidirectional causalities between GDP and governance indicators arise due to varying levels of institutional development, governance quality, and economic dependency in South Asian countries. Bidirectional causality suggests mutual reinforcement; for example, economic growth fosters better governance (e.g., political stability, corruption control) and strong governance enhances economic performance. Unidirectional causality indicates that either governance drives GDP (e.g., regulatory quality) or vice versa depending on the structural and economic priorities of each country. The observed causal relationships between GDP and governance indicators can be explained by the mutual influence of economic performance and institutional quality. In countries with bidirectional causality, such as India, economic growth fosters better governance through improved resources, institutional reforms and citizen demands for accountability. Simultaneously, stronger governance ensures stability, reduces corruption and enhances public services, which support economic growth. Unidirectional causality, seen in other cases, suggests that GDP drives improvements in governance indicators without a reciprocal effect, possibly due to weaker institutional frameworks or delayed responses. Variations across South Asian countries reflect differences in governance quality, development priorities, and socio-political dynamics, where stronger institutions enable bidirectional causality, while weaker ones show limited reciprocal influence.

Table 3: Panel Regression Analysis-Economic Growth and six indicators of Good Governance

Explanatory Variable	Coefficient	t-Statistic	p-value	Marginal Effect
C	3.401***	2.971	0	
PV	3.552***	2.735	0	
RQ	-4.543**	-2.416	0.02	
CC	-5.309***	-2.716	0.01	
GE	6.409***	2.966	0	
RL	3.271***	2.821	0	3.664 (9.307**)
VA	-1.624	-1.100	0.27	
RL^2	-0.402**	-2.314	0.02	
Adjusted R-squared	0.812			
F-statistic	31.439			
Prob (F-statistic)	0			

Source: Author's calculation; ***, ** and *Significant at 1%, 5% and 10% level respectively; Chi-square value is present in the first bracket ().

Table 3 displays the outcome of a panel regression analysis that examines the relationship between economic growth and six metrics of good governance. Research indicates that factors such PV, GE, RL have a positive and beneficial influence on economic growth. A positive relationship between Political Stability and Absence of Violence/Terrorism (PV), Government Effectiveness (GE), Rule of Law (RL) and economic growth is well-documented in economic literature. Political stability reduces uncertainty, encouraging both domestic and foreign investment which drives economic growth (Aisen & Veiga, 2013). When violence and terrorism are minimized, resources are diverted from conflict-related expenditures to productive activities, fostering development. Government Effectiveness (GE) enhances economic performance by ensuring efficient public service delivery and implementing policies that promote business growth and innovation. Effective governance reduces transaction costs, strengthens infrastructure and builds investor confidence, directly contributing to GDP growth (Kaufmann et al., 1999).The Rule of Law (RL) supports economic growth by protecting property rights, enforcing contracts, and ensuring fair competition. A robust legal framework reduces corruption and promotes

accountability, creating an environment conducive to entrepreneurship and trade (North, 1990). Additionally, RL strengthens institutions that maintain economic stability. Together, these governance factors create a virtuous cycle: economic growth provides resources to further improve governance, while stable and effective governance sustains growth. The relationship is particularly critical in developing regions, where improvements in governance can unlock significant growth potential, as highlighted in empirical studies on South Asian countries.

A negative relationship between Regulatory Quality (RQ), Control of Corruption (CC), Voice and Accountability (VA), and economic growth may arise due to several contextual factors. In developing economies, including South Asia, implementing strict regulations and anti-corruption measures can initially increase compliance costs, stifle informal sector activities and slow down economic activity (Mauro, 1995). Similarly, improved voice and accountability may empower diverse groups, leading to policy changes and political instability in the short term which can deter investment (Rodrik, 1999). Additionally, inefficient enforcement of reforms or regulatory overreach might undermine their intended benefits, further hindering growth. These relationships often reflect the transitional dynamics of governance reforms, where the economic costs of establishing robust institutions outweigh immediate gains. However, in the long run, these indicators are critical for sustainable development, as they enhance transparency, equity and investor confidence, contributing to stable economic growth (North, 1990). The only indicator which has a nonlinear relationship with the economic growth is Rule of Law (RL) and its effect on the economic growth has been captured through the marginal effect. The result of the marginal effect shows a percentage increase in RL leads to a 3.66% increase in economic growth.

7. Conclusions and Recommendations

Good governance is crucial for fostering economic growth and facilitating development. Moreover, the research has two main purposes. The first step is to identify the South Asian countries where good governance is associated with economic growth. The second part of the article delves into how these six government indicators affect economic growth. The analysis shows that while political stability and absence of violence, rule of law and government effectiveness have a positive effect on economic growth and control of corruption; voice and accountability have a negative effect on economic growth. For development agencies and governments, there are several suggestions. As a first step, nations should put money into their infrastructure. Governments should prioritize

the improvement of laws, rules and regulations while also promoting citizen engagement in government processes. This article argues that laws and the quality of regulations have a greater impact on a country's economic growth. Foreign companies would be enticed to set up shop in their nation as a result of this investment. Businesses would be more likely to set up shop in the country if its leaders instilled a sense of security and stability, which would boost production. Second, governments are trying to enhance governance through research and finance; development agencies should back such efforts.

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Farm Size and Productivity of Maize Cultivation in the Madathukulam Block of Tiruppur District

J. Suresh Kumar*

Abstract

This study examines the relationship between farm size and maize productivity in the Madathukulam Block of Tiruppur District. As maize is a vital crop in this region, understanding the productivity factors impacting its cultivation is essential for agricultural development and economic sustainability. Data for this research was collected from a representative sample of 250 maize farms, covering various farm sizes during 2018-2019 through a three-stage stratified random sampling approach. The study found an average farm size of 2.74 hectares, with cropping intensities between 116.77 and 152.94 percent. The cost to cultivate one hectare of maize was calculated to be ₹ 75,874.65, with productivity averaging 166.67 quintals per hectare and a production cost of 455.23 per quintal. Gross returns were estimated at ₹ 178,377.46, with lower production expenses on large farms compared to medium-sized farms, where expenses were higher at ₹ 78,101. Larger farms demonstrated higher productivity, with an input-output ratio of 1:3.345, compared to marginal farms at 1:3.15. This disparity suggests that economies of scale enable larger farms to benefit from improved technology, better-quality inputs, and more efficient management practices. Moreover, larger farms are better equipped to absorb risks and employ strategies that maximize productivity. This research emphasizes the need to balance productivity and the socio-economic welfare of smallholder farmers. While large farms achieve higher productivity, small farms are essential to rural livelihoods. The study suggests that agricultural policy should address the needs of both small and large farms to promote sustainable maize cultivation in the Madathukulam Block.

Keywords: *Input, Output, Cost and Return, Net Income, Gross Return and Maize Production.*

JEL Classification: Q12, Q13, Q15, D24, O13

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Introduction

The term "Queen of Cereals" refers to maize, sometimes known as corn, because of its many applications, extensive cultivation, and adaptability (Reddy et al., 2016). According to the Food and Agriculture Organization (FAO), maize is the cereal crop that is produced the most globally, accounting for about 1 billion metric tons annually and roughly 21% of the world's cereal production. With a share of the global production of maize of over 35%, the United States is the largest producer in the world. (USDA, 2021). In addition to these major producers, there are also Argentina, Brazil, China, and India; together, they account for more than 70% of the world's production of maize (FAO, 2021). Maize is a major source of food and nutrition for animals around the world. Maize is a staple meal in developing countries and is consumed in a range of recipes, such as porridge, tortillas, and cornbread (FAO, 2021). In developed countries, maize is frequently used as animal feed, particularly for poultry and livestock, as well as a raw material for products like biofuels, starch, and sweeteners (Reddy, et al., 2016). The estimated global trade value of maize, which is over $30 billion USD (FAO, 2021), demonstrates the economic importance of this crop. Millions of individuals throughout the world have employment opportunities due to the cultivation and processing of maize (Reddy et al., 2016). On 173.45 hectares or 19.98% of the total cropped area under study, maize was cultivated. It contributed 34.05 percent of the gross crop production.

Agriculture is the backbone of India's economy, and the country's diverse agro-climatic regions offer opportunities for various crop cultivations. In this context, maize, one of the most important cereal crops, occupies a significant place in the agricultural landscape. Maize cultivation has gained prominence due to its versatility in being used as food, feed, and raw material for various industrial processes. However, the productivity of maize cultivation varies across regions and is influenced by multiple factors. One such critical factor is the size of the farms on which it is grown.

The Madathukulam Block, located in the Tiruppur District of the southern Indian state of Tamil Nadu, has a substantial agricultural sector, with maize being a prominent crop. As in many other regions, the productivity of maize cultivation in Madathukulam is subject to variations, and understanding the dynamics of these variations is crucial for sustainable agricultural development. Farm size, among various factors, plays a pivotal role in determining the yield and overall productivity of maize in this region.

The relationship between farm size and agricultural productivity is a topic of enduring interest for researchers, policymakers, and agricultural practitioners. Historically, debates

have revolved around whether small or large farms are more efficient and productive. Understanding this relationship is vital for crafting policies and interventions that can optimize agricultural production and support the livelihoods of farmers in the Madathukulam Block.

The primary objective of this study is to explore the connection between farm size and the productivity of maize cultivation in the Madathukulam Block. By analyzing the interactions between farm size, resource utilization, and maize yield, this research aims to provide insights into how farmers in this region can enhance their productivity, thereby contributing to food security, income generation, and sustainable agricultural practices.

In the subsequent sections, we will outline the methodology employed in this study, present the data collection and analysis procedures, and discuss the significance of the findings in the context of agricultural policy and rural development. The investigation of farm size and maize productivity in the Madathukulam Block contributes to the broader discourse on agricultural economics and can offer valuable recommendations for improving agricultural practices and the well-being of farmers in this region.

Materials and Methods

A stratified random sample in three stages was employed for the block, village, and farmers. Tiruppur, a district in Tamil Nadu, was specifically picked to prevent operational difficulties. One block, Madathukulam, in the chosen district, was randomly picked for the first stage of the study out of the seven others because it had the largest land planted with maize during the Kharif and Rabi seasons. Every hamlet in the chosen block was listed, along with how much of it was used for growing maize. In the second stage, ten villages from this block were randomly selected. Five categories were created using a different list of maize farmers from particular localities that included their holding size. Farm sizes were categorized as follows: marginal (less than 1 ha), small (1 to 2 ha), semi-medium (2 to 4 ha), medium (4 to 10 ha), and large (10 ha or more). From these categories, a sample of 250 growers was randomly selected. The third stage of selection was also carried out randomly, based on the distribution of growers across each size group.

Data Collection and Sampling

An experiment was conducted during the agricultural year of 2018 and 2019. This study examines the production function via the lens of the Cobb-Douglas production function. It functioned as the analytical framework for the study. The Cobb-Douglas production

function is a prevalent economic model that demonstrates the relationship between inputs and outputs in a production process. Consequently, doubling all inputs will provide a corresponding doubling of output, as the Cobb-Douglas production function presupposes constant returns to scale. In specific circumstances where scale economies or diseconomies of scale take place in the actual world, this presumption might not be accurate. Its thesis is that labour and capital are frequently utilized in predefined ratios. Business owners can actually regularly alter the inputs they use in combination. The Cobb-Douglas production function assumes the input elements' exponents total up to 1. As a result, scaling returns appear to be constant. In practice, the exponents could differ from 1 in some way. The assumption used by the model which might not be true for all industrial processes is that inputs are not totally interchangeable.

Given how stylized the Cobb-Douglas model is, it might be challenging to accurately capture the subtleties of real production processes. The model doesn't include how technological advancements or innovation impact output. In actuality, technical developments have a big impact on output. There might be non-linear connections between inputs and outputs in some agriculture or manufacturing processes that the linear version of the model is inadequate to capture. The model makes the assumption that the elasticity of substitution and marginal productivity are constant, however, this may not always be the case. The specific functional form of the Cobb-Douglas production function can have a considerable impact on the results, and several functional forms might be more appropriate depending on the situation.

In many economic circumstances, the Cobb-Douglas production function is still a helpful tool for clarifying and comprehending production connections.

Crop Production

The general from of production function equation for maize production taken as a below

$$\text{Log } Y = \log a + \log X_1^{b1} + \log X_2^{b2} + \log X_3^{b3} + \log X_4^{b4} + \log X_5^{b5} + \log X_6^{b6} + \log X_7^{b7} + \log X_8^{b8}$$

Y = Total Gross Income of crops in ₹ per hectare

X_1 = Expenditure on Human Labour in ₹ per hectare

X_2 = Expenditure on Bullock Labour in ₹ per hectare

X_3 = Expenditure on Machinery Power in ₹ per hectare

X_4 = Expenditure on Seed in ₹ per hectare

X_5 = Expenditure on Manure in ₹ per hectare

X_6 = Expenditure on Fertilizers in ₹ per hectare

X_7 = Expenditure on Pesticides in ₹ per hectare

X_8 = Expenditure on Irrigation in ₹ per hectare

A = Constant

b_1....b_8 = Regression Coefficient of respective variables

The production was organized along the same lines as that of maize. The functional form and the variables considered stayed the same.

Returns to Scale

Returns to scale involves increasing or decreasing all production-related elements to the same degree so that, regardless of production scale, the proportion of inputs remains constant. When all inputs are raised in the same proportions, the effect on output appears in three phases and increases the production scale:

1. Returns to scale rise as a result of the fact that total output grows more rapidly than all inputs combined;
2. Since the rise in total product is exactly proportional to the increase in inputs, returns to scale become constant;
3. Returns to scale decline because output growth is not proportional to input growth in all cases.

The most common way to determine returns to scale is to fit the Cobb-Douglas production function using the least squares approach, multiply the resulting value by exponents that indicate the production elasticity of the inputs, and then divide the result by the exponents.

$$\text{Log } Y = \log a + \log X_1^{b1} + \log X_2^{b2} + \log X_3^{b3} + \ldots\ldots\ldots \log X_n^{bn}$$

Where Y represents the farm's overall output, X_1, X_2, X_3... Xn represents variable inputs, and b1, b2, b3... bn represents elasticity coefficients. Adding the coefficients of the independent variables will reveal the return to scale. With regard to the independent variables, these coefficients were nothing more than elasticity.

$$\text{If } b_1 + b_2 + b_3 + b_n = 1 \text{ constant return to scale}$$

$$\text{If } b_1 + b_2 + b_3 + b_n < 1 \text{ decreasing return to scale}$$

$$\text{If } b_1 + b_2 + b_3 + b_n > 1 \text{ increasing return to scale}$$

Marginal Value Product of Inputs

In order to assess their productivity across various sizes of holdings and corps, the marginal value products (MVP) of various inputs, including human labour, bullock labour, equipment power, seed, manure, fertilizers, pesticides, and irrigation, were calculated at their geometric mean level. The following steps were taken in order to estimate the marginal value of the various inputs' outputs.

$$Y = aX_1^{b1} + X_2^{b2} \ldots X_n^{bn}$$

Where,

Y = Output Values in ₹ per hectare

X_1 ….. X_n = Input Variables

b1…… bn = Elasticity Coefficient

The partial derivatives of the output value (Y) with respect to the input

$$X_1 \frac{dy}{dx} = ab_1 + X_1^{b-1} + X_2^{b2} \ldots\ldots\ldots X_n^{bn}$$

The marginal value product of X_1 was then obtained by substituting the corresponding geometric mean b values of $X_1, X_2, \ldots X_n$

Results and Discussion

Structure of Farms

The farm was the final or ultimate unit of inquiry in this study, which covered 250 such units spread across 10 villages in a district block. The term 'farm' refers to the land actually cultivated (including current fellow) by a farmer and his family, regardless of ownership or location.

Size of Farm

The physical dimensions of the farm unit are a significant aspect in the study of agricultural organization and management. Table 1 presents the quantity of sample farms, total cultivated area, and average size categorized by size group for the 2018-19 study period.

Table – 1 The average holding size on each size-group of the sample farm

SI. No	Size Group (in hectare)	No. of Farms	Cultivated Area (in hectare)	Size of Holding (in hectare)
1	Marginal (0-1)	59	40.34 (23.60)	0.68
2	Small (1-2)	89	145.78 (35.60)	1.63
3	Semi- Medium (2-4)	65	193.30 (26.00)	2.97
4	Medium (4-10)	26	173.56 (10.40)	6.67
5	Large (10 and above)	11	133.91 (4.40)	12.17
	Total	**250**	**686.89 (100)**	**24.12**
	Average	**—**		**2.74**

Source: Primary Data

The average size of holding cases, as seen in the table above, is 2.74 hectares. This illustrates the traits of the sample communities, which were predominantly characterized by small holdings. Most cultivators, 59.20 percent, belong to the 0 - 2 hectares category, whilst merely 4.40 percent are in the 10 hectares and above category. The proportion of land cultivated within the 10 to 20-hectare category was 4.40 percent. Merely 9.58 percent of the land is under cultivation. It illustrates the irregular distribution of land within the research area.

Input Cost per Hectare

The table - 2 shows the cost of major inputs used in the cultivation of maize crops. The table shows that the average cost per hectare for growing maize was ₹ 75874.65. In the categories of 0 to 1 hectares and 4 to 10 hectares, it was ₹ 72854.39 and ₹ 78101.00, respectively. The 4 to 10-hectare size group of farms had the highest cost in comparison to other size groups of farms because more was invested in labor, fertilizers, machinery power, manure, seed, pesticides, bullock labor, and irrigation.

Fertilizer (18.23%), machinery power (9.10%), manure (6.56%), seed (5.65%), pesticides (3.43%), bullock labor (1.66%), and irrigation (0.73%) made up the remainder of the input factors (while maintaining rental value constant). Human labor made up 41.82 percent of these factors.

Table – 2 Input Cost per Hectare

(in) ₹

SI. No	Input Factors	Marginal (0-1)	Small (1-2)	Semi-Medium (2-4)	Medium (4-10)	Large (10 and above)	Average
1	Human Labour	30302.40 (41.60)	31711.68 (42.13)	32040.74 (41.83)	32316.17 (41.39)	31369.17 (41.79)	31724.24 (41.82)
2	Bullock Labour	1219.87 (1.68)	1242.86 (1.65)	1268.61 (1.65)	1323.52 (1.69)	1237.98 (1.66)	1260.59 (1.66)
3	Machinery Power	6689.75 (9.19)	6844.53 (9.09)	6964.56 (9.09)	7082.04 (9.06)	6851.44 (9.13)	6906.60 (9.10)
4	Seed	4254.81 (5.84)	4283.04 (5.69)	4288.64 (5.59)	4326.62 (5.54)	4320.02 (5.76)	4294.49 (5.65)
5	Manure	4894.57 (6.71)	4982.43 (6.62)	4993.15 (6.53)	5030.95 (6.45)	4951.95 (6.59)	4980.10 (6.56)
6	Fertilizers	12881.50 (17.68)	13405.05 (17.81)	14154.25 (18.47)	14850.61 (19.01)	13507.76 (17.99)	13838.62 (18.23)
7	Pesticides	2500.00 (3.43)	2562.58 (3.41)	2604.00 (3.39)	2697.36 (3.45)	2597.93 (3.47)	2596.13 (3.43)
8	Irrigation	503.01 (0.69)	540.18 (0.71)	562.40 (0.73)	584.36 (0.74)	554.32 (0.73)	552.89 (0.73)
9	Rental Value	6000.00 (8.23)	6000.00 (7.98)	6000.00 (7.83)	6000.00 (7.69)	6000.00 (7.99)	6000.00 (7.91)
10	Overhead Charges	3608.43 (4.95)	3689.06 (4.91)	3732.23 (4.89)	3889.31 (4.98)	3658.53 (4.89)	3720.95 (4.91)
Total Cost		**72854.39 (100.00)**	**75261.44 (100.00)**	**76608.62 (100.00)**	**78101.00 (100.00)**	**75049.15 (100.00)**	**75874.65 (100.00)**

Source: Primary Data

Note: Figures in bracket show the percentage of the respective cost

Yield and Cost of Production

The table – 3 displays the cost of production per quintal as well as the average yield per hectare for maize crops of various sizes. The table shows that 166.67 quintals of maize

were produced on average per hectare. Up until the size range of 4 to 10 hectares, the yield rose; beyond, it fell. Medium farms used higher inputs as a result. For the main product and by product, the average production costs per quintal were ₹ 455.23 and ₹ 290.35, respectively.

Table – 3 Yields and Cost of Production for Maize Crop

SI. No	Size of Group (in hectare)	Yield in Quintal / Hectare		Total Value (₹)	Cost of Production Per Quintal (in ₹)	
		Main Product	By Product		Main Product	By Product
1	Marginal (0-1)	150.00	246.98	229759.03	485.69	294.98
2	Small (1-2)	161.95	260.07	247545.45	464.72	289.38
3	Semi-Medium (2-4)	170.20	263.52	259363.29	450.10	290.71
4	Medium (4-10)	173.91	266.71	264820.43	449.08	292.83
5	Large (10 and above)	170.32	262.30	259439.76	440.65	286.11
Average		**166.67**	**261.32**	**254252.11**	**455.23**	**290.35**

Source: Primary Data

Measures of Farm Profit

The table - 4 displays the maize crop's output, net income, labor income for families, and farm business income.

Family Labour Income: It contains net profit or loss plus (+) the wages attributable to the farmer's and his family's efforts.

Farm Business Income: Gross income less (-) all production costs, excluding labour costs and interest on capital owned. It is a way to quantify how much money a farmer and his family make from their capital expenditures, labour, and administration efforts.

According to the table, the average output, net income, family labor income, and farm business income were ₹ 254252.11, ₹ 178377.46, ₹ 181956.99 and ₹ 183565.12,

respectively. These values were highest in the size category of 4 to 10 hectares because more input resources were being used. 1:3.35 was the input to output ratio.

Table – 4 Gross Incomes, Net Income, Family Labour Income and Farm Business Income

(inper hectare)

SI. No	Size of Group (in hectare)	Input	Output	Net Income	Farm Business Income	Family Labour Income	Input Output Ratio
1	Marginal (0-1)	72854.39	229759.03	156904.64	164204.03	162902.83	1:3.15
2	Small (1-2)	75261.44	247545.45	172284.01	177959.25	176338.68	1:3.28
3	Semi-Medium (2-4)	76608.62	259363.29	182754.67	187238.66	185514.47	1:3.38
4	Medium (4-10)	78101.00	264820.43	186719.43	191601.39	190095.97	1:3.39
5	Large (10 and above)	75049.15	259439.76	184390.61	189273.10	187650.03	1:3.45
Average		**75874.65**	**254252.11**	**178377.46**	**183565.12**	**181956.99**	**1:3.35**

Source: Primary Data

Cobb-Douglas Function Equations of Maize Crop

$$Y= 3.622\ X_1^{.098}(.095) + X_2^{.255}(.090) + X_3^{.262}(.151) + X_4^{.096}(.122) + X_5^{.193}(.154) + X_6^{.118}(.084) + X_7^{-0.068}(.096) + X_8^{.054}(.038)$$

$$\mathbf{R^2= .994}$$

Each Xi represents an input variable related to maize production, such as labour, land, fertilizer, water, etc.

The exponents on each X is how the output elasticity, or how sensitive the output (maize yield, Y) is to changes in each input.The numbers in parentheses represent standard errors for each exponent.

Output Elasticity: For example, X_1 has an exponent of .098, indicating that a 1% increase in X_1leads to an approximately .098% increase in maize yield.

An exponent greater than 1, like X_1 , suggests increasing returns to scale for that input, while an exponent between 0 and 1 indicates diminishing returns.

Negative exponent values, like – 0.068 for X_7, imply that increases in this input reduce maize yield.

Statistical Significance: Standard errors provided in parentheses help assess the reliability of each coefficient. Smaller standard errors relative to the coefficient value indicate more reliable estimates.

Goodness of Fit (R^2): The R^2 **=** 0.994 indicates that the model explains 99.4% of the variation in maize yield, suggesting a very good fit of the model to the data.

This function provides insights into how each factor influences maize production. Factors with high positive exponents, like X_1, play a significant role in increasing yield, while those with low or negative exponents have a lesser or negative impact. The model's high R^2 value indicates that these factors collectively provide a robust prediction of maize output.

Production Elasticity and Marginal Products of Farm Input on Maize Crops

In Table 5, each crop's production elasticity coefficient is presented along with a test for statistical significance and the standard error. For the maize crop, the coefficient associated with bullock labour and machinery power was found to be significant, while pesticides had a negative correlation with human labour, seed, manure, fertilizers, and irrigation. This implies that certain factors, like bullock labour and machinery power, positively impact maize production, while the use of pesticides shows an inverse relationship with other input factors. Some factors failed to reach statistical significance, leaving the elasticity of production for maize effectively unchanged.

Positive and negative correlations among variables reflect the differing relationships between input factors and crop productivity. For instance, a positive correlation between machinery power and yield suggests that as machinery power increases, maize productivity tends to increase. Conversely, the negative correlation between pesticides and factors like labour and fertilizers indicates that increased pesticide use may reduce reliance on these other inputs, potentially due to reduced pest-related labour needs or because excessive pesticide use can negatively affect soil health, diminishing the effectiveness of other inputs.

Table – 5 Production Elasticity, Standard Error and R^2 of Maize Crop

	Human Labour	Bullock Labour	Machinery Power	Seed	Manure	Fertilizers	Pesticides	Irrigation	R^2	Return to Scale
Regression Co-efficient	0.098	0.255*	0.262***	0.096	0.193	0.118	-0.068	0.054	0.994	(1.008) Constant
SE	0.095	0.090	0.151	0.122	0.154	0.084	0.096	0.038	-	-

Source: Primary Data

*Significant at 1% level of Significance

**Significant at 5% level of Significance

****Significant at 10% level of Significance

This table presents the results of a regression analysis for maize crop production, with coefficients for various input factors and measures of statistical significance.

Regression Coefficients: The coefficients represent the elasticity of maize production with respect to each input. A positive coefficient suggests that increasing this input would have a positive effect on production, while a negative coefficient indicates a negative effect. For example, Machinery Power has the highest positive elasticity (0.262) and is statistically significant at the 1% level, suggesting a strong and reliable relationship with maize production. Bullock Labour also shows a positive elasticity (0.255), statistically significant at the 1% level, indicating that increases in bullock labour are positively associated with maize output. Human Labour (0.098), Seed (0.096), Manure (0.193), Fertilizers (0.118), and Irrigation (0.054) all have positive coefficients, though they are not statistically significant at the 1% or 5% levels. This implies they have weaker or less consistent effects on production compared to machinery and bullock labour. Pesticides have a negative coefficient (-0.068), indicating a potential inverse relationship with output, though it is not statistically significant. This may suggest inefficiencies or misuse in pesticide application.

Standard Errors (SE): The standard errors show the variability of each estimate, with smaller values indicating more precise estimates. For example, the SE for irrigation (0.038) is relatively low, suggesting higher precision, while seed (0.122) and manure (0.154) have higher SEs, suggesting greater variability.

R-Squared (R^2): An R^2 of 0.994 indicates that 99.4% of the variance in maize production is explained by the input factors included in the model, signifying an excellent fit of the regression model.

Return to Scale: The sum of the coefficients (1.008) suggests constant returns to scale, as it is very close to 1. This implies that a proportional increase in all inputs would lead to a nearly proportional increase in output, supporting the efficient allocation of resources in this context.

This analysis suggests that machinery power and bullock labour significantly contribute to maize production, while other inputs show less consistent effects. The high R^2 value highlights a robust model, and the overall return to scale indicates efficient input utilization.

These findings are valuable for several applications. The model can assist smallholder farmers in Madathukulam Block by clarifying the relationship between farm size and maize productivity, guiding decisions on resource allocation. If the data suggests larger farms are more productive, smaller farmers might consider strategies for consolidation or cooperative farming. Policymakers can leverage these insights to craft policies that address the unique needs of both small-scale and large-scale maize farmers. For instance, if smaller farms show greater efficiency, policies could aim to improve smallholder access to credit, technology, and training. Alternatively, if larger farms yield higher productivity, policies might support land consolidation and mechanization.

The model's findings on the role of mechanization could help prioritize machinery introduction for larger farms, while agricultural extension services could offer targeted subsidies. Results may also guide market strategies, with larger farms potentially able to meet bulk demands, while smaller farms could benefit from cooperative approaches to access larger markets. Understanding the relative risks for different farm sizes can inform risk mitigation strategies, such as crop diversification for smaller farms or economies-of-scale management for larger ones. If smaller farms are found to be more productive, policies could encourage these farmers to adopt eco-friendly practices. Finally, the results could promote a balanced strategy, supporting both small and large farms for equitable wealth and opportunity distribution.

The elasticity coefficients and regression analysis offer actionable insights. The production function incorporates variables like land, labour, and technology, with coefficients representing their contributions to maize yield. A positive coefficient indicates that an increase in input, such as labour or machinery, proportionally raises productivity. Factors that increase yield without proportionally raising costs contribute to profitability. Elasticity illustrates maize yield sensitivity to changes in inputs; for instance, a high labour elasticity indicates its importance for productivity. The model can assess each input's marginal productivity, guiding resource allocation decisions based on cost-benefit analysis. A

positive technology coefficient highlights the productivity boost from adopting advanced practices.

This production function model provides detailed insights for optimizing maize cultivation in Madathukulam Block. Analyzing elasticity and marginal effects helps farmers and policymakers make informed decisions on resource allocation, technology adoption, and policies that enhance maize production and profitability for local farmers.

Marginal Products of Farm Input on Maize Crops

In order to compare crop productivity, the marginal value outputs for various inputs were computed at their geometric mean levels. Table 6 demonstrates that, when compared to other inputs, bullock work and irrigation had the lowest marginal value productivity. Human labor, seeds, and fertilizers had the highest marginal value of productivity. In comparison to irrigation and bullock labor, it shows that spending one extra rupee on human labor, fertilizers, and machine power yields far larger returns in additional output.

Table – 6 Different Input Marginal Value Products for Maize Crop

Human Labour	Bullock Labour	Machinery Power	Seed	Manure	Fertilizers	Pesticides	Irrigation
11.3271	8.0932	9.7931	9.3250	9.4642	10.4707	8.8088	7.2339

Source: Primary Data

In terms of particular crops, the marginal value products of human and bullock work were 11.3271 and 8.0932, respectively. The marginal values of labor, seed, manure, fertilizers, pesticides, and machinery were 9.7931, 9.3250, 9.4642, 10.4707, and 8.8088, respectively. In the irrigation scenario, the marginal value of corn changed by 7.2339.

Conclusions

The study on farm size and maize productivity in the Madathukulam Block of Tiruppur District presents a comprehensive analysis of the relationship between farm size and productivity, highlighting the impact of farm scale on output efficiency, resource utilization, and risk mitigation. Larger farms tend to benefit from economies of scale, allowing for greater investments in modern technologies and mechanized equipment. This access to advanced resources boosts productivity per acre, as these farms can implement precision techniques and sophisticated machinery, which smaller farms often find financially unfeasible.

Economies of scale also allow larger farms to reduce the per-unit cost of production, as fixed costs such as machinery, labor, and land preparation are spread over a greater number of acres. The production cost per quintal of maize, calculated at ₹ 455.23, suggests that larger farms can achieve this efficiency through scale. Larger farms have a comparative advantage in resource utilization. By optimizing the application of inputs like fertilizers, pesticides, and irrigation, they can achieve higher yields. For instance, the study reports that maize's input-to-output ratio stands at 1:3.35, indicating that for every unit of input cost, the output value is 3.35 times higher, reflecting efficient resource allocation. The calculated marginal products (e.g., 11.3271 for labor, 9.7931 for equipment) highlight how resources contribute differentially to productivity, and larger farms capitalize on this by adjusting input combinations optimally.

Larger farms have a higher capacity to absorb risks associated with crop failure, market fluctuations, and environmental uncertainties. This risk absorption allows them to focus on long-term productivity strategies rather than short-term survival tactics. Consequently, they are often better positioned to invest in advanced seeds, crop insurance, and irrigation technologies, which might be inaccessible to smaller farms due to high initial costs.

Despite lower productivity on a per-acre basis, smallholder farmers continue to be vital to the socio-economic framework of Madathukulam Block. They are often constrained by limited capital, making it difficult to afford mechanized tools or advanced inputs. Moreover, their lower productivity translates to lower income, and they often rely on off-farm income sources.

Maize appears to be particularly profitable in the region, with an average net return of ₹ 178377.46 per hectare and an average yield of 166.67 quintals per hectare. These figures underscore the crop's profitability and its potential to generate substantial revenue, especially for larger farms.The breakdown of the marginal products, such as those for human labor (11.3271), fertilizers (10.4707), and irrigation (7.2339), reflects the significance of each input to maize productivity. These figures suggest that both labor and efficient fertilizer application are crucial for maximizing output.

The findings suggest that agricultural policy interventions should address both productivity enhancement and smallholder support. Expanding credit options would enable smallholders to invest in productivity-enhancing inputs and equipment. Offering technical training can bridge the productivity gap by equipping smallholder farmers with knowledge of modern farming practices. Encouraging cooperative structures could allow smaller farms to achieve collective economies of scale, sharing costs and resources that would be

otherwise inaccessible. Implementing sustainable practices can safeguard long-term productivity, particularly for smallholders with limited resilience to environmental risks.

The study underscores the importance of farm size in influencing maize productivity within the Madathukulam Block. A dual policy approach that promotes efficiency on larger farms while supporting the needs of smallholders would enable balanced agricultural growth. Such an approach would help bolster food security, improve rural livelihoods, and foster the economic resilience of the entire farming community in the region.

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India's Foreign Trade in Services During 1991/92 – 2021/22: Composition and Diversification

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Abstract

India's foreign trade has been changing its pattern and composition over the years since 1991 with shift in focus from dominance of primary goods to secondary goods and finally to services in Indian trade. In 2021-22, export of India's services has registered a growth rate of about 23 % over 2020-21. India's services traded have been categorised by RBI as Non-factor services comprising of transportation, travel, insurance, G.n.i.e.and Miscellaneous. The Miscellaneous services have been categorised under nine heads from 2010-11.Resilience of the services sector has primarily been driven by software services. The aspect of diversification in trade in services has been noticed. With this background, in this paper we are to examine the compositional change in India's trade in services, the growth and diversification in trade of services by using Diversification Index and Comparative Trade Diversification Index during 1991/92 – 2021/22 based on secondary data collected from Economic Survey. The data source is Reserve Bank of India.

Keywords: *Trade in Services, Diversification, Composition*

JEL Classification: F10, F14, L80

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1. Introduction

Over the years Indian foreign trade has experienced many ups and downs in its path of development. In post reform period, Indian trade has shown a change in its composition and direction, away from primary goods to manufactured goods and finally towards services.

The main commodities responsible for the slowdown in export growth in 1997-98 are cereals and raw cotton in the agricultural sector, ores and minerals, crude and petroleum products leather products, transport equipment and electronic goods in the manufacturing sector. Major decline has been registered in rice (-52 per cent), tea (-24.3 per cent), coffee (-23.4 per cent) and oil meals (-19.8 percent). Imports of petroleum crude & products have increased by 63.8 per cent due to strengthening of international crude oil prices. The share of manufactured goods has marginally decreased from 68.9 % in 2008-09 to 67.2 % in 2009-10.This trend has continued during 2008-09 to the first half of 2010-11, with the share of the major category, i.e. manufactures, stagnating at 68.9 per cent and even falling in 2009-10; share of primary products has fallen to 12.7 % in the first half of 2010-11 after increasing in 2009-10 as reported by Economic Survey 2010-11. The import share of food and allied products has fallen to 2.1 % in 2008-09 from 3.3 % in 2000-01. Economic Survey 2019-20 has reported that merchandise trade deficit has been the largest component of India's current account deficit. The 1991 reforms of the Indian economy have been associated with the expansion of the service sector in India which has taken off in the 1990s when India has started a series of economic reforms in response to a serious balance of payments issue as reported by IBEF. The consistent performance of miscellaneous services to export of services has been possible due to Government initiatives for promoting service exports like service Exports from India Scheme. Setting up of data centers, cloud services and cyber security has also lead to better performance of software service exports. The Exim Policy 2002-2007 advocates' growth promotion of exports in embedded software, hardware has been made admissible for duty free import for testing and development purposes. Hardware up to a value of US$ 10,000 has been allowed to be disposed of subject to STPI (Software Technology Parks of India) certification. It has also advocated 100% depreciation to be available over a period of 3 years to computer and computer peripherals for units in EOU/EHTP/STP/SEZ. The Foreign Trade Policy (FTP) 2009-14 has given a major thrust to trade in services by continuing SEIS (Service Export from India Scheme), SFIS (Served from India Scheme) and RAFT (Remote Authentication from Foreign Trade) schemes. The FTP 2015-20 and 2021-26 aimed to promote and increase India's share in global service

trade. India's cost advantage in software service delivery is also a favorable factor. The services sector has got support from numerous government initiatives like Dmart Cities, Clean India, and Digital India. It has played a dominant role in India's GDP. In 2021-22, services sector has accounted for 48% of total exports, outperforming *goods exports* as reported by Economic Survey, 2020-21.Diversification, a process of a reduction in the concentration or an increase in the variety of production and exports (UNCTAD) in trade in services has been observed over the study period.Government of India has approved the 'Action Plan for Champion Sectors in Services' to give focused attention to 12 identified Champion *Services Sectors*. IT-BPM has been the largest exported service of India accounting for about 49% of total service exported by India. Availability of large, skilled, low waged manpower with English language skills, Indian services have become popular all over the world. During 2020-21, according to NASSCOM's provisional estimates, IT-BPM revenues (excluding e-commerce) has reached US$ 194 billion adding 1.38 lakh employees as Economic Survey, 2021-22 reports. In 2023-24, the contribution of primary sector to GDP in India is 17.7%, that of manufacturing is 27.6% and that of service sector is 54.7%.

The present study is dessided in two phases: study of trade in services during 1991/92–2009/10 and that during 2010/11–2021/22. The total study is structured as follows: the objectives of the study are shown under section 2. Section 3 reveals some relevant literatures on the related topics. The methodology and estimates are shown in section 4 and section 5 respectively. The conclusion and recommendation of the study is under section 6.

2. Objectives of the Study

The paper aims to examine:

(i) The compositional change in India's foreign trade in services (exports and imports) during 1991/92–2021/22,

(ii) The diversification in India's foreign trade in services (exports and imports) during 1991/92–2021/22.

3. Literature Survey

Various empirical studies are available in respect of composition and diversification in trade in services by India. However, few of the most significant ones are highlighted below.

L.G.Burange, et al. (2009) have observed in their paper that the major growth in the

exports and imports of services in India have occurred chiefly in the post liberalization period (1991-2007). India's share of World exports of services has increased from 0.78% in 1980 to 2.65% in 2007.

Barry Eichengreen & Poonam Gupta, (2012) have shown that the share of exports of modern services in the total has been increasing steadily from 44 percent in 1991 to 63 percent in 2000-01 and further to 74 per cent in 2010-11.

Olivier Cadot et al. (2011) have dealt with some factual questions-"how is export diversification measured?" and "what are the basic stylized facts about trade export diversification across time and countries?" The third question is about diversification's drivers, and also deals with relationship between trade diversification, growth and employment. They have measured the Theil's Index (1972) with decomposability properties in measuring diversification.

Manoj Kumar Sinha (2016) has focused on composition of India's services exports including travel, transportation, insurance, GNIE, and miscellaneous services having annual compound growth rate of 11.22%, 13.69%, 14.85%, 14.29%, and 21.51% respectively during 1990/91–2014/15. Overall growth rate of total service is 17.41%.

Shuchi Gupta (2019) has observed in her paper that India's foreign trade has undergone a complete change both in regard to the composition as well as the direction of trade.

UNCTAD secretariat (2022) reports that an economy is defined as commodity dependent when it derives 60 per cent or more of its merchandise export revenues from primary commodities such as food, agricultural raw materials, base metals and crude oil. Commodity dependence is more prevalent at earlier stages of development. The report concludes that commodity dependence is prevalent in almost every part of the world. Diversification is a key to reducing vulnerability, building social and economic resilience and ensuring sustainable development.

As per Economic Survey 2020-21, "External Sector," we observe that resilience of the services sector has primarily driven by software services, which has accounted for 49 percent of total services exports even during the pandemic. The external sector has provided an effective cushion to growth with India recording a Current Account Surplus of 3.1% of GDP in the first half of FY21.

Also, in Economic survey 2021-22 "External Sector," we observe that India has maintained its remarkable performance in world services trade in post pandemic situation. This has

been achieved due to computer, business and transportation services that have constituted more than 80 per cent of total services exports.

In Economic Survey 2022-23 "External Sector: Watchful and Hopeful," we observe that in India, the share of trade as a percentage of GDP has been showing an increasing trend, being above 40 per cent since 2005 (except 2020 being the pandemic year). In case of trade in services India has maintained its dominance in the world services trade in FY22.

4. Methodology:

The aspect of compositional change in the trade basket of India in both the phases has been studied from secondary data collected from the Economic Survey, Govt. of India. The values of exports and imports of services in India are in current US $ million. To adjust inflation, we have used the Consumer Price Index (CPI) with base period as 2010. The current values of exports and imports of all the years under study are divided by CPI of the corresponding year of study and then multiplied by 100 to get the values at constant prices of 2010. The percentage distribution of export and import of all service items has been calculated to study the compositional change. The aspect of diversification in Indian foreign trade in services during 1991/92–2021/22 has been studied with the help of

$$\textbf{Theil's Entropy Index} = \{\sum Ei \cdot \ln (1/Ei)\}$$

where, Ei is the proportion of i^{th}item of service either exported or imported.

The Diversification Index formula for both exports and imports has been developed by Pal (1996):

$$\textbf{Diversification Index} = \{\sum Ei \cdot \ln (1/Ei)\} \div \ln(N)$$

where**,** Ei is the proportion of i^{th} item of service either exported or imported.

N is the number of items of services, either exported or imported.

The value of the Diversification Index lies between zero and unity. For Export Diversification Index (EDI), if the value is zero, it indicates that export of services by India is totally concentrated in one item of service. If the value of the index is unity then it indicates that export in services is fully diversified among various items of services. Similarly for Import Diversification Index (IDI), if the value is zero, it indicates that import of services by India is totally concentrated in import of one item of service. If the value of the index is unity then it indicates that import in services is fully diversified among various items of services.

Comparative Trade Diversification Index (CTDI) measures the performance of export diversification with respect to import diversification over time.

CTDI = Export Diversification Index (EDI) / Import Diversification Index (IDI).

If the value is unity it indicates that exports and imports are equally diversified. If it is more than unity, export is more diversified compared to its imports and if it is less than unity, then import is more diversified compared to exports.

5. Estimates

5.1. Compositional Change in India's Trade in Services During 1991/92 – 2021/22

The compositional change has been studied by examining the percentage distribution of export and import of items of services over the study period as follows:

5.1.1. Percentage Distribution of India's Export of Services During 1991/92 – 2009/10

Table-1 reveals that in 1991-92 out of total services exported, travel has constituted 39.37%. Export of travel services has dropped drastically from 38.51% in 1996-97 to 18.13% in 2001-02. The global economic slowdown in the early 2000s have reduced the international travel and tourism. Thereafter, the trend has continued to fall to 12.37% in 2006-07 and to 12.35% in 2009-10.The export percentage of transportation services has increased from 18.70% in 1991-92 to 26.13% in 1996-97. This may be because of the liberalised trade policies, improved infrastructure including ports, airports and logistics facilities. Then it has dropped to 13.45% in 2001-02 and to 10.81% in 2006-07. This fall in share of transportation services maybe due to the global economic slowdown in the early 2000s. The percentage share marginally has risen to 11.61% in 2009-10. For Insurance and Pension Services, a fluctuating trend has been noticed over the study period with marginal changes.It has increased from 2.15% in 1991-92 to 2.90% in1996-97. The reason for the rise in share may be attributed to liberalised trade policy of 1991-92 allowing for increased foreign investment and participation in insurance sector. It has fallen to 1.62% in 2006-07 and increased to 1.67% in 2009-10.The export share of G.n.i.e (Government not included elsewhere which includes government expenditure on administrative machinery and foreign services outside the country) to total service export from India has a negligible share. Its share has increased from 0.34% in 1991-92 to 0.96% in 1996-97 to 2.99% in 2001-02. It has dropped to 0.34% in 2006-07 and then marginally has risen to 0.46% in 2009-10. The miscellaneous services including software, business, financial and communication services, has the maximum share of 39.44% in case of export of services in 1991-92 due to liberalised trade policy of 1991-92.

Government's policies to promote software exports have attributed to higher percentage contribution in export. Then it has dropped to 31.50% in 1996-97 and increased to 63.77% in 2001-02. Miscellaneous services, mostly software services have contributed the most in export during this period of time. Indian IT sector has experienced huge growth due to its ability to offer cost effective services to businesses in the developed countries of the world. It has further risen to 74.86% in 2006-07 and then has dropped to 73.91% in 2009-10. Global boom in the IT sector and the increasing demand for specialised services in developed nations have also played a vital role. Overall, in the export side, the percentage share of Miscellaneous services has been the maximum in 1991-92, followed by travel and then by transportation. Insurance and Pension services have a little contribution followed by G.n.i.e. The same trend is followed till 2009-10.

5.1.2 Percentage Distribution of India's Export of Services During 2010/11–2021/22

RBI has classified miscellaneous services into nine heads from 2010-11 due to the use of Balance of Payments Manual 6 for computing Balance of Payments in India. According to the classification, our estimates (Table-2) reveal that the export percentage of travel services has increased from 12.67% in 2010-11 to 16.56% in 2015-16. Then it has dropped to 4.12% in 2020-21 and to 3.57% in 2021-22. The falling trend may be due to lockdown situation. The percentage contribution of transportation services in export of services has shown a marginal falling trend from 11.47% in 2010-11 to 10.60% in 2020-21 and then an increasing trend of 12.83% in 2021-22. The rise is due to the fact that there has been a surge in sea transport and air transport. The percentage contribution of Insurance and Pension Services (including life insurance, health insurance, property insurance, liability insurance,reinsurance, pension fund management, annuities, benefit plans, contribution plans) is low at 1.56% in 2010-11. It has marginally increased to 1.71% in 2015-16 and decreased to 1.30% in 2021-22. G.n.i.e. has showed a negligible contribution to export of services in India since 2010-11. The export percentage contribution of construction services is also very poor at 0.54% in 2010-11. It has increased to 1.22% in 2015-16 and to 1.27% in 2020-21 and then dropped to 1.04% in 2021-22. Maintenance and repair services n.i.e has negligible contribution to total export of services. Manufacturing services on physical inputs owned by others has also negligible contribution to export of services by India. Financial services (including financial advisory services, banking services, insurance services, asset management services) has witnessed a falling trend in its contribution to total export from 5.22% in 2010-11 to 3.85% in 2015-16 and to 2.15% in 2021-22. This fall may be due to global financial crisis and uncertainty. Export percentage contribution of charges for use of intellectual property n.i.e is very negligible

at 0.15% in 2010-11, 0.38% in 2015-16, 0.64% in 2020-21 and finally falls to 0.32% in 2021-22. Telecommunication, computer, information services have the highest percentage contribution to export of services with 44.30% in 2010-11, 59.62% in 2015-16, 50.02% in 2020-21, 49.34% in 2021-22. India's skilled labour force, government's favourable policies, high global demand for IT services have attributed to the highest percentage of export of telecommunication, computer, information services to total export. Other business services (including technical and professional services, research and development services, management consulting services, market research and analysis, legal services, accounting and auditing services) have shown 18.32% contribution to total export of services in 2010-11. It has fallen drastically to 2.26% in 2015-16. This drastic fall may be due to the global economic slowdown. Then it has increased drastically to 23.85% in 2020-21 and then marginally fallen to 23.17% in 2021-22. An increase in export percentage of the item despite the COVID-19 pandemic has been driven by Indian services sector's strong presence in global services exports, particularly its IT and business services. Personal, cultural and recreational services (including Audio-visual services, music and performing arts, cultural events and festivals, recreational services, education and training services, heritage and artistic services) has a negligible contribution of 0.18% in 2010-11 and has increased to 1.24% in 2021-22 in total export of services. Other.n.i.e (including Environmental Services, Scientific and Technical Services, Professional and Technical Services and Other Services involving Transcription services and Translation Services) has a small contribution of 5.16% in total export of services in 2010-11. It has fallen to 1.76% in 2015-16. The fall may be due to global economic slowdown, decline in commodity prices, weak global trade, appreciation of US dollar. Further it has increased to 4.59% in 2020-21 and dropped marginally to 4.42% in 2021-22. Overall, telecommunication, computer, information services have achieved the highest position in export of services during 2010/11–2021/22.

5.1.3. PercentageDistribution of India's Import of Services During 1991/92–2009/10

Let us now examine India's imports of services during 1991/92–2009/10. Our estimates (Table-3) reveal that the import of Travel services has hold 12.19% of total services imported in 1991-92. It has marginally risen to 12.71% in 1996-97 and rapidly to 21.82% in 2001-02. This rising trend may be due to the economic growth of the country during that time period. It has led to increase in travel for business purposes. Globalisation and international connectivity, changes in tourism and travel have played the crucial role in increase in import of travel services by the country. Thereafter it has dropped to 15.08% in 2006-07 and improved to 15.68% in 2009-10. This fall may be due to policy changes

and regulations affecting travel and tourism. The import percentage of transportationt services has shown a fluctuating trend over the study period 33.76% in 1991-92, 35.48% in 1996-97, 25.09% in 2001-02, 18.21% in 2006-07 and 20.03% in 2009-10. The drop in percentage contribution of transportation services in 2001-02 may be due to changes in global trade patterns and government policies. For Insurance and Pension Services, the import percentage to total import of services is very little amounting to 3.30% in 1991-92. It has fallen to 2.27% in 1996-97, 2.03% in 2001-02, to 1.45% in 2006-07 and finally risen to 2.16% in 2009-10. The low percentage contribution of this service may be due to the limited reliance on foreign insurance services, Government policies and regulations. The percentage contribution of G.n.i.e to total import is also very low. It has shown a falling trend over the period of study from 3.15% in 1991-92 to 2.64% in 1996-97, to 2.05% in 2001-02, to 0.91% in 2006-07 and further to 0.88% in 2009-10. The low contribution may be due to its nature, country's import structure. The percentage share of Miscellaneous Services to total import has been the highest amounting to 47.60% in 1991-92. Its share has marginally dropped to 46.90% in 1996-97 and has risen to 49.01% in 2001-02. In 2006-07, the import percentage has also risen to 64.35% of total import and dropped to 61.25% in 2009-10. India's rapid economic growth has led to increased demand for import of miscellaneous services to support its growing industries. Liberalisation of services trade by the country has made it easier for foreign countries to operate here. Globalisation is one of the most vital factors for increase in growth of demand for Miscellaneous services leading to increase in demand for imports of this service. In the import side, since 1991-92, Miscellaneous services has first the list, transportation services stood the second, followed by travel services. Insurance and Pension services (3.30%), G.n.i.e. (3.15%) have more or less same share in 1991-92. The same trend has been followed till 2009-10.

5.1.4. Percentage Distribution of India's Import of Services During 2010/11–2021/22

According to the new classification of Miscellaneous services by RBI, Table-4 shows the percentage contribution of travel services in import has risen from 13.69% in 2010-11 to 17.48%in 2015-16. It then has shown a fall to 9.79% in 2020-21which may be due to the pandemic and then has risen to 11.07% in 2021-22. The import percentage of transportation service has marginally decreased from 17.31% in 2010-11 to 16.81% in 2020-21 and increased to 24.38% in 2021-22.Insurance and Pension Services with a very low contribution to total import has shown a marginal fluctuating trend since 2010-11. The share has decreased from 1.74% in 2010-11 to 1.36% in 2015-16 and increased marginally to 1.75% in 2020-21 and then decreased to1.41% in 2021-22. The percentage

contribution of G.n.i.e. in total import is negligible to total import of services. It has decreased from 1.02% in 2010-11 to 0.87% in 2020-21 and to 0.66% in 2021-22. This item of import is actually not a significant part of total import since its components like administrative machinery such as defense equipment or embassy supplies may not hold a significant share in total import. The import share of construction service has also been very low at 1.44% in 2010-11 which has risen to 2.22% in 2020-21 and again dropped to 1.99% in 2021-22.The import percentage contribution of maintenance and repair services n.i.e.has also negligible role in total import of services. It has increased from 0.38% in 2015-16 to 0.94% in 2021-22. The share of manufacturing service to total import is very negligible overtime. The import share of financial services has also decreased from 9.29% in 2010-11 to 3.70% in 2015-16 which may be due to global economic slowdown, fall in commodity prices, weakening of global trade. It has further dropped to 4.05% in 2020-21 and to 3.82% in 2021-22. The percentage of import of charges for use of intellectual property n.i.e has increased from 3.01% in 2010-11 to 5.78%in 2015-16 and to 6.56% in 2020-21 and then decreased to 6.15% in 2021-22. The low percentage throughout the study period is due to limited reliance on foreign intellectual property like patents, trademarks etc. Domestic innovation, cost considerations may be some other factors affecting the low percentage of import of the item. The import share of telecommunication, computer, information services has increased from 4.65% in 2010-11 to 4.82% in 2015-16 and to 10.45% in 2020-21 and then fallen to 9.86% in 2021-22. The low percentage of import till 2015-16 may be due to factors like high growth of IT industry, export-oriented IT sector, government initiatives in India to promote domestic technology. The percentage increase in import since 2020-21 may be due to COVID -19 pandemic situation. The import contribution of other business services has increased from 33.05% in 2010-11 to 42.14% in 2020-21 and then decreased to 35.15% in 2021-22. These high percentage contributions of the item over the years have attributed to factors like India's growing integration into the global economy leading to increased outsourcing of business services from foreign companies. India's participation in complex global supply chains needs import of specialized business services to support trade and commerce. The percentage share of personal, cultural and recreational services has risen from 0.67% in 2010-11 to 1.44% in 2015-16, to 2.39% in 2020-21 and finally to 3.04% in 2021-22. This may be due to the changing consumer behavior, global trade recovery, digitalization during COVID-19 pandemic situation. The share of Other.n.i.e has decreased from 14.13% in 2010-11 to 8.27% in 2015-16. This may be due to global economic slowdown and weakening of global trade. It further dropped to 2.24% in 2020-21 and then to 1.48% in 2021-22 which may be attributed to factors mainly affected by COVID-

19 pandemic including reduction in consumer spending, supply chain disruptions, logistics challenges, global trade contraction. Overall, other business services has the highest position in case of import of services during 2010/11–2021/22.

5.2. Diversification in India's Foreign Trade in Services During 1991/92–2021/22

5.2.1. Export Diversification Index (EDI) During 1991/92–2009/10

Our estimates (Table-5) reveal that the value of EDI hasrisen from 0.7141 in 1991-92 to 0.7626 in 1992-93. The value has shown a high diversification in export of services. Then it has decreased to 0.7403 in 1993-94. It has again risen to 0.7638 in 1996-97 and to 0.7701 in 1997-98 and then decreased to 0.7143 in 1998-99. From 1999-2000 the trend has started falling. It has decreased to 0.5090 in 2007-08 and to 0.4657 in 2008-09. In 2009-2010, it has risen to 0.5125. The falling rate indicates a fall in share of the variety of items of services in the export basket of India.

5.2.2. Import Diversification Index (IDI) During 1991/92–2009/10

In 1991-92 the value of IDI is high at 0.7443. It has a declining trend over the years. The index value has decreased to 0.7381 in 1997-98, to 0.4885 in 1998-99. A sharp rise has been noticed in 1999-2000, with further rise till 2001-02 indicating a rise in the variety of items of services in the import basket. Then a fluctuating trend has been noticed till 2009-10 ending with 0.6445.

5.2.3. Comparative Trade Diversification Index (CTDI) During 1991/92–2009/10

In 1991-92, the value of CTDI is 0.9594. This is less than unity implying that import diversification is more compared to export diversification in India. In 1992-93 and 1995-96 to 1998-99 the EDI values are greater than IDI resulting in higher values of CTDI i.e. greater than unity. In these few years of study (1992-93 and 1995-96 to 1998-99), India has been offering a more diversified basket of items of services for export compared to import. In rest of the years under study the values of CTDI have been less than unity.

5.2.4. Export Diversification Index (EDI) During 2010/11–2021/22

Under the new classification by RBI since 2010-11, the value of EDI is 0.6782 in 2010-11 which is a moderate value for diversification for the country. It has decreased to 0.6173 in 2014-15 and to 0.5313 in 2015-16 indicating a fall in share of variety of items of export in India. Then it has risen to 0.6113 in 2016-17, to 0.6631 in 2017-18 and 0.6635 in 2018-19. This implies an improvement in diversification of the items of export India. It has decreased to 0.5866 in 2021-22.

5.2.5. Import Diversification Index (IDI) During 2010/11–2021/22

The value of IDI is 0.7919 in 2010-11 which is a higher value implying the presence of a variety in the items of services imported. The IDI values remain more or less the same during 2010/11–2021/22. The values are more consistent in case of IDI compared to EDI.

5.2.6. Comparative Trade Diversification Index (CTDI) During 2010/11–2021/22

Throughout the study period IDI values are higher than EDI values resulting in lower values of CTDI, i.e. CTDI values are less than unity. This implies that variety in items of services exported by India has been low compared to variety in items of services imported by the country over the years. The values of CTDI are consistent throughout except in 2015-16.

5.3. Growth Rate of EDI, IDI, CTDI During 1991/92–2009/10

Our estimates (Table 6) that the growth rates of EDI is negative throughout the study period indicating that diversification of items of export has not improved over the years. But the growth rate of IDI is positive during 2010/11–2021/22 implying an improvement in diversification in items of import. Hence, CTDI also shows a negative growth rate.

6. Conclusions

In this paper we have tried to analyse the compositional change and aspect of diversification of Indian foreign trade in services in two phases. Compositional change from primary goods to secondary goods and finally to services in Indian trade has been observed with rising contribution of trade in services in total trade of the country. The percentage distribution of export and import of different items of services have been fluctuating in most of the cases leading to compositional change. Miscellaneous services have showed the highest percentage share in case of both export and import of services in India during 1991/92–2021/22. Over the years, the CTDI has been greater than unity in most of the years in the first phase of the study period, although less than unity there after. This implies that the variety in the items of export basket of India has been lower throughout except in 1992-93, 1995/96–1998/99. The import basket of India has been offering a greater variety of items of services in most of the years under study.India needs to diversify more and more in its export basket of services for more growth of the country from foreign trade.

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Table-1 Percentage Distribution of India's Export of Services during 1991/92–2009/10

ITEMS	1991-92	1996-97	2001-02	2006-07	2009-10
Travel	39.37	38.51	18.13	12.37	12.35
Transportation	18.70	26.13	13.45	10.81	11.61
Insurance & Pension services	2.15	2.90	1.66	1.62	1.67
G.n.i.e	0.34	0.96	2.99	0.34	0.46
Miscellaneous	39.44	31.50	63.77	74.86	73.91
TOTAL	100	100	100	100	100

Source: Reserve Bank of India, Computed by Authors

Note: G.n.i.e.- Government not included elsewhere

Table-2 Percentage Distribution of India's Export of Services during 2010/11–2021/22

Items	2010-11	2015-16	2020-21	2021-22
Travel	12.67	16.56	4.12	3.57
Transportation	11.47	10.90	10.60	12.83
Insurance and pension services	1.56	1.71	1.15	1.30
G.n.i.e.	0.43	0.45	0.31	0.32
Construction	0.54	1.22	1.27	1.04
Maintenance and repair services n.i.e	NA	0.12	0.08	0.10
Mfg services on physical inputs owned by others	NA	0.14	0.14	0.20
Financial services	5.22	3.85	2.10	2.15
Charges for use of intellectual property n.i.e	0.15	0.38	0.64	0.32
Telecomm, computer, information services	44.30	59.62	50.02	49.34
Other business services	18.32	2.26	23.85	23.17
Personal, cultural and recreational services	0.18	1.03	1.13	1.24
Other.n.i.e	5.16	1.76	4.59	4.42
TOTAL	100	100	100	100

Source: Same as Table-1 Computed by Authors Notes: G.n.i.e.-Government not included elsewhere.
Other.n.i.e - Environmental Services, Scientific and Technical Services, Professional and Technical Services and Other Services involving Transcription services and Translation Services

Table-3 Percentage Distribution of India's Import of Services during 1991/92–2009/10

ITEMS	1991-92	1996-97	2001-02	2006-07	2009-10
Travel	12.19	12.71	21.82	15.08	15.68
Transportation	33.76	35.48	25.09	18.21	20.03
Insurance & Pension services	3.30	2.27	2.03	1.45	2.16
G.n.i.e	3.15	2.64	2.05	0.91	0.88
Miscellaneous	47.60	46.90	49.01	64.35	61.25
TOTAL	100	100	100	100	100

Source: same as in Table-1 **Computed by AuthorsNote:** same as Table-1

Table-4 Percentage Distribution of India's Import of Services during 2010/11–2021/22

Items	2010-11	2015-16	2020-21	2021-22
Travel	13.69	17.48	9.79	11.07
Transportation	17.31	17.82	16.81	24.38
Insurance and pension services	1.74	1.36	1.75	1.41
G.n.i.e.	1.02	1.03	0.87	0.66
Construction	1.44	1.13	2.22	1.99
Maintenance and repair services n.i.e	NA	0.38	0.71	0.94
Mfg services on physical inputs owned by others	NA	0.05	0.02	0.05
Financial services	9.29	3.70	4.05	3.82
Charges for use of intellectual property n.i.e	3.01	5.78	6.56	6.15
Telecomm, computer, information services	4.65	4.82	10.45	9.86
Other business services	33.05	36.74	42.14	35.15
Personal, cultural and recreational services	0.67	1.44	2.39	3.04
Other.n.i.e	14.13	8.27	2.24	1.48
TOTAL	100	100	100	100

Source: Same as Table-1. Computed by Authors

Notes: same as Table-2

Table-5 Diversification Indices of Export, Import, Comparative Trade in Services during 1991/92–2009/10

YEAR	EDI	IDI	CTDI
1991-92	0.7141	0.7443	.9594
1992-93	0.7626	0.7450	1.0236
1993-94	0.7403	0.7500	.9871
1994-95	0.7382	0.7452	.9906
1995-96	0.7273	0.7257	1.0022
1996-97	0.7638	0.7250	1.0535
1997-98	0.7701	0.7381	1.0433
1998-99	0.7143	0.4885	1.4622
1999-000	0.6369	0.6775	.9400
2000-01	0.6793	0.7048	.9638
2001-02	0.6457	0.7378	.8751
2002-03	0.5838	0.6760	.8636
2003-04	0.5869	0.6491	.9041
2004-05	0.5563	0.6649	.8367
2005-06	0.5252	0.7308	.7187
2006-07	0.4982	0.6109	.8155
2007-08	0.5090	0.6706	.7590
2008-09	0.4657	0.7057	.6599
2009-10	0.5125	0.6445	.7952

Source: Same as in Table-1, Computed by Authors

Notes: EDI = Export Diversification Index, IDI=Import Diversification Index, CTDI = Comparative Trade Diversification Index

Table-6 Diversification Indices of Export, Import, Comparative Trade In Services during 2010/11–2021/22

YEAR	EDI	IDI	CTDI
2010-11	0.6782	0.7919	0.8564
2011-12	0.6674	0.7667	0.8705
2012-13	0.6136	0.7295	0.8411
2013-14	0.6173	0.7491	0.8240
2014-15	0.6173	0.7369	0.8377
2015-16	0.5313	0.7257	0.7321
2016-17	0.6113	0.7562	0.8084
2017-18	0.6631	0.7644	0.8675
2018-19	0.6635	0.7666	0.8655
2019-20	0.6209	0.7308	0.8496
2020-21	0.5858	0.7188	0.8150
2021-22	0.5866	0.7281	0.8056m
GROWTH RATE OF EDI, IDI, CTDI during 1991/92–2021/22			
1991/92-2009/10	g	2010/11–2021/22	g
EDI	-2.7709	EDI	-0.5186
IDI	-0.6379	IDI	0.8435
CTDI	-2.1466	CTDI	-0.2597

Source: Same as Table-1 Computed by Authors

Notes: EDI = Export Diversification Index, IDI=Import Diversification Index, CTDI = Comparative Trade Diversification Index, g=growth rate

Department of Economics

The Department of Economics at Rabindra Bharati University was established in November 1972 and the Silver Jubilee of its activities was celebrated during 1997-98 through a series of Foundation Lectures. Special lectures, Seminars and Re-union of past and present students and teachers.

Economics courses both at the Postgraduate and Honours levels have a well-planned and balanced approach to the teaching of this dynamic social science discipline. In the Post Graduate level semester system has been introduced in 2010. Semester syllabus for M.A. in Economics has been framed in 2010 and further revised in 2013. Courses in each subject area are detailed in separate Modules with references to specific reading materials. Specialization at the postgraduate level includes (1) Econometrics and Statistics (2) Rural Economics and (2) Economics of Money and Finance and International Trade. Each of the area of Specialization contain Project Work emphasizing on theoretical as well as empirical analysis. Field Survey, Building up of theoretical model, Statistical analysis of result obtained by running computerized statistical software in respective area of research and finally, Preparation of the project in the Post Graduate Level encourage the research aptitude of the students. From April 2007, the department has already started M.Phil course. From 2010 the semester system has been introduced and curriculum have been revised and updated in the light of present need of the day. Asper the new regulation of UGC a six month Ph.D. Course work has also been initiated from 2010 in this department successful completion of which give the opportunity to the students to be registered in the Ph.D. programme under this university.

Class-room teaching is regularly supplemented by Extension Lectures and Special Lectures by noted teachers and scholars from others universities/Institutes, occational seminars on contemporary issues in the subject area.

The Department has published quite a few books and monographs over the years. The NAAC Peer Team in report made special mention of the research activities in this Department.

The Department takes pride in the fact that increasingly large number of its students have been qualifying in the NET/SLET examinations each year.

The Department has organized its 1st Refesher Course (UGC) in Economics on "Development Economics and India since 1991" during February, 2004.

In April, 2006, the department organized a national on IPR Awarness sponsored by the Ministry of Human Resource Department, Govt. of India.

In March. 2009, the department organized a seminar on "Globalization : Conceptual and Empirical Issues."

In March. 2010, the department organized a seminar on "Empirical Issues on Indian Economy".

In March. 2011 and 2012, the department organized annual seminar on "Contemporary Issues in Development Economics."

In March.2013, the department organized Seminar on "Development Paradiagm of the East and North-East States in India during the post-reform period : problems and prospects."

In February 2014, the department organized a workshop on Contemporary issues on Macroeconomics.

In February 2015, the department organized a workshop on advanced issues on Microeconomics.

In March 2015 the department organized a seminar on "Contemporary Issues in Development Economics."

In March 2016 the department organized a seminar on "Contemporary Issues in Development Economics"

In February 2016 the department organized three-day workshop in "Frontiers in Applied Econometrics".

In March 2017 the department organized a Research Scholars' workshop.

In January 2018 the department organized International workshop on 'Behavioural Economics.'

In March, 2018 the department organized a seminar on "Contemporary Issues in Development Economics.

In February 2019, the department organized a workshop on "Application of Techniques in the Area of Social Sector".

In November, 2022, the department organized International Seminar on "Fifty Years of the Indian Economy since 1972".

In March, 2023 the department organized Two-Day Workshop on "Research Methodology with Applications in Economics".

In February, 2024 the department organized Two-Day Seminar on "Contemporary Issues in Development Economics".

In March, 2024 the department organized Two-Day Workshop on "Applied Econometrics: Pance Data Analysis."

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