FINANCIAL INCLUSION, ITS DETERMINANTS AND IMPACT ON ECONOMIC GROWTH: AN EMPIRICAL STUDY OF INDIA WITH REFERENCE TO BRICS ECONOMIES

A Thesis

Submitted In Fulfilment of the Requirements for the Degree

of Doctor of Philosophy

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Declaration

I, Amit Pandey hereby declare that the thesis entitled 'Financial inclusion, its determinants and impact on economic growth: an empirical study of India with reference to BRICS economies' submitted to Thapar Institute of Engineering & Technology (Deemed to be University), Patiala, in fulfilment of the requirements for the award of the degree of Doctor of Philosophy in Finance, is a record of the original research work carried out by me under the supervision of Dr. Ravi Kiran, Professor, School of Humanities & Social Sciences, Thapar Institute of Engineering & Technology and Dr. Rakesh Kumar Sharma, Assistant Professor, School of Humanities & Social Sciences, Thapar Institute of Engineering & Technology. The matter embodied in this thesis has not been submitted in part or full to any other institute for the award of any degree.

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Certificate

This is to certify that the thesis entitled '**Financial inclusion, its determinants and impact on economic growth: an empirical study of India with reference to BRICS economies'** which is being submitted by Mr. Amit Pandey, in fulfilment of the requirements for the award of the degree of Doctor of Philosophy in Finance, is a record of the candidate's original research work carried out under our supervision and guidance. The matter embodied in this thesis has not been submitted in part or full to any other institute for the award of any degree.

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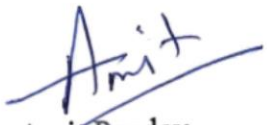

Amit Pandey

Contents

Abstract

Desire for a financially inclusive economy has been the foremost priority; however, the road to achieve financial inclusion is not so easy. This research is an attempt to identify the determinants of financial inclusion. Indian economy has been treading on the path of financial inclusiveness. This study tries to analyse financial inclusion by collecting data through a questionnaire to examine the status and relation of determinants of financial inclusion with Economic growth. In the later part an effort is made to examine financial inclusion in BRICs economies, using secondary data. This will help in presenting a true and holistic picture of financial inclusion in India in relation to other BRICS economies and also help to create a model associating determinants of financial inclusion with economic growth.

The first step to increase financial inclusion is to increase the access to financial services. Hence, the first determinant of financial inclusion considered in this study is access to financial services. A five-point Likert scale has been employed for assessing the relation among determinants of financial inclusion and economic growth. Usage, Digitalisation and FinTech are included as important dimensions of access to financial services. Any effort towards financial inclusion will be incomplete without considering financial initiatives. Hence, another important determinant of financial inclusion considered is financial initiatives. Financial initiatives cover two important dimensions, viz. financial Policy and financial schemes. The third important determinant of financial inclusion considered in the study is financial literacy. Financial literacy covers two dimensions, Financial Inclusion Awareness and Financial Inclusion competency. Financial Inclusion awareness focuses on primary knowledge and deeper understanding and knowledge is covered through competency. The study examines the relation among determinants of financial inclusion and economic growth. The research also examines the mediation of financial literacy among Access to financial services and economic growth. For financial initiatives a direct relation is observed with economic growth.

Moreover, adequate research has not been done for examining relation among determinants of financial inclusion in BRICS economies. Initially for comparing financial inclusion of India with Brazil, Russia, China and South African' economies, the variables included are: i) the number of depositors and ii) ATM/user iii) Broad Money;

iv) Bank Branches; v) Domestic Credit to Private Sector; vi) Internet Users; vii) Inflation; viii) Exchange Rate. Results depict that cross section random model is good fit when using GDP as the dependent variable and also in case of GDP/Capita too. The results support that determinants of financial inclusion assist in enhancing economic growth. The study thus, presents a holistic view of financial inclusion status in India and financial inclusion in BRICS economies. The results will help focus on certain determinants like institutional credit, increasing depositors and increasing awareness through certain macro-indicators like inflation rate and exchange rate. These results are important for policy makers and practitioners.

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List of abbreviations

Abbreviation	Full form
ATM	Automated teller machine
AVE	Average variance extracted
BRICS	Brazil, Russia, India, China and South Africa
BB	Bank branches
BM	Broad money
CB-SEM	Covariance-based structural equation modeling
CFA	Confirmatory factor analysis
CMB	Common method bias
CR	Composite reliability
CSRE	Cross section random effect
DCPS	Domestic Credit to Private Sector
DEPO	Depositors
DFI	Digital financial inclusion
ER	Exchange rate
EG	Economic growth
FI	Financial inclusion
FE	Fixed effect
FL	Financial literacy
Fin-Tech	Financial technology
GDP	Gross domestic product

GDP/capita	Gross domestic product per capita
GoI	Government of India
GPFI	Global partnership for financial inclusion
HTMT	Heterotrait-monotrait
INF	Inflation
PMJDY	Pradhan Mantri Jan Dhan Yojana
M	Mean
PLS-SEM	Partial least squares structural equation modeling
SD	Standard deviation
SEM	Structural equation modeling
SPSS	Statistical package for social sciences
SRMR	Standardized root mean square residual
VB-SEM	Variance-based structural equation modeling
VIF	Variance inflation factor

Chapter 1

Introduction

1.1 Evolution of financial inclusion and background of the research

Over the last three decades, financial inclusion and economic growth have become unique research areas. As per Levin (2005), economic research in the early 21st century didn't highlight the role of access to finance or the links between access to finance, poverty, gender, and economic growth. Beck and Levine (2018) pointed out that until the 1990s, few authors like Schumacher (1973), Goldsmith (1969), and Shaw (1973) considered well-developed financial institutions and access to financial products and services as essential for economic growth. Currently, it has caught the fancy of researchers and there are several studies covering cross-country research (De Matteis, 2015; Ghosh & Bhattacharya, 2019; Corrado & Corrado, 2015) and industry-level analyses (Edgett & Parkinson, 1994; Lievens *et al*., 1999; Klumpes, 2004; Bilan *et al*., 2019) related to financial access. Empirical analysts have demonstrated that a strong financial system reduces credit restrictions that stifle sector-level development and thus assist in optimizing capital allocation within the economy.

Prior literature has also stressed on the formal financial system access, termed as financial inclusion, which has acquired significant interest among policymakers and scholars worldwide in recent years. The fundamental objective of financial inclusion is to examine how unbanked households or individuals can access formal financial services regardless of their income or savings. Beck *et al*., (2007) emphasized that countries with strong financial depth have fast growth and income equality, while financial exclusion increases economic disparity. Further, the nations with an inclusive financial industry increased the income of the lowest segment of the economy more quickly than those with a weaker financial sector. Moreover, it is widely acknowledged that economic shocks disproportionately impact economically disadvantaged groups and households with low incomes in emerging nations. Thus, the provision of formal financial access to these groups is seen as a vital instrument for enabling them to deal with financial crises and economic shocks. Financial inclusion is necessary, as it facilitates access to and usage of high-quality, long-term, and secure financial services. Since India is a member of BRICS (Brazil, Russia, India, China and South Africa), understanding India's financial position in relation to these emerging economies assumes vital importance. A comparative

analysis with other BRICS economies will help understand and learn about good financial inclusion practices in these nations. This will help us know where India is performing well in terms of financial inclusion indices and take appropriate action in case of difficulties in making these services available to the underprivileged and financially excluded population. Evidently, India must surmount several obstacles to achieve financial inclusion by facilitating access to financial services to the majority of the population.

1.2 Need for financial inclusion in India

After 75 years of independence, India still cannot provide access to modern financial services to all. Formal financial services, like banking services in India, are primarily focused on the urban market, leaving a gap in financial inclusion and access to people living in sub-urban and rural regions (Oskarsson, 2018). Only consistent efforts toward financial inclusion can ensure a country's long-term economic and social progress. Since a large amount of rural and tribal area remains blocked from access to formal financial services, this leads to the region's slow economic progress and pervasive poverty. Income uncertainty of the disadvantaged makes the situation worse. They need easy access to savings, micro-credits, insurance, and transfer services to meet a broad range of financial requirements. Individuals and businesses currently excluded from the formal financial sector must be assisted to strengthen their human and physical capital to help them engage in income-generating activities and manage risks associated with their livelihoods. In view of these, the policymakers in India have been working on reforms to cover the following perspectives:

- *Building a system that encourages savings in banks:* India is an economy with a high rate of savings. However, a substantial portion of this savings doesn't enter the country's financial system due to the absence of adequate banking facilities for many households. Thus, the availability of full banking services and financial inclusion for everyone would help to bridge this gap, bringing at least part of this money into the country's official financial system and thus assisting in capital creation.
- *Sufficient and transparent formal banking credit:* Most people living in areas with high poverty levels are forced to rely on moneylenders or their relatives and

friends for loans. Appropriate availability of banking services will allow them to gain access to credit at affordable rates.

- *Resolve public welfare and subsidy holes*: Recently, the majority of government assistance to citizens in the form of cash transfers or product subsidies gave way to many unethical business practices. With financial inclusion, there may be direct cash transfers into bank accounts; thus, the true beneficiaries would only get assistance.
- *Financial stability:* Successful financial inclusion leads to increased financial stability since people have access to a variety of financial goods and services that may aid in better money management. Along with higher financial understanding, greater financial inclusion directly benefits the financial sector's openness and accountability. This is because more individuals can now access regulated financial services and interact with the financial system.

The transition of India from an undeveloped to a developing nation was rather dramatic, and it had far-reaching effects on the country's economic and financial environment. One of India's most difficult tasks is providing access to formal financial services and establishing financial inclusion, due to its vast diversity and geographical reach (Sarma and Pais, 2011). The government of India has initiated various schemes to boost inclusiveness. The study gains paramount importance in the context of these initiatives. Phases of Financial Inclusion have been highlighted in Table 1.1.

Table1.1: Phases of financial inclusion in India

Phase-I	Phase-II	Phase-III	Phase-IV
1960-90	1990-2004	2005 -2012	2013 onwards
• Channelling Credit of Neglected sectors of the Economy • Emphasis on Weaker sections	• Strengthening Financial Inclusion in India • Self Help Group (SHG)Bank Linkages	• No Frill Accounts • Rural Bank Penetration • Core Banking Technology • Setting up of Microfinance Bank • Financial Literacy Centre	• BSBDA-Basic Savings Bank Deposit Account • LBS-Lead Banking Scheme • IT Enabled Services • PMJDY-Pradhan Mantri Jan Dhan Yojana

Source: Authors compilation

Starting with channelling credit of the neglected sector in phase I to a move to no-frill accounts in phase III; and finally to replace it with a basic saving bank deposit account

(BSBDA) in Phase IV. Setting up of microfinance bank and financial literacy centre were the major changes in Phase III. Core banking and technology adopted in phase III have finally extended to IT-enabled services in Phase IV.

The Indian government has initiated many measures to promote financial inclusion in the country, including the introduction of the Pradhan Mantri Jan Dhan Yojana (PMJDY) programme, which seeks to provide every household in India with a bank account and access to other financial services. To reach remote and marginalized populations, the government has also promoted the use of technology, such as mobile banking and digital transactions. It becomes important to have a premise of prominent financial inclusion programmes in India before proceeding ahead. This is provided in table 1.2.

Table 1.2: Prominent financial inclusion programmes in India

Scheme	Description
Pradhan Mantri Jan Dhan Yojana (PMJDY)	This is a country-wide initiative towards financial inclusion that was started in 2014. Every person in the nation would have simple access to financial services, including savings and bank accounts, remittances, credit, insurance, and pensions.
Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)	A government-sponsored life insurance program for individuals with a savings account.
Pradhan Mantri Suraksha Bima Yojana (PMSBY)	This insurance program, which the government supports, offers accidental death and disability insurance to those with savings accounts.
Pradhan Mantri Mudra Yojana (PMMY)	This programme, introduced in 2015, offers start-ups and small enterprises micro-loans.
Aadhaar Enabled Payment System (AEPS)	This electronic payment system was introduced in 2010 and employed biometric identification to allow individuals to receive and make payments using their Aadhaar number.
Direct Benefit Transfer (DBT)	This programme was initiated in 2010 and allowed the government to transmit subsidies and other benefits directly to recipients' bank accounts. This programme has been instrumental in reducing corruption and enhancing delivery efficacy.
Atal Pension Yojana (APY)	In order to provide a comprehensive social security system for all Indians, particularly people experiencing poverty, the underprivileged and unorganized sector employees, the programme was introduced in

	2015.

Source: RBI, 2023

1.3 Financial inclusion in Brazil, Russia, India, China and South Africa

In the previous few decades, universal financial inclusion has been one of the most important development priorities for the BRICS nations. Despite the wide variation, all BRICS nations have highlighted the promotion of FI as their primary policy objective. An increasing corpus of empirical research demonstrates that FI has various beneficial implications on development outcomes in emerging countries such as BRICS. Eventually, economic development is better in economies with higher levels of FI. Hence, these nations' governments and central banks are working on financial constraints and improving their financial infrastructure. Because banks and other financial institutions offer many different products and services, such as bank accounts, credit cards, ATM services, loans, and other forms of credit. Hence, society is considered financially inclusive when most of the population has access to these financial products (Goel. 2023).

Although, the G20 recognized the potential benefits of expanding banking services to the unbanked in 2010 and made financial inclusion a central agenda (GPFI, 2016). Three key pillars for financial inclusion identified by the World Bank (2012) are public and commercial sector commitment, a supportive legislative and regulatory environment, and an adequate financial information and communications technology (ICT) infrastructure. Kumar (2005) discovered considerable geographical differences in access as well as the importance of income, wealth, education, and gender in determining urban access to the financial system in Brazil. The indicators of financial inclusion in Brazil covers less levels of financial literacy resulting in decreased conviction in bank institutions, imperfect Knowledge regarding financial product/services (Wale-Awe, 2020). As indicated by Kpodar and Andrianaivo (2011), the coefficient on the number of deposits per head and the number of loans per head had a positive and statistically significant effect on African economies. The study concluded that improved access to financial resources permits households to make productive investments. Fostering financial inclusion, as observed by Demirguc-Kunt, Klapper, and Singer (2013), promotes income generation, eliminates disparities, lowers poverty and stimulates economic growth.

Several countries and financial institutions have spearheaded key global legislative measures to bridge the gap between FI and low-income, disadvantaged communities (Chakravarty and Pal, 2013). Several initiatives and strategic policies have been framed by the central banks of developed and developing nations to expand access to the financial system. Eventually, a developed financial system consisting of a well-structured and efficient set of financial markets and intermediaries is essential for economic development because these financial markets and institutions promote economic growth by allowing new businesses to enter the market. As pointed out by (Aghion *et al.*, 2009; Cecchetti and Kharroubi, 2012; Bayoumi and Melander, 2008), economic growth is higher when a nation has a well-established banking infrastructure and more developed financial markets. So, improving the financial and banking system leads to easier use of resources within society and speeds up economic growth. However, to address the issue of financial exclusion, policymakers in various nations continue to invest enormous resources in raising the degree of financial inclusion in their nations. Previous studies have investigated several themes on financial inclusion (Mader, 2018; Zins and Weill, 2016; Sharma and Kukreja, 2013) such as the relationship between financial inclusion and banking stability (Aduda & Kalunda, 2012; Danisman & Tarazi, 2020; Wang & Luo, 2022; Ghosh, 2022) the nexus between financial inclusion and human development (Laha, 2015; Nanda & Kaur, 2016; Matekenya *et al.*, 2021; Liu *et al.*, 2023).

1.4 Motivation behind the research

Human existence revolves around inclusion. Nobody likes to feel unwelcomed, undervalued or excluded. Inclusion is important for society, businesses, organizations, markets goods, and services. For instance, financial markets are still not entirely accessible. This is problematic not just for the economy but, more crucially, for the people who are being excluded from the system. Financial inclusion is often acknowledged as positively affecting poverty, promoting equality, and achieving natural and sustainable economic growth. Consequently, enabling a completely inclusive financial marketplace must be an objective of each economy. The current study makes an effort to answer these three research questions:

RQ1: What are the important determinants of financial inclusion in India?

RQ2: Does any positive relationship exist between determinants of financial inclusion and economic growth?

RQ3: Does any positive relationship exist between determinants of financial inclusion and economic growth in Brazil, Russia, India, China and South African' economies?

1.5 Statement of the problem

A stable, reliable, and effective financial system promotes economic growth (Van *et al.*, 2021). A well-developed financial sector increases the availability of financial services (financial inclusion) and lowers the cost of such access, boosting economic activity and raising production. Sethi and Acharya (2018) opine that financial inclusion is crucial in facilitating and achieving sustainable economic growth. However, due to weak financial systems and inadequate provision of financial markets and services, many financial systems are not inclusive (Ozili, 2020) leaving millions of individuals and small enterprises without access to banking services. It is considered that providing these individuals with access to and enhancing their usage in the financial market may boost their economic participation, lessen their vulnerability, and potentially help them reduce poverty (Sukmana and Ibrahim, 2018). Sarma and Pais (2011) contend that a nation that is not economically developed cannot encourage financial inclusion. Bihari (2011) argues that financial inclusion is a crucial pre-condition for achieving uniform economic growth.

Meanwhile, it is widely accepted that financial inclusiveness in the country may catalyse individual and economic growth. These include allowing individuals to build up savings, access credit options, invest, and safeguard themselves from unexpected income fluctuations. Additionally, to provide individuals with the tools they need to deal with situations like sickness, job loss, or death in the family. In developing countries, including frontier and emerging economies, a large proportion of the population has low, irregular, or no income, unemployed, financially illiterate, poor healthcare facilities, small market size, and poor infrastructure, making it difficult to scale up financial inclusion. Since, empirical support on the influence of financial inclusion and its determinants on economic growth are inadequate, and the research was restricted to developed economies, and financial institutional constraints were not included in the growth model.

As a result, the primary novelty of this work is as follows. It examines the link between financial inclusion and economic growth using a survey technique with data from customers' using bank services. The study initially tries to examine impact of determinants of FI on economic growth in India through primary data. The study then

uses secondary data to compare financial inclusion in India with other BRICS economies to have a holistic picture of financial inclusion. Panel data analysis has been used to investigate the impact of determinants of financial inclusion of BRICS economies on Economic Growth. Accordingly, the research objectives undertaken have been mentioned below:

1.6 Objectives of the study

O1: To analyse the current status of financial inclusion in India.

O2: To identify the determinants of financial inclusion in India.

O3: To analyse various schemes of government of India to boost financial inclusion.

O4: To examine the impact of financial inclusion on the economic growth.

O5: To compare financial inclusion in India with Brazil, Russia, China and South African' economies.

1.7 Significance and contribution of the research

This study is important for the government and policymakers because it will help determine how to set up its financial inclusion approach towards society to help the economy grow. The result may give precise findings for a deeper understanding of the relationship between financial inclusion and economic growth. The results from primary sources will reveal which access to financial services and financial initiatives are helpful that encourage a change in behaviour and account holders to do more banking transactions, which may lead to a faster rise in economic activity.

This research will be a significant addition to the sparse literature on the inter-relation between crucial macro-economic determinants of financial inclusion and economic growth across BRICS nations through a panel-data approach. Emerging BRICS economies are striving to enhance their understanding of financial inclusion, thus, providing a major opportunity for conducting research on this interesting and appealing topic. As empirical data on the influence of financial inclusion on economic growth is still limited in BRICS, as reported by eminent researchers (like Kochar, 2018; Agarwal *et al.*, 2017; Demirguc-Kunt *et al.*, 2018) and the present research contributes to the existing scant literature. The study's findings indicate that efforts to increase financial inclusion can't be undertaken in isolation. The evidence from the study suggests that, even when special attention is paid to the design as well as to the adoption and utilization of the

acquired formal financial service, there is a need to reconsider and broaden the strategy of financial inclusion to include measures to promote economic empowerment, general education, and digital skills of the excluded while also taking into account the overall structure of the economy.

1.8 Organization of the thesis

The thesis embodies five chapters: Introduction; Review of Literature and Hypotheses Development; Research Design and Methodology; Data Analysis and Results; and Findings, Implications and Future Research.

Chapter 1: Introduction

This chapter presents a concise introduction to the background of this research work. It highlights the research problem and presents the need for the study. The chapter throws light on recent trends of financial inclusion in India. It also throws light on the prominent financial inclusion programmes in India. The chapter briefly highlights the state of financial inclusion in Brazil, Russia, China and South Africa. This chapter also presents the study's objectives, needs, and motivation.

Chapter 2 - Review of literature and hypotheses development

This chapter reviews pertinent literature from various sources to comprehend various concepts of financial inclusion, in India and other countries of the world. The review of literature assists to provide a direction to the research based on the theoretical framework of various studies covered for comparison and deeper learning. The study presents the research gaps and hypotheses development.

Chapter 3 - Research design and methods

The present chapter discusses the research design and methods applied for achieving the objectives. In this chapter, the research objectives have been chalked out clearly, along with formulation of the hypothesis. It majorly focuses on the research design, sampling design, sources of data collection, details of the questionnaire, reliability and validity test and also defines the research methods used to prove the study's hypothesis. The study gives details of research undertaken through primary and secondary data. The conceptual

model of the research has also been a part of this chapter. Secondary data research is undertaken to compare the financial inclusion of India with other BRICS economies.

Chapter 4 - Data analysis and results

The present chapter emphasizes the findings from data analysis. The chapter also covers the interpretation of responses to questions collected through questionnaires of different stakeholders. The chapter starts with the demographic profile of the respondents. Structural Equation Modeling has been applied to study to analyses the current status of financial inclusion in India, identify the determinants of financial inclusion in India, and examine their impact on economic growth. The study uses panel data analysis to compare financial inclusion in India with Brazil, Russia, China and South African' economies.

Chapter 5- Findings, implications and future research

This chapter focuses on major findings and discusses them in view of other researchers' works. The study based on major findings also provides implications for practitioners, academicians and policymakers. The research objectives are revisited and discussed in the light of current research works. The limitations of the study and directions for future research constitute a vital section of this chapter.

1.9 Chapter summary

Financial inclusion has picked up in developed countries, but emerging economies like India are still in evolving stage. Understanding financial inclusion in India with reference to BRICS economies is challenging due to myriad reasons preventing its full adoption by a larger populace. The reasons to dwell on the important determinants to enhance their impact on economic development will help to focus on these vital determinants. This chapter paves the way to carry forward the research to help achieve the objectives specified. The next chapter will be based on important reviews related to the domain of financial inclusion to focus on hypotheses development.

Chapter 2

Review of literature and hypotheses development

The theoretical literature on financial inclusion covers a variety of dimensions. The present evaluation has been divided into further sub-headings, each of which addresses a significant micro and macro determinants of financial inclusion. These are categorized as determinants of financial inclusion, i) Access to financial services, ii) Financial initiatives and iii) Financial literacy. For Primary and secondary data analysis, the relation of these determinants has been examined with economic development.

2. Determinants of financial inclusion: The determinants of financial inclusion covered in the current study are:

2.1 Access to Financial Services

2.2 Financial Literacy

2.3 Financial Initiatives

2.1 Access to financial services

In access to financial services, usage, digitalization and fin-tech have been included. The literature review for all these is covered through sections 2.1.1 to 2.1.3.

2.1.1 Usage

An important determinant of financial inclusion is usage. This section covers how usage as an indicator of access to financial services, which influences economic growth. A strong emphasis on FI has its origins in both micro and macro analyses that have established the role of financial access in economy's stabilization (Ratnawati, 2020; Morgan and Pontines, 2014; Čihák et al., 2021; Pham & Doan, 2020; Pal and Bandyopadhyay, 2022) and good governance through enhanced transparency (Emara & Said, 2021; Ben Khelifa, 2023; Widyatini, 2019; Dalwai et al., 2014) a positive impact on steadier growth; and reduction in income inequalities (Kling et al., 2022; Park and Mercado, 2018; Kim, 2016; Huang, 2023). At the macroeconomic level, the empirical research is extremely convincing, arguing that more access to financial services or financial development is not just positively but also causally associated with economic growth (De Gregorio and Guidotti, 1995; Anand and Chhikara, 2013; Sulong and Bakar,

2018; Sethi and Acharya, 2018). The academic literature is abundant with studies that explain the function that financial access or usage plays in various configurations of economic growth, and each research offers insights into the subject matter. Emerging nations employ a supply-side policy to expand their economies through FI. The notion of financial inclusion stems from Schumacher (1973) theoretical framework, which established the value of financial institutions in resource allocation. Under this scenario, countries' governments would make banking services available to the unbanked to increase stability in the market (Ahamed & Mallick, 2019; Kamal et al., 2021; Pham & Doan, 2020; Hakimi et al., 2022) and diversify their financing base (Morgan & Pontines, 2018; Saha & Dutta, 2021; Sethy & Goyari, 2022).

Researchers like (Sinclair, 2013; Dabla-Norris, 2015; Roa, 2015; Léon and Zins, 2020; Sayed and Shusha, 2019; Esquivias, 2021) emphasize that a lack of access is a restriction and a perceptible barrier to financial inclusion. Information issues related with the unbanked may be largely resolved if financial exclusion is tackled by enhancing usage of financial services. Particularly, information frictions generate obstacles such as requirements for collateral, documentation, and costly tariffs, which a significant portion of the population cannot satisfy. Particularly high transaction costs are caused by the fragmentation of the market, the dispersion of producers, and the absence or poor condition of transportation networks in emerging or rural economies. This is further supported by Collard (2007), that consumers avoid financial services because they are physically difficult to access. Thus, it takes more time and money to do banking if no local branches are nearby. The populace may have to rely on expensive public transportation, which adds to the cost. Thus, consumers are less likely to have meaningful interactions with the banking industry, which may contribute to feelings of marginalization and isolation.

Additionally, due to the low level of banking usage facilities, people tend to use informal credit. Families and individuals unable to get access to mainstream financial systems are considered financially excluded (Guiso, Sapienza, & Zingales, 2004). People who have small business face difficulties to access formal financial credit and are thus economically excluded from the society. Financial and social exclusion in India is a major hurdle in a growing and emerging economy like India, thus this needs to be tackled and the basic banking and financial services are to be made available to the marginalised and

underprivileged groups (Mahajan & Ramola, 1996). Financial exclusion is a process in which people find it hard to access and use the basic financial products/services that help to fulfil their needs and thus, have a better societal presence (Peterson, 2008). The phrase "financial exclusion" was initially used by Leyshon & Thrift (1995) to characterize the methods used to keep certain socio-economic groupings and people out of the financial structure. Kempson *et al*., (2004) consider financial exclusion as a complex set of hurdles, discouraging the access and use of basic financial services. It doesn't merely resolve around physical barriers related with geography. Financial exclusion also emerges in case the customers are given access to poor quality products and inappropriate services. Since individuals cannot lead a normal life without financial goods, processes that result in financial exclusion ultimately contributes to social exclusion. It implies that preventing people from being financially excluded isn't just about giving them a variety of financial goods, regardless of whether or not such products are suitable for the consumers. Instead, the financial products need to be selected and provided in a responsible manner.

Several variables were used to examine the association between determinants of FI and economic growth. Usage at financial institutions is the most popular one, and it is taken as a determinant of FI in many regional studies (Tuesta *et al*., 2015; Inoue 2019; David 2018; Bongomin & Ntayi, 2020). Other researchers (Kim *et al*., 2018; Sharma, 2016; Williams 2017; Anthony-Orji *et al*. 2023) have emphasized that expanded financial institutions enhance economic efficiency and equality. As per (Srinivasan, 2007; Beck *et al*., 2015; Kebede *et al*., 2021), bank-based systems may boost industrial development, and unrestricted banks can gather information at scale and make a profit from start-ups and investments. India is an emerging economy, and trying to achieve financial inclusiveness in terms of universality, despite constraint of a large population, large geographical area, and poor physical, social, and technological infrastructure. Even though it has significantly improved over the years, not everyone in India still has access to a bank account (Iqbal and Sami, 2017). Because of the stringent requirements and processes that must be met in order to get credit, disadvantaged groups in society, such as minorities, women, and others, are almost always financially excluded. Therefore, all financial inclusion initiatives should aim to make it easier for people to acquire and utilize appropriate financial goods/services more extensively (United Nations, 2006). The significance of FI has been shown both theoretically and practically. As emphasized by

Morgan & Pontines (2018), the yield on financially focused SMEs is greater with inclusion in the market.

Additionally, SMEs could climb the social ladder if banks help this sector, leading to economic growth. Financial inclusion, in the context of financial institutions, refers to the distribution of their operations to various population segments. The public unable to realise financial services are less financially literate and are also excluded from other benefits of FI (Klapper & Lusardi, 2020). Governments and international organizations are promoting financial inclusion to reduce economic inequalities. Microcredit and microfinance were among the first forms of financial inclusion (FI) promotion tools. According to Morduch (1999), micro-credits constitute small loans provided to economically excluded individuals. Despite the increase in their popularity, they have occasionally been attacked for the speculative character of their business (extremely high-interest rates and fees). Microcredit was shown to have somewhat good benefits as a tool for development, but these effects were not found to be transformational (Banerjee *et al*., 2015).

The macroeconomic evidence (Chirwa and Odhiambo, 2016; Sharma *et al*., 2018; Gebrehiwot and Makina, 2019; Oyebowale and Algarhi, 2020; Matsebula and Sheefeni, 2022) suggests that well-developed financial institutions have a substantial beneficial long-term influence on economic growth. Further, access to usage or credit is essential for the financially excluded segment to make investments that could significantly enhance their standard of living (Guiso *et al*., 2009; Dong 2014; Weerasinghe and Dedunu 2017; Ogbebor *et al*., 2020). Individuals and enterprises incapable of getting credit from conventional financial institutions, may be able procure it from informal sources. These alternatives may be much less in terms of numbers and amount provided, as compared to services offered by formal institutions. Thus, financial inclusion helps people access financial instruments more effectively and encourages individuals in various financial activities that constitute social life. Hence, the expansion of formal financial institutions, an important process for allocating funds to all sections of society (Schumacher, 1973) without biases, is an essential part of the nation. The availability of formal credit may benefit from a rise in the overall amount of formal sector savings. This may help financial institutions reach out to businesses and consumers they had previously avoided and to help them diversify their portfolios (Allen *et al*., 2014). Demirguc-Kunt & Levine (2009)

highlight that FI ensures equality by easing lending limits on impoverished individuals having no collateral or credit history. They also emphasized that loosening credit limits promotes loan flow to enterprises and individuals with superior entrepreneurial ideas rather than those with more collateral, implying increased economic chances for those with less wealth. Eventually, a well-organized inclusive financial system provides all kinds of financial products, for instance deposits, savings, insurance and credit to all individuals, irrespective of their income levels and status (Demirguc-Kunt *et al*., 2013).

Increased access to bank accounts and savings is essential for increasing financial stability especially this is for the economy in financial crisis (Han and Melecky, 2013; Lee *et al*., 2022; Ardic *et al*., 2011). Swamy (2012) opined that the introduction of banking usage in India from 1991 to 2005 has led to direct lending of finance to individuals and businesses in rural areas and has significantly reduced rural poverty and increased social growth. Sarma (2016) has ascertained usage indicators to measure the FI in India. The dimensions Sarma (2016) used included bank penetration, ATM installation, and the number of bank branches. Many other authors also endorsed the usage parameters, such as (Park and Mercado, 2015; Wang and Guan, 2017; Kim 2016; Camara and Tuesta, 2014; Sarma, 2012). According to Van *et al*., (2019), financial usage, such as the number of automated teller machines and bank branches, significantly affects individuals and social growth. The researchers revealed that countries with more number of bank branches were more financially included. The FI center in Washington recommended that if individuals and businesses are introduced to innovative usage approaches, it will encourage more access to suitable financial services/products (Blancher *et al*., 2019). Advocating a strong role of banks in developing nations, Gerschenkron (1962) contends that banks fund economic expansion more effectively and efficiently than market-based systems.

Consequently, Levin (2005) suggested that with better access to banking services, firms and individuals have equal opportunities for investment in their well-being, such as education, physical assets and starting a new business. Yadav, Upadhyaya and Sharma (2012) also indicated the financial sector's pivotal role in impacting the country's GDP. Financial inclusion is believed to significantly influence the process of financial market growth (Costa & Ehrbeck, 2015; Vo & Nguyen, 2021).

Over the past few decades, emerging economies have worked to improve their financial inclusion and connect their financial systems to the global financial market (Hajilee *et al*., 2017). This has helped them grow their economies at a faster pace. Access to financial resources can contribute to sustained economic activities through micro-level networks. It could enhance realized business opportunities, moreover, potential entrepreneurs may decide to expand and scale up their business (Klapper *et al*., 2006). Financial institutions stimulate the stakeholders' economic and social development. Through these institutions, financial inclusion serves as a mechanism for empowering users of financial services. It is considered as an important strategy for empowering stakeholders, since it fosters habits of economic independence and self-reliance (Serido and Deenanath, 2016; Sundaram and Sriram, 2015). As per (Shetty *et al*., 2015; Shama, 2016), it influences attaining economic and social empowerment. So the growing number of usage facilities and banking access promotes social growth. As more individuals enter the formal financial sector, central banks may be able to utilize interest rates as a major policy instrument (Paulsen and Yildirim, 2018; Van and Linh, 2019). Kempson and Whyley (1999) emphasized that a basic bank account is considered very vital especially for persons with low incomes. Moreover, a greater degree of financial inclusion may improve the efficacy of monetary policy (Mehrotra and Yetman, 2014). Thus, usage is an important determinant to be included in this study. Based on the arguments provided, the hypothesis has been framed is:

H1a: Usage is an important dimension of access to financial services.

2.1.2 Digitalization

The global financial systems have established prudential standards that must be adhered to ensure the efficiency of banking sectors (Siddik *et al*., 2014). In recent years digitization and digital banking have been considered crucial for improving financial development and inclusion. Most research on digital technologies and development indicators has focused on the sustainable and environmental aspects, ignoring how digital development affects financial inclusion and deepening. Lenka and Barik (2018) discovered that digitalization has emerged as one of the primary factors behind developing an inclusive society and economic system. Digitalization has the potential to increase FI by integrating underserved groups into the established socio-economic system (Barruetabena, 2020).

Digitalization is the use of digital technology to enhance business practices and ease communication. The digitalization of corporate operations has a favorable and considerable impact on productivity and business capacities (Zetzsche *et al*., 2019; Aziz and Naima, 2021). Firms that digitized their business operations might change their traditional structure into a modern organization by expertly managing resources and streamlining business procedures (Bokkens, 2021). Digital meeting scheduling, digital governance, live social media broadcasting, online ordering, booking, delivery, and tracking services, as well as digital financial services (or mobile banking) are examples of digital services are examples of digitalized corporate operations (D'souza, 2021; Lu *et al*., 2021; Rashid and Kumar, 2022). As per (Badruddin, 2017; Siwale and Godfroid, 2022; Mpofu and Mhlanga, 2022) recent research, digitizing corporate operations fosters financial inclusion and has a favourable and considerable impact on economic growth. The adoption of digital business enhanced productivity and economic development practices via technologically innovative company procedures (Jayaraman and Maku, 2019; Siano *et al*., 2020; Mainelli *et al*., 2021). A new driving force for countries' inclusive economic development has emerged with the advent of a new wave of information and technological revolutions: digital inclusive finance (Sabbagh *et al*., 2013; Myovella *et al*., 2020; Law, 2021; Tikku and Singh, 2023), which is characterized by the utilization of emerging digitalization.

The advent of digitalization in finance solves traditional inclusive finance's challenge of balancing social and commercial benefits, helps to ease spatial and geographical restrictions; (Nyanhete, 2017; Badruddin, 2017; Banna *et al*., 2020), lowers the service threshold of finance in rural areas; lowers the high cost of financial services in rural areas, effectively adjusts the allocation of financial resources between urban and rural areas; and reduces the gap between financial services in urban and rural areas (Nguyen 2020; Kumar Vaid, 2020; Svotwa *et al*., 2023). An integral component of getting started with digital financial inclusion is making a digital platform that works well for customers and offers extra financial services like loans, savings, or insurance. Digital information makes it possible to offer more personalized services. Customers may send and receive funds via the bank with the use of this platform. Customers can access digital services via their cell phones and other e-gadgets. The consumer's smartphone will serve as a point-of-sale terminal and a conduit for information between the customer and the bank. Digitalization provides access to formal financial services and lowers transaction costs compared to

conventional banking options. Digitalization diminishes customers' risk of loss when using cash-based payment methods, like theft and other financial crimes (Vega Bernal, 2017; Ozili, 2022; Kapron, 2021). While traditional financial institutions have a history and infrastructure that cannot be easily replaced, digital finance start-ups have benefited from the Reserve Bank of India's (RBI) flexible regulatory standards and the government's pro-start-up policies (Maurya, 2019; Kanungo and Gupta, 2021; Ertürk *et al*., 2022). Indian people, who are already known for being cautious and risk-averse in their financial decisions, need greater faith in digitalization. Evans (2018) established that digital technologies considerably affected and raised people's engagement in financial markets and thus enhanced financial inclusiveness.

Even microfinance organizations throughout the globe are offering digital payments and mobile banking to their consumers. The growth of financial technology has also been fuelled by society's growing preference for cashless transactions, which have been made through digital payment methods. Digitalization has increased the speed, security, simplicity of use and affordability of payments. A systematic review by Mugdha and Pandey (2018) has indicated the importance of the internet and digital banking to enhance accessibility and reduce costs. However, the study also raises caution regarding the risks involved in e-banking and suggested how new technologies could help reduce the risks. Even countries like Kenya have adopted digitalization, and as reflected by Demombynes and Thegeya (2012), m-banking with new and modern financial services has helped transform the lives of the Kenyan population. Many countries of different geographies have initiated digitization through ICTs to provide fast, cheap, and accessible financial services. Many examples of countries using ICT as a medium include mobile money, CELPAY in Zambia; M-PESA in Kenya; WIZZIT in South Africa. We have a cash transfer facility in India through (UIADI) Aadhar; Unified Payments Interface (UPI). Thus, it is evident that digitization is an essential determinants of financial inclusion. GPFI (2016) reported that digitization encourages users to access digital services and financial products efficiently. The ease of access through digitization is removing the barriers to financial inclusion. Ghosh (2018) has reaffirmed that the (Adhar) biometric identification system, with its linkage to bank accounts & other financial services, positively influences financial inclusion. Digitalization is perhaps the best innovation that has happened in the banking industry in today's world.

Diniz *et al*., (2012) revealed that the installation of branchless banks has a beneficial influence on economic growth in a number of emerging nations. Financial inclusion is delivered in advance through digital banking (Aziz and Naima, 2021). A new concept known as digital financial inclusion (DFI) has emerged recently. Using DFI, the implementation and execution of FI will be easier, more effective, and less cost-prohibitive. Further, DFI will enable the affordability and sustainability of financial products provided to consumers (Gomber *et al*., 2017). In addition, digital financial inclusion through accumulating small but large amounts of idle funds can provide businesses with additional finances and support green innovation. Therefore, digital financial inclusion increases the effectiveness and accessibility of funding, aids in lowering the risks associated with green business innovation and increases the willingness of corporate management to embrace green business innovation.

Digitalization of corporate processes and digitized financial boost banks' reputation and value. Siddik *et al*., (2017) concluded that digitalization through internet banking has increased financial inclusion and the performance level of banks in Bangladesh. Hence, Digitalization, as seen by the widespread use of mobile phones and the expansion of internet access, has a favourable effect on the percentage of the population that has access to financial services, which in turn boosts economic growth (Lenka and Barik, 2018). The authors also found a direct correlation between the development of digital technology and the spread of financial inclusion.

Digital banks were able to increase their market share in the financial system by reaching out to remote consumers. Research on the banking systems of BRICS demonstrates that universal access to digital financial services increases stability, decreases default risks, and broadens financial opportunity (Rohman and Bohlin, 2013; Rao *et al*., 2017; Wale-Awe *et al*., 2020). Developed countries and even Sub-Saharan Africa (SSA) countries through digital financial services have enhanced economic activity (Organisation for Economic Cooperation and Development (OECD); Myovella *et al*., 2020). Researchers like (Aker *et al*., 2016; Setiawan *et al*., (2020) have ascertained digitalization as a strong determinant of financial inclusion and support its positive impact on economic development. Accordingly, the related hypothesis is:

H1b: Digitalization is an important dimension of access to financial services.

2.1.3 Financial technology (Fin-Tech)

In the current literature, there are studies that look at the link between technology and economic development. However, mainstream research hasn't paid much attention to how technological approaches through FI could help economic growth. Although the FinTech industry is still in its infancy, only a limited amount of academic research has been conducted (Bansal, 2014; Al-Mudimigh and Anshari, 2020; Arner *et al*., 2020; Senyo and Osabutey, 2020; Isukul and Tantua, 2021) and even less of it has been done in the context of financial inclusion. As a result, there is a need for a deeper understanding of how FinTech and financial inclusion are related to one another.

FinTech is a new financial sector that has emerged as a result of recent advancements in digital technologies contributing towards global financial inclusiveness. According to Schueffel (2016), the term fin-tech is a combination of finance and technology. It refers to using and implementing new technologies to provide better financial services and products. With the potential to substantially lower prices and enhance the availability of financial services, FinTech is suggested as a feasible solution to financial exclusion (Salampasis and Mention, 2018; Tok and Heng, 2022; Ediagbonya and Tioluwani, 2023). FinTech businesses with the potential to significantly disrupt existing financial institutions (Popescu, 2019; Loo, 2019; Senyo *et al*., 2022) are at the vanguard of the Fin-Tech sector, pushing the creation of new digital financial services (Kandpal and Mehrotra, 2019; Rauniyar *et al*., 2021; Brika, 2022).

According to Gozman *et al*., (2018), the development of fin-tech and its solutions primarily seeks to reduce extant barriers to entry, thereby allowing new actors to enter the various sections of the value chain of financial services. The growth of the Fin-Tech industry has therefore been intimately tied to technical breakthroughs and innovations (Alt *et al*., 2018). In the 1990s, the internet revolution enabled e-commerce financial transactions to be affordable and paved the way for the emergence of electronic finance, which has fundamentally altered the financial services industry. This, in turn, led to the creation of new business models that focus on offering services over the internet, like online trading services and online banking (Gimpel *et al*., 2018). Eventually, the emergence of new and better technologies like artificial intelligence and big data analytics has assisted in making solutions that are more consumer-focused (Breidbach *et al*., 2020; Baber 2020; Caciatori Junior and Cherobim, 2020). Use of diverse electronic devices,

such as mobile phones, automated teller machines, point-of-sale systems, smart televisions, computers, and tablets, has enabled banking to be conducted anywhere. Today, a variety of banking transactions, including the transfer and reception of funds, balance inquiry, purchase of airtime, payment of bills, and account establishment, can be completed or initiated from locations other than a bank's physical location.

Technological advancement has expedited financial service activities in the global financial market by transforming information, automating procedures, and allowing for the quick flow of financial transactions (Barrett, Sahay, & Walsham, 2001). A study by Kaur and Aggarwal (2017) suggested that 80% of banks showed positive growth in total factor productivity. The reason attributed is the important role played by technological changes, especially in public sector banks operating in India. The widespread use of mobile connectivity and smartphone technology makes it possible for financial institutions to find new ways to connect with more customers. As per Broby (2021), mobile banking services and Fin-Tech firms are paving their way into the financial industry in a variety of ways to reach out to larger geographical areas. Individuals living in rural regions and can't afford additional banking services may now have access to all kinds of services through technology (Zameer, Shahbaz, and Vo, 2020). Further, many scholars (Lee and Shin, 2018; Asongu *et al*., 2021; Nchofoung and Asongu, 2022) have endorsed that technologies have become an integral part of the financial system and are beneficial for attaining sustainable economic development. The use of mobile phones and the internet through technological infrastructure has emerged as a new option to provide unbanked individuals broader access to the formal financial system. Thulani *et al*., (2014) have pointed out that digital financial services through technology have enhanced rural resident's access to affordable financial goods and services. Analogously, Cherotich *et al*., (2015) found that the introduction of modern technologies and the internet into Kenya's banking sector dramatically changed the banking paradigm. This innovation in banking sector approaches offered a strategic techno-framework for commercial banks in Kenya to attain high profitability, efficiency and productivity in banking outreach.

The digitalization of financial services and internet banking has reduced transaction cost and improved accessibility among individuals, and innovation of technology in the banking sector has increased FI in most of the regions in the Indian economy (Planning Commission, 2009). Hence, with the help of mobile phones and internet facilities, digital

banking services promote an inclusive financial system (Banerjee & Francis, 2014). Despite the benefits, many developing countries are gradually taking the necessary measures to increase financial Inclusion through artificial intelligence to provide access to a comprehensive range of financial services to the marginalized section. This calls for a well-organized, techno-banking infrastructure to make a user-friendly environment for the marginalized section to make them participate in the country's economic growth. Scholars such as Nair *et al*., 2020; Del Gaudio *et al*., 2021; Lashitew *et al*., 2019 have empirically confirmed that technology effectively bridges socioeconomic differences in an economic system. Several other studies, such as (Kabakova & Plaksenkov, 2018; Wulan, 2017; Azarenkova *et al*., 2020; Higgins, 2019) have also supported that technology may offer disadvantaged and underprivileged populations access to much-needed education and public services and thus encourage equality in society.

Around the world, artificial intelligence (AI) has permeated all sectors of society and transformed non-digital economies into digital economies. This technological revolution is widely recognized as a powerful accelerator that has the potential to make the world more inclusive and speed up global economic growth (Bansal, 2014). The financial industry can make reliable and transparent products that reach customers and small businessmen more accurately through AI. Thus, collaborating with Fin-tech companies will help adopt digital platforms and thus assist in offering these services and products to a large segment of society (Claessens *et al*., 2018). In order to empirically examine this following alternative hypotheses are framed:

H1c: FinTech is an important dimension of access to financial services.
The dependent variable used in the study is economic growth.

Overall the hypotheses related to access to financial services are framed as follows:
H1: Usage, digitalization and FinTech are important dimensions of access to financial services.
H2: Access to financial services (Usage, Digitalization and FinTech) is an important determinant of financial inclusion and is positively associated with economic growth.

The next section of research focuses on financial initiatives undertaken in India and how these are related to economic growth.

2.2 Financial initiatives

Indian Government and BRICS Nations are developing and executing a cogent set of policies and schemes to advance financial inclusion in an economy. It's possible that attempts to promote financial inclusion will not be gender-neutral, and more work may be needed to guarantee advantages for certain demographic groups, especially those who are financially excluded. The majority of adults in many emerging nations still lack access to financial services, particularly those at the bottom of the economic pyramid, especially women and the rural populace (Grout, 1997; Hartmann, Maddaloni and Manganelli, 2003; Corner, 2005; Garg and Agarwal, 2014; Mani, 2016). There is a huge potential to help nations create an environment that is conducive to advancing financial inclusion via financial policies and schemes. Thus, sub-section 2.2.1 has studies focusing on Financial Policies, and sub-section 2.2.2 covers financial schemes.

2.2.1 Financial policy

An important policy goal of the Government of India (GoI) is to improve the economy and financial system of the country as a whole. Subsequently, the GoI has persistently prioritized the development of financial inclusion on a greater scale to build an inclusive society (Gupte, Venkataramani and Gupta, 2012; Bisht and Mishra, 2016; Sandhu and Singh, 2016). Yadav, Upadhyay and Sharma (2012) state that the global slowdown of 2008 has affected the economies adversely, and hence it is important to examine the macroeconomic effects of fiscal policy in an emerging economy like India. Still, the literature is ripe with studies reflecting that the path is ridden with problems (Collard, Kempson and Dominy, 2003; Kesavan, 2015). More than 50% of individuals lack access to financial technology, goods, and services offered by commercial banks and financial institutions in developing nations and growing markets like India (Shrier, Sharma and Pentland, 2016; Purohit and Bindra, 2016; Gupta, 2018; Mukherjee, Mallik and Thakur, 2019). This is despite the Indian government's initiative to introduce several innovative programmes and policies to promote financial inclusion. These programs aim to provide social security for disadvantaged members of society. After extensive planning by financial experts and policymakers, the government has launched financial inclusion initiatives.

As a part of these efforts, banks have been urged to increase their offering of services and products to the financially excluded section. In 2006, the Reserve Bank of India (RBI)

initiated a programme to connect all households with bank accounts and induce a culture of saving in rural areas (Manjunath and Ramaprasada Rao, 2015, Saxena and Anand, 2017; Aku, 2018; Dhillon and Srivastava, 2018). Pradhan Mantri Jan-Dhan Yojana (PMJDY) was launched in 2014 by the Indian government with the intention of providing its citizens with free bank accounts that could be opened with zero balance and fewer documents than were previously necessary (Rana, Luthra and Rao, 2018).

Various policy initiatives introduced by many emerging nations which include, Micro-financing and SHGs to enhance and augment FI (Cole, Sampson, and Zia, 2009; Dixit, and Ghosh, 2013; Sahoo, Pradhan and Sahu, 2017; Pickens, Porteous, and Rotman, 2009; Reddy, 2016; Ravichandran and Alkhathlan, 2009). In developing nations, microfinance has greatly assisted underserved households, MSMEs, and self-employed entrepreneurs. Micro-financing plays a vital role in improving financial awareness through various initiatives. Okello Candiya Bongomin (2020) suggested reinforcing the initiatives of financial intermediaries such as microfinance institutions and banks to help conduct financial literacy programs. Researchers like Nkwede 2015; Bayar and Gavriletea 2018 examined the influence of FI through financial policy on economic development and growth for three decades starting from 1982. The research revealed that inclusive financial activities considerably reduced poverty and positively influenced economic growth. Supporting this, Sarma and Pais (2011) suggested introducing innovative FI policies essential for growth. Hence, it is pertinent to examine the role financial policies play in inclusion, ultimately resulting in inclusive growth.

2.2.2 Financial schemes

With the help of the Global Partnership for Financial Inclusion (GPFI) and the Organization for Economic Co-operation and Development (OECD), India has been actively engaging in achieving financial inclusion. As one of the co-chairs along with Indonesia and the United Kingdom in the GPFI, India is actively involved in the development of relevant research and policy guides in digitalization, regulation and financial inclusion that GPFI publishes from time to time. Furthermore, the Reserve Bank of India is a member of four working group's viz. Standards, implementation and evaluation, digital financial literacy, financial education for MSMEs and core competencies for financial literacy under the International Network for Financial Education (INFE), set up under OECD. The Indian government has also initiated the

process of preparing its National Strategy for Financial Inclusion (NSFI) under the aegis of the Financial Inclusion Advisory Committee (FIAC). The policymakers of India have started a self-help group (SHG) program in rural and urban areas to connect the people from the bank. The program has become the world's largest initiative for mobilizing women to implement government policy in the country. The Swarnjayanti Gram Swarozgar Yojana (SGSY) policy has generated employment among below poverty line (BPL) people to connect the financial system and avail such facilities.

FI is drawing the response of academics, policy-makers, and market players as it has the potential to knit the economy's growth (Beck, Demirguc-Kunt and Honohan, 2009). India, too has announced a lot of schemes to enhance FI. Schemes initiated are Pradhan Mantri Jan Dhan Yojana (PMJDY); Atal Pension Yojana (APY); Pradhan Mantri Vaya Vandana Yojana; Pradhan Mantri Suraksha Bima Yojana (PMSBY); Pradhan Mantri Mudra Yojana; Credit Enhancement Guarantee Scheme (CEGS) for Scheduled Castes (SCs); Venture Capital Fund for Scheduled Castes under the Social Sector Initiatives and Varishtha Pension Bima Yojana (VPBY) (Khaki and Sangmi, 2017). Thus, the present study tried to unravel how financial policy and schemes could assist in economic growth. Finance Ministry 2012 issued directives for opening one bank account per family for attaining full FI and introduced national electronic benefit transfer for account holders (Roy, 2012). In November 2005, RBI directed banks to initiate strategies to advance financial inclusiveness. The strategies that were initiated include i) No-frills accounts, ii) Know-Your-Customer (KYC), iii) Banking Correspondents (BCs) & (iv) use of information technology. This was adopted by all private and public banks generally in phases (Dangi and Kumar, 2013).

Thus, there are diverse initiatives taken in India to eradicate financial exclusion and make poor people stakeholders of FI (Srinivasan, 2007; Dasgupta, 2009). However, Nepal Govt offered easy access to financial services and zero balance savings accounts to the female heads of households. With this scheme, around 84% of women opened their accounts in the bank (Chiapa, Prina and Parker, 2016). Similarly, Dabla-Norris, Townsend and Unsal (2015) have launched schemes of micro-credit loans in rural areas by introducing the "Village Fund Program." Every village got 1 million baht to set up a village bank that makes the availability of funds to villagers. This scheme is one of the largest microfinance to improve access to finance in rural areas in that region. Similarly, In India

savings program for children (Chiller bank program) was initiated by RBI in 2015, encouraging children to open and operate savings bank accounts independently. The program targets children between the ages of 10 and 17 years. This program aims to teach the student to inculcate the habit of saving and enable them to become financially empowered citizens in the future. These small steps can assist in achieving financial inclusion and also enhance inclusive growth. Therefore, financial policies play an important role in attaining financial inclusion and fostering inclusive growth. The related hypotheses are:

H3: Financial initiatives (Financial schemes and policy) are an important determinant of financial inclusion and are positively associated with economic growth.

Any study on financial inclusion is incomplete unless we examine the role of financial inclusion in it. Thus, the next section, 2.3, examines the literature relating financial literacy with financial inclusion and economic development.

2.3 Financial literacy

The need to improve financial literacy was first acknowledged in the developed world in the 1990s (Damayanti *et al.*, 2018) but gained international attention after the 2008 financial crisis in the United States. There has been less research conducted in underdeveloped and developing nations until recently (Remund, 2010; Refera, Dhaliwal and Kaur, 2016; Karakurum-Ozdemir, Kokkizil and Uysal, 2019; Putri, Damayanti and Rahadi, 2022). A study by Kebede and Kuar (2015) has indicated that low-resource nations, particularly those in Asia and Africa, have shown little evidence of financial literacy. Various government and non-government organizations are working to educate the public on financial matters so that they can make informed financial decisions. As financial education has been considered a vital factor that influences financial decision-making and economic growth, it is important to examine how financial determinants through this would impact economic growth (Batsaikhan and Demertzis, 2018; Pașa, Picatoste and Gherghina, 2022). Having stable personal finances is crucial for a family and a secure future (De Brentani and Cooper, 1992; Claessens, 2006). Low financial literacy may result in bad financial choices (Jacob, Hudson and Bush, 2000), which can hinder long-term goal achievement (Remund, 2010). Financial literacy enables a person to maximize the utilization of their constrained financial resources. Financial literacy

provides knowledge and skills, makes people financially competent, and assists in making wise financial decisions and choices (Okello *et al.*, 2016).

As seen from the literature, researchers consider financial awareness and financial competency are important indicators of financial literacy. Equal attention has been paid to these measures in developed, emerging, and underdeveloped markets. As highlighted by Liew *et al*., (2020), digital financial knowledge positively affects people's savings and spending habits. This study is based on Indonesia, and thus it can be felt that researchers across the globe want to focus on this important aspect. The 2.4.1 sub-section is devoted to a literature review related to financial literacy awareness (FL Awareness), and the 2.4.2 sub-section covers studies on financial literacy competency (FL competency).

2.3.1 FL awareness

According to Rajeev and Vani (2017), financial illiteracy among the financially excluded is a significant demand-side barrier to financial inclusion. They also noted that increasing access to financial services is largely ineffective without concurrently addressing the problem of financial illiteracy. Recent research on India's financially excluded group revealed (Agarwal *et al*., 215; Bharucha, 2019) that financial illiteracy is widespread in rural and urban regions. Providers of financial services and products face serious obstacles due to the widespread issue of financial illiteracy, which can only be addressed by increased communication and education (Rai, Dua and Yadav, 2018; Singla and Mallik, 2021). In addition, a lack of financial literacy may result in personal loans that are not secured (Liu *et al.*, 2021), financial difficulty, and even bankruptcies (Bourova *et al.*, 2018). People with high literacy might invest in stocks, which would give a better return on their money. Eventually, financial illiteracy is a crucial problem in the global process of financial and social inclusion (Lyons and Kass-Hanna, 2019). Due to the complex financial and economic environment, financial literacy is required. Although, spreading various financial schemes and policies in the country will not work unless and until everyone is aware about the formal financial system. This endorses the need for financial literacy, as it encompasses knowledge, skills, awareness and attitudes to make proper financial decisions (Maturana and Nickerson, 2019). A major challenge for providers of financial services and products is ensuring that the financially excluded segment understands the product and service offerings and the potential benefits. Private companies have also been described as potentially important actors in educating the financially excluded segment.

In developing countries like India, poverty is the main issue, and a large number of people live in rural and semi-urban areas; therefore, not only financial services accessibility in these areas will lead to financial development, but more important is the awareness of these services, which ultimately promotes economic development (Hasan, Le and Hoque, 2021; Gautam *et al.,* 2022). Kefela (2011) conducted a study to evaluate the effects of financial literacy in developing nations. He discovered that a lack of financial knowledge could result in individuals making poor returns, risky decisions, and unaware of day-to-day financial hazards. Calderone (2014) mentioned that the financial literacy center (FLC) and programmes in these areas spread awareness about basic financing to link new users to the financial system. Thus, financial literacy is an effective medium between individuals and financial systems in rural and urban areas. A financially aware person will have knowledge to make considerable decisions for the effective and efficient use of financial resources in the market (Bongomin *et al*., 2016).

With the support of financial literacy, rural people can contribute to financial development (Hasan *et al*., 2020) and improve financial behaviour. Hence, a strong relationship exists between financial literacy and financial development, which leads to inclusive growth (Kefela, 2010; Klapper, Lusardi and Panos, 2012; Hasan *et al*., 2022). Several researches conducted in developing nations have also indicated that a higher level of financial literacy is positively associated with more engagement in financial markets, greater use of formal forms of borrowing, larger voluntary savings, and enhanced financial diversification (Landerretche and Martinez, 2013; Beckmann, 2013; Xu and Zia, 2012; Morgan and Trinh, 2019). In contrast, a study by (Lusardi and Oggero, 2017; Raccanello and Sundaram, 2018) reflects that most people in the BRICS areas, particularly in India, make poor economic decisions. Economic growth in the BRICS region will depend on making prudent financial decisions. Therefore, the BRICS government must concentrate on financial education to support a strong culture to stimulate economic growth in these nations (Mabula and Ping, 2019). However, there is a scarcity of studies on financial literacy with a focus on people in emerging nations like India. As a result, these studies must be conducted, and institutional frameworks must be restructured to support programmes and policies that will expand the reach of financial education in developing nations.

2.3.2 FL competency

Financial competence (FC) refers to decreased dependence on others (Collins, 2011) ability and freedom to achieve financial objectives through financial decision-making (Lusardi, 2012; Arianti, 2018; Raut, 2020). The FC and FI nexus is developed in the corporate and public sector domains on the idea that FC provides more flexibility to control desired results, assuring accountability, sustainability, and quality information of financial institutions. However, (Finke and Huston 2014; Lusardi, 2019) contend that FL competency boosts confidence, knowledge, and willpower in the face of financial obstacles, resulting in financial independence, leads to rational financial decision-making. Correspondingly, financial competence is identified as one of the main components which influence FI, as per the finding of (Kou *et al*., 2021).

Good financial skills and knowledge lead to greater wealth (Bannier and Schwarz, 2018). The research that has been done on financial literacy so far shows that it not only helps people make good money choices but also has a link to their overall health (Monticone, 2010; Behrman *et al*., 2012; Jappelli and Padula, 2013). Prior literature highlights that investigation related with determinants of financial literacy concentrates on macro-economic sources (Spataro and Corsini, 2017; Lusardi and Mitchell, 2011; Sági, Vasa, and Lentner, 2020), where financial literacy is suggested as a policy strategy for combating financial vulnerability in the society. Gallego-Losada *et al*., (2022) envisaged a strong positive impact of financial education on social development. Greater financial literacy is emphatically related to huge participation in financial markets, and greater usage of formal financial in society leads to individual growth in the Russian economy (Klapper, Lusardi & Panos, 2013). Morgan and Long (2020) used Organisation for Economic Co-operation and Development (OECD) countries to examine financial literacy and social development through FI. They have used three financial literacy components: knowledge, attitude and behaviour. The study revealed that financial literacy has statistically significant effect on FI and social development. The study also reflected that a good financial attitude is associated with various financial products and increased use of formal credit facilities.

Struckell (2022) addressed that financial literacy is directly linked to a higher level of an individual's start-up earnings and self-employment. In a financial crisis, someone who is knowledgeable about the situation will be able to manage it better than an uninformed one. Correspondingly, Usama (2018) associated financial competencies with increased

entrepreneurial activity and economic growth. In a similar vein, Mashizha, Maumbe and Sibanda (2019) suggested that there is a need to offer financial education to SME owners. They advocated for expanding the assessment of financial literacy to diverse strata of the population. Moreover, financial competencies are essential to reap the benefits of the digital revolution, to protect oneself from the impending risks associated with digital financial services, to understand complex information, and to make informed financial decisions (OECD, 2017).

Valaskova, Bartosova and Kubala (2019) reiterated improved abilities and basic financial understanding as vital for conducting appropriate financial transactions. To be more precise, higher levels of competent skills result in a diversified portfolio, thus leading to fewer financial blunders and a low payment default rate (Hastings and Mitchell, 2020). According to Gaurav and Singh (2012), millions of rural households in developing nations are unable to make wise financial choices because of their limited knowledge of financial goods and inability to analyse financial data. Financial competence, thus, is seen as a financial behavior that improves one's ability to engage in extensive financial activities and achieve financial well-being (Lučić, Barbić and Uzelac, 2022). The ability to manage one's finances well is essential for both maintaining one's standard of living (Roska and Miroslavic, 2022) and improving one's financial situation (Lusardi, 2019). Thus, it is not merely financial awareness, but possessing the requisite competencies is the need of the hour. Thus, based on the above discussion, we have framed our hypotheses as follows:

H4: Financial literacy (FL awareness and FL competency) is an important determinant of financial inclusion and positively associated with economic growth.

Earlier studies on financial literacy relate it directly with economic growth. Moving a little further from here, examining the mediating role of financial literacy between access to financial services and economic growth was important. The related hypothesis is:

H5: Financial Literacy mediates between access to financial services and economic growth.

Having refereed to papers related with determinants of financial inclusion, access to financial services, financial initiatives, and financial literacy, it becomes eminent to relate all of these. Thus, to examine the impact of determinants of financial inclusion on economic growth, the related hypothesis is:

H6: Access to financial services (with the mediation of *financial literacy) and financial initiatives are positively associated with economic growth.*

Since this study covers both an analysis of financial inclusion in India and also wanted to focus on how financial inclusion is related with Economic Growth in BRICS economies. Section 2.5 covers the studies mostly related to BRICS and other developing nations.

2.4 Determinants of financial inclusion and economic growth in relation to BRICS economics

As the Indian Government and many BRICS nations have been constantly pursuing financial inclusion initiatives, examining how these could be included in the current study is pertinent. Chen *et al*., (2012) developed a financial inclusion index for India by using the geometric average of four dimensions: penetration, accessibility, usage, and transaction costs. According to the findings, the level of financial inclusion in India increased between 2008 and 2009. Zins and Weill (2016) applied a Probit model on 37 African countries using the World Bank's Global Findex database. The result indicated that educated, richer, and older individuals are more financially included. Traditional and mobile banking emerged as the main determinants of financial inclusion in these economies. Allen *et al*., (2016) have also used the World Bank Global Findex data to scrutinize the countries and individual characteristics associated with financial inclusion on a world scale. The authors concluded the lower banking cost, improved technology, proximity to financial intermediaries, politically stable environment, and affordable financial product and services. Access to formal financial services in an economy results in equal investment opportunities among individuals and businessmen (Mehrotra and Yetman, 2015). The research outcome of Salim (2018) didn't highlight the impact of financial reforms on the return on an asset or return on equity for the banks, however results showed a positive impact on an increase in net interest margin. Capital strength and asset quality are the main drivers of profitability.

According to Demirguc-Kunt *et al*., (2022), financial inclusion is essential for a country's GDP growth. Ibor *et al*., (2017) have highlighted that financial inclusion has played an important role in driving the country's economic growth in Bangladesh, and financial inclusiveness has helped alleviate poverty and improve living standards in the country. Hence, inclusive finance is necessary for an economy to ensure stable growth and development of the economy. Sarma and Pais (2011) pointed out the dominance of informal finance in society is reduced by financial inclusion. Further, Banerjee and Francis (2014), financial institutions serve as a driving force behind its stakeholders' economic and social development. Gross domestic product, also known as GDP, is the most common and significant economic term, and it is used worldwide to measure the performance of an economy (Ayres & Warr, 2006). Dasgupta, Lall and Wheeler (2005) found that investment and income level at the start statistically affect economic growth in the MENA region. Bahrini and Qaffas (2019) used a GMM growth model to determine that the adoption of ICTs such as mobile phones, internet access, and broadband was the primary factor in economic development in 14 MENA and 31 Sub-Saharan African nations. Cihak, Mare and Melecky, (2016) illustrate the fact that nations with more financial depth enjoy a higher growth rate in industries. Parkhimenka *et al*., (2017) has focused on the importance of heuristics. Singla and Prakash, (2021) indicated the age of the firm, profit after tax, investment in research and development, dividends, leverage and net fixed asset as significant positive drivers for improving value-based performance.

The determinants and financial parameters are related to economic growth so that BRICs comparison may be feasible. When financial restraints on businesses are alleviated, economic growth is stimulated. Based on panel Granger causality tests, the impulse response functions (IFR) from the panel VAR analysis imply that financial inclusion boosts economic growth and financial inclusion and economic growth are mutually causative. Hence, financial inclusion seems to boost OIC economies (Kim, Yu and Hassan, 2018).

The effect of financial development on economic growth is estimated by Durusu-Ciftci *et al*., (2017) using data from a panel of 40 nations covering 1989–2011. The author's discovered that the growth of the stock and credit markets has favourable long-term impacts on GDP per capita. At the macro level, GDP per capita is a crucial financial inclusion element. Similarly, using panel data econometrics, Chakravarty & Pal (2013)

investigate the effects of significant banking policies on financial inclusion across Indian states between 1972 and 2009. They concluded that social banking policy played a significant role in promoting financial inclusion across states. Using the Global Findex data of 31 OECD countries, Voica (2017) determined the connection between financial inclusion and social characteristics. According to their empirical evidence, wealth inequality prevents people from using financial institutions, whereas a heavy reliance on public institutions and established formal financial institutions increases financial inclusion. Thus, an effort should be made to identify the relationship between macro-level determinants of financial inclusion with economic growth, as financial inclusiveness promotes economic prosperity (Chatterjee, 2020; Nizam *et al*., 2020. The related hypotheses to compare the determinants of financial inclusion with economic growth in BRICS economies are:

H7: Financial inclusion determinants (Number of depositors; ATM/User; Broad Money; Bank Branches; Domestic credit to private sector by banks; Internet users; Inflation and Exchange Rate) are important predictors of economic growth measured through Gross Domestic Product (GDP).

H8: Financial inclusion determinants (Number of depositors; ATM/User; Broad Money; Bank Branches; Domestic credit provided by the bank; Internet users; Inflation and Exchange Rate) are important predictors of economic growth measured through *Gross Domestic Product per Capita (GDP/Capita).*

2.5 Research gaps

Although financial inclusion has been the subject of several studies for industrialized nations, there is still limited and sparse literature on developing economies, including BRICS, compared to developed economies. Thus, it is important to examine how determinants of financial inclusion: i) Access to Financial Services, viz. Usage; Fin-Tech and Digitalization; ii) Financial Literacy and iii) Financial initiatives are related with and impact economic growth. To have greater depth, it is also essential to study whether access to financial services (Usage, FinTech and Digitalization) directly and positively influences economic growth or whether the relationship improved with the mediation of financial literacy. Some studies have established a correlation between increased access to financial resources and reduced poverty (Littlewood *et al.*, 1999; Honohan, 2004;

Ardic, Heimann, and Mylenko, 2011). Across the globe, researchers have advocated that FI is crucial to reducing economic disparity (Kim, 2016; Ouechtati, 2020; Von and Orthofer, 2020; Verma and Giri, 2022). However, studies by (Khandare, 2019, Nagpal *et al*., 2020; Barik, and Pradhan, 2021) highlight that FI is low in BRICS nations. In view of these, it is vital to examine the status of financial inclusion in BRICS to frame a model to fill the gap in the literature and discover the new potential in this theme.

Thus, it becomes important to examine determinants of financial inclusion in India through primary research and also to examine it from a macro perspective taking BRICS nations. This will present a true and holistic picture of financial inclusion in India with respect to other BRICS nations.

2.6 Chapter summary

It may be observed from the abovementioned literature review that various researchers have done some pioneering work regarding determinants of financial inclusion in developed and developing countries, including India. However, there is a need to work on a comprehensive and integrated strategic framework for India in relation to BRICS nations. This study proposed to fill this gap by conceptualizing financial inclusion determinants and establishing a link with economic growth. This study proposes to identify key determinants of financial inclusion using primary data and relate them with economic growth. The study also aims to generate a model taking the secondary level research at the macro-level by examining financial inclusion determinants in BRICS economies. Having laid a broad framework and developing research hypotheses, the next chapter presents a detailed methodology followed to achieve the research objectives.

Chapter 3

Research design and methodology

In order to accomplish the objectives of the study, research methodology offers a logical and systematic sequence of numerous research phases and methodologies based on scientifically proven procedures. Methodology guarantees impartiality and uniformity in the methods, resulting in more dependable outcomes. Several studies on several facets of financial inclusion have been published. The current study has used a mix of primary survey and secondary data analysis to examine several aspects of financial inclusion among BRICS nations. For a primary analysis, data were collected from 1800 individuals from 21 cities across Indian districts through a planned survey. Secondary data on the status of financial inclusion in BRICS countries were gathered from various sources, including World development indicators (WDI), International Monetary Fund (IMF), Financial Access Survey, other government reports, and other committees' reports on financial inclusion, among others. Based on the literature review, the details of determinants of financial inclusion covered in this study are mentioned in Table 3.1.

Table 3.1: Details of the variables included in the study

Primary data		**Secondary data**	
Financial inclusion determinants	Method	**Financial inclusion determinants**	Method
1. Access to financial services		**1. Access to financial services**	
i. Usage	Structured questionnaire	i. Depositors (Depo)	Panel data analysis & Hausman Test
ii. Technology (FinTech)		ii. ATM per User (ATM/User)	
iii. Digitalization		iii. Domestic credit to private sector by banks (DCPB)	
		iv. Internet Users (IU)	
2. Financial literacy (Mediating Variable)		**2. Financial literacy**	
		i. Inflation rate	
		ii. Exchange rate	
3. **Financial initiatives**		**3. Financial initiatives**	
		i. Bank branches (BB)	
		ii. Broad money (BM)	
Dependent Variable		**Dependent variable**	
Economic growth	Structured questionnaire	Economic Growth: Gross Domestic Product: GDP	
		Economic Growth: Gross Domestic Product: GDP /Capita	

Source: Authors compilation

3.1 Research design of primary analysis

The data were collected from different socio-economic groups who have saving bank accounts or using financial products and services. The sample included urban and rural locations, genders, graduates & postgraduates, service-class persons and self-employed people to represent the overall population. Indicators were finalized after getting expert input and reviewing relevant prior research.

3.2 Development of questionnaire and non-response bias

The questionnaire was based on the indicators, and questions were created with a scale of 1 (strongly disagree) to 5 (strongly agree). Likert scale is used for data collection. A structured questionnaire was used to get information from the customers using financial services. The respondents were informed about the purpose of the survey and how their answers will be useful for the policy-makers and help them incorporate changes and amendments in the policies. A pilot study was carried out with 65 respondents from the target group to ensure that the suggested measures were suitable. The results of the pilot research revealed that the survey had good face validity and that the participants comprehended the questions. Expert opinion was taken from 25 bank officers and management experts. The suggestions by experts were incorporated and some questions were modified. After that, 2300 questionnaires were distributed among different groups of society. After excluding the invalid survey replies, 1800 valid responses were taken for further research. Table 3.1 displays the various scales and their respective references. As per the suggestion of Armstrong and Overton (1977), the effect of non-response bias was also measured by contrasting the replies of the first and final 34 percent of respondents. Non-response bias shouldn't be a problem since there were no statistically significant variations in the research constructs or demographics ($p > 0.05$).

3.3 Data collection

It is usually challenging and complicated to record the data that is acquired from a variety of individuals. People who are working in jobs are more likely to have used financial institutions for financial services, which is a major step towards achieving financial inclusion and ultimately achieving financial satisfaction. It was worthwhile to examine financial inclusion in India. The sample includes the female population and persons who

use formal financial institutions for various financial services, including completing financial transactions and establishing savings accounts.

3.4 Measurement of construct

As per Williams and Simoff (2006) and Taherdoost (2019), uni-dimensionality lies at the heart of the Likert scale; making it the most widely used scaling process in social sciences research. Therefore a 5-point Likert scale was used to measure the research constructs, which included the determinants of financial inclusion (FI), i) access to financial services [covering: usage (USG), digitalization (DIGI), and FinTech;] ii) financial initiatives and financial literacy (FL) and the dependent variable, viz. economic growth (EG). The procedures were carried out in accordance with the suggestions of (Carpenter, 2018). The economic condition of most developing countries is quite different from that of advanced economies (Das *et al*., 2013). Consequently, the models of these countries have to be adapted and validated for broader acceptance in these economies.

The details of questionnaire are provided in Appendix 1. The questionnaire was pilot tested and Cronbach Alpha for the construct was found good and the values are shown in table 3.2. The values for all sub-scales were greater than the acceptable range (0.70). All conceptual model constructs, except for social-demographic variables, were measured with multiple-scale items.

Table 3.2: Cronbach alpha of scales

S No	Scales	Number of Items	Cronbach's alpha
1.	Access to financial services	24	0.900
2.	Financial literacy	19	0.881
3.	Financial initiatives	15	0.948
4.	Economic growth	8	0.912

Source: Self-compilation through SPSS

3.5 Statistical approach and mechanism

In order to accomplish the goals of the research, this study used mixed method approach. Both the statistical packages for social sciences (SPSS) version 28.0 manufactured by IBM and Smart PLS version 3.0 developed by Smart-PLS were used to analyse the cross-sectional data set. Before beginning the analysis process, the data were examined to see whether or not there was common method bias (CMB). Multicollinearity and normalcy was also checked. The presence of CMB may have an unfavourable effect on the investigation results. There were efforts made to reduce the possibility of CMB occurring. Harman's single-factor test was carried out to examine the possibility of CMB. The existence of intercorrelations between two or more sets of independent variables is what is meant by the term "multicollinearity." The values of the variance inflation factor (VIF) were used in the examination of multicollinearity. If the values in the data set are distributed symmetrically around the mean, then we say the data set has a normal distribution. The Skewness and Kurtosis values were used to evaluate the degree to which the data deviated from normalcy. All the values of Kurtosis were in the range of -3.0 to 3.0.

We used partial least squares (PLS) to evaluate the correlations using a variance-based structural equation modeling (SEM) methodology. As per Hair *et al*., (2019), for the purpose of estimating a system of complicated interrelationships, including several constructs and indicators, PLS-SEM is an appropriate statistical approach. Thus, PLS-SEM was used to analyse the data (Rofiqo *et al*., 2022). PLS-SEM was preferred to the variance-based SEM (VB-SEM) in this research, because of its predictive causality in identifying essential construct (Sarstedt *et al*., 2022). Additionally, because of the explanatory nature of our investigation, PLS-SEM is the ideal match for our research (Farooq and Radovic-Markovic, 2017). Further, a two-step procedure is employed: measurement outer model (MOM) and structural inner model (SIM). According to Hair *et al*., (2014), the measurement outer model (MOM) is concerned with the correlation between each external variables and its corresponding latent variable. Oke *et al*., (2012) suggested that the structural inner model (SIM) is used to calculate the correlation between the constructs.

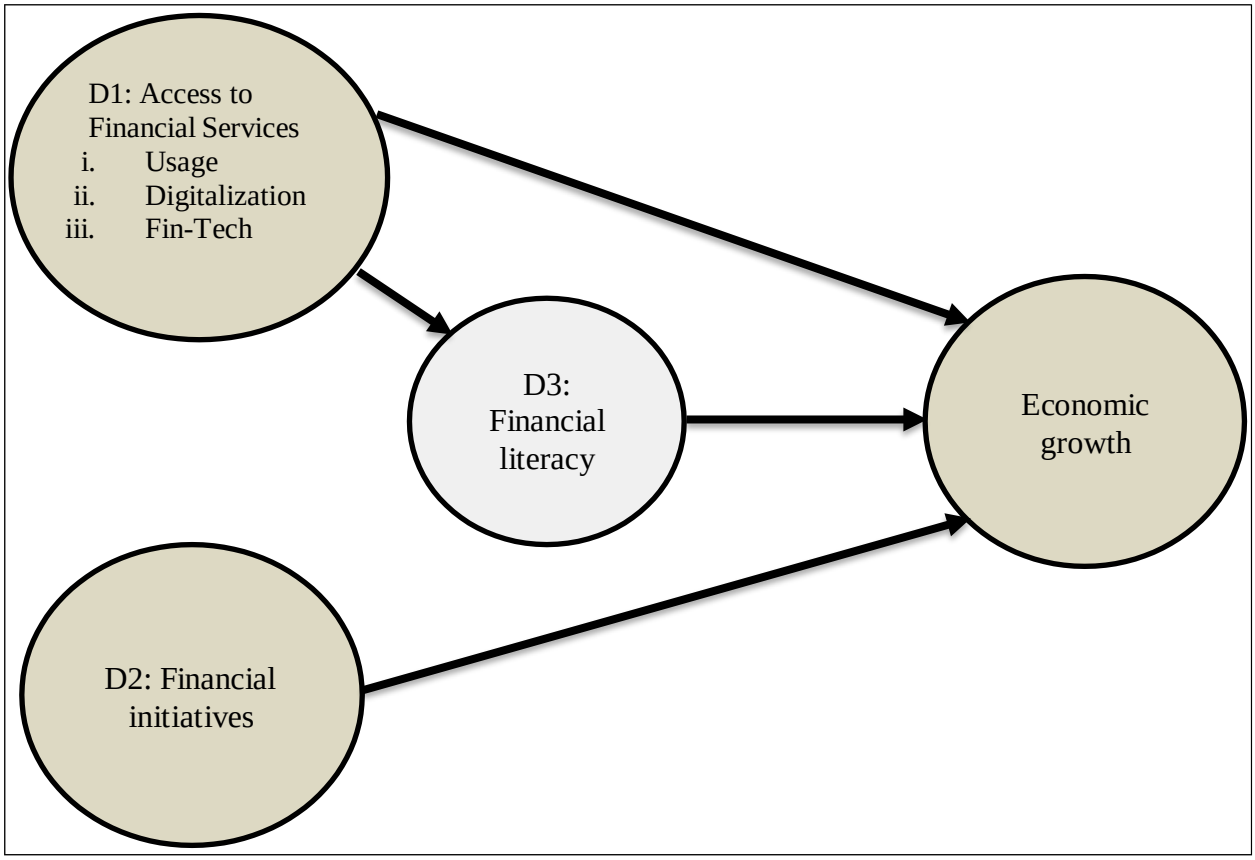
3.5.1 Structural equation modeling

As per Gefen *et al.,* (2000), structural equation modeling (SEM) is a multi-variate statistical method used to investigate the interactions between independent latent variables and endogenous variables. SEM assists in conducting relations among many variables and provides path coefficients, direct and indirect paths; mediation and moderation and performance map analysis, (Gefen *et al*., 2011; Urbach and Ahlemann, 2010). Structural equation modeling permits researchers to assess a model's overall fit and verify the structural model as a whole. SEM evaluates not only the hypothesized structural links between constructs, but also the links between a construct and its corresponding measures (Chin, 1998b; Gefen *et al*., 2000). SEM has benefits over the earlier generation of analytic methods (such as, principal component analysis, factor analysis, or multiple regression). SEM enables researchers to have flexibility, especially when evaluating the interaction between theory and evidence (Chin, 1998a). In fact, it has been discovered that using SEM gives researchers the ability to: i) model relationships between various predictors and criterion variables; ii) create unobservable latent variables; iii) model measurement errors for observed variables; and, iv) statistically test a priori theoretical and measurement assumptions against empirical data.

3.5.2 Partial least square

Herman Wold, an econometrician, invented partial least squares (PLS) in the 1970s (Chin, 1998a). PLS incorporates alternating least squares techniques as an extension of principal component and canonical correlation analysis (Henseler *et al*., 2009). The measurement model and structural model are two sets of linear equations to which the route of PLS models is often applied (Henseler *et al*., 2009). The structural model (i.e., the inner model) describes the relationships between a latent variable and its manifest variables (items), while the measurement model (i.e., the outer model) specifies the links between unobserved or latent variables. PLS-SEM is being used more often in commercial domains such as marketing and finance (Henseler *et al*., 2009). PLS-SEM provides a more reliable structural model assessment. When the CB-SEM distributional assumptions cannot be met, PLS-SEM is considered as a possible alternative method (Hair *et al*., 2011). In order to evaluate the research model, this research applied PLS-SEM technique. The conceptual framework has been depicted through figure 3.1

Figure 3.1: Conceptual framework relating financial inclusion determinants (D1, D2, and D3) and economic growth



Source: Authors compilation

3.6 Research framework of for financial inclusion of BRICS economies

3.6.1 Research design of secondary analysis related with BRICS

In recent years, macroeconomics studies have moved into the dynamic and creative field of economic growth. Economists have been attempting to discover the variables or national policies that influence long-run growth and may allow for greater levels of financial inclusion and economic growth. Changes in these policies seem to explain periods of economic stagnation or rapid economic development (King and Rebelo, 1990). In order to investigate the impact of determinants of financial inclusion on economic growth, this research employed panel analysis technique on data collected from Brazil, Russia, India, China and South Africa (BRICS). In order to mitigate the heterogeneity problem, unlike other empirical studies that encompass a broader spectrum of countries, including both developing and developed nations, we concentrate on the sample of only BRICS nations. These are emerging nations, and the relationship between financial

inclusion and economic growth is vigorously debated, especially in view of FinTech and the digitalization of banks. In addition, the period covered by this research is from 2005 to 2019, as many financial systems in developing nations began to focus more on development due to deregulation in 2004 (Wilson and Purushothaman, 2003).

3.6.2 Description of data

The current research analyses how financial inclusion determinants relate with growth parameters for the BRICS economies. The study has used secondary data, choosing determinants of the FI from World Bank's Global Fin-index database, IMF and balance sheets of BRICS banks. The panel data set consists of all five BRICS nations, covering the period from 2005–2019. The currency value of all countries has been converted to USD. Two dependent variables were considered. Economic growth was measured using gross domestic product (GDP) and gross domestic product (GDP) per capita. Based on a few important studies, the independent variables selected are: i) Depositors (DEPO); ii) ATM per User; iii) Bank Branches (BB); iv) Exchange Rate (ER); v) Inflation Rate (IR); Internet User (INTUSERS); vi) Broad Money (BM) and Domestic credit to private sector by banks (DCPS). The dependent variables are: i) Gross Domestic Product (GDP); ii) Gross Domestic Product per Capita (GDP/CAPITA).

The indicators of the study, along with the literature support, are shown in Table 3.3. Kim *et al*., (2018) included ATM/100,000, BB/100,000 adults and depositors/1000 as the measures of FI. ATMs offer impressive benefits, such as convenience, reduction in transaction costs and reduction of the workload of banks. GDP is the indicator used for economic growth as it is one of the most crucial factors influencing FI (Omar and Inaba, 2020; Sharma, 2016). Domestic credit to the private sector is one of the indicators of FI, which significantly affects economic growth (Olowofeso *et al*., 2015) and has been included as an independent variable. Other indicators such as internet users (Evans & Adeoye, 2016), inflation rate (Rojas-Suarez and Amado, 2016) and population (Omar and Inaba, 2020) have also been considered in the current research.

Table 3.3: Data variables and literature support

S. No	Variables	Independent or Dependent	Source of Data	Literature Support

1.	Depositors (DEPO)	Independent	World bank database	Beck, Kunt and Peria (2007), Kim *et al.*, (2018)
2.	ATM per User	Independent	World bank database	Mbutor & Uba, (2013); Evans (2016); Kim *et al.*, (2018)
3.	Bank Branches (BB)	Independent	World bank database	Sarma (2008), Kim *et al.*, (2018)
4.	Exchange Rate (ER)	Independent	Global Findex	Mbutor & Uba, (2013)
5.	Inflation Rate (IR)	Independent	Global Findex	Evans (2016); Lenka & Bairwa, (2016); Mbutor & Uba, (2013), Kim *et al.*, (2018)
6.	Internet User (INTUSERS)	Independent	World bank database	Polasik and Piotr Wisniewski (2009), Foon and Fah (2011), Chavan, (2013)
7.	Broad Money (BM)	Independent	Global Findex	Wachtel (2003), King and Levine (1993)
8.	Domestic credit to private sector by banks (DCPS)	Independent	World bank database	Nyasha and Odhiambo (2014); Kjosevski (2013)
9.	Gross Domestic Product (GDP)	Dependent	Global Findex	Wong, (2015). Chibba, (2009), Omar and Inaba (2020), Hariharan and Marktanner (2012)
10.	Gross Domestic Product per Capita (GDP/CAPITA)	Dependent	World bank database	Awe and Olawumi, (2012), Kim *et al.*, (2018), Wakdok (2018)

Source: Authors compilation

The determinants mentioned in Table 3.3 provide significant and practical information on how inclusive an economy's financial system. If just one determinant is employed to gauge financial inclusion, the financial system's level of inclusivity will only be partially revealed. The amount of financial inclusion may be misunderstood if a single metric is used. As a result, more than one metric should be utilized to assess the financial system's inclusivity. As per literature support, banking penetration, the presence of bank branches, and deposit and credit utilization are crucial markers used, hence they are also included in the present study for determining the impact of financial inclusion on economic growth.

3.6.3 Estimation and techniques

The research uses panel data analysis to examine how financial inclusion affects the economic development of the BRICS country. A simple panel least squares analysis is done with the fixed effect (FE) and cross-section random effect (CSRE) and without fixed effect and random effect. A panel data set is a collection of longitudinal or temporal cross-sectional data that tracks a number of people across time. Panel data allows us to

distinguish between inter-individual and intra-individual differences by providing sequential observations for several individuals. This enables in building and testing complex behavioural models, than through the single time series or cross-sectional analysis. The accuracy of parameter estimates and prediction is further improved by panel data (Baltagi and Li, 2002; Chamberlain, 1984; Hsiao, 1985; Anderson and Hsiao, 1982), which also offer significantly more degrees of freedom, the ability to control for omitted variable bias, and a reduction in the issue of multicollinearity.

3.7 Chapter summary

Through the present study, banks and the public could detect the vital determinants of financial inclusion in India and the BRICS nations. Focusing on financial inclusion determinants would assist in augmenting financial inclusiveness and promote economic growth. This chapter explains the details of data collection and portrays in detail the research design and methodology adopted in the current research. The chapter also discusses the sample frame, questionnaire design and construct measurement, pilot study and validity and data collection techniques. This chapter outlines the research methods used for designing the comprehensive model of financial inclusion. The chapter portrays various tools and techniques that have been applied to test the hypotheses.

Chapter 4
Data analysis and results

This chapter presents the results of quantitative data analysis, in addition to the demographics of the responses and the sample population. This chapter reports the results of the PLS-SEM analysis using the methodology that has become standard throughout the field and is supported by earlier research (Chin, 2010). To begin, the veracity and dependability of the information and the structural model's validity is determined after the measurement model has been evaluated. Beginning with the evaluation of the measurement model, the convergent, discriminant, and internal consistency validity of reflective constructs were evaluated. Harman's single factor test was used to check common method bias. The significance of the structural model were then evaluated, followed by an evaluation of the model's explanatory power. These analytical results are presented, followed by the findings of this study's hypotheses.

Sections 4.1 to 4.3 deal with analysis based on primary data collected from India. Further, to examine the impact of financial inclusion on the economic growth in BRICS nations, secondary data was used, and the technique applied was panel data analysis. These results are projected through sections 4.4 to 4.7. Section 4.8 deals with discussion of overall results in the light of earlier literature.

4.1 Descriptive statistics

Descriptive statistics are used to characterise the basic properties of the data in study. There are brief descriptions of the sample and the measurements. Descriptive statistics are used to convey quantitative information in an intelligible way. A research study could use many different measures to report the data. In this study to describe the characteristics mean and standard deviation is used. Table 4.1 describes the sample characteristics through mean and standard deviation. The results depict mean and standard deviation of questionnaire items of all scales.

Table 4.1: Mean and standard deviation of variables

Construct and Items	Mean	Standard deviation	Construct and Items	Mean	Standard deviation	Construct and Items	Mean	Standard deviation

Access to Financial Services								
Usage			Digitalization			FinTech		
U.1	4.24	0.82	D.G.1	4.20	0.71	T.G.1	4.38	0.78
U.2	4.08	0.70	D.G.2	4.10	0.74	T.G.2	4.34	0.84
U.3	4.04	0.88	D.G.3	4.07	0.80	T.G.3	3.99	0.71
U.4	4.07	0.81	D.G.4	4.16	0.79	T.G.4	3.98	0.94
U.5	4.11	0.91	D.G.5	4.09	0.81	T.G.5	4.18	0.77
U.6	4.14	1.02	D.G.6	4.12	0.76	T.G.6	4.06	0.81
			D.G.7	4.06	0.79	T.G.7	4.15	0.78
			D.G.8	4.08	0.79	T.G.8	4.10	0.81
			D.G.9	4.22	0.78			
			D.G.10	4.24	0.79			
Financial Literacy								
FL Awareness						FL Competency		
F.A.1	4.00	0.81				F.C.1	4.17	0.73
F.A.2	4.05	0.77				F.C.2	4.21	0.74
F.A.3	4.05	0.80				F.C.3	4.20	0.73
F.A.4	4.02	0.89				F.C.4	4.30	0.75
F.A.5	4.21	0.85				F.C.5	4.14	0.75
F.A.6	4.15	0.80				F.C.6	4.21	0.77
F.A.7	4.22	0.70				F.C.7	4.16	0.77
F.A.8	4.07	0.79				F.C.8	4.25	0.77
F.A.9	4.07	0.69				F.C.9	4.25	0.76
F.A.10	4.13	0.72						
Financial Initiatives								
Financial Policy						Financial Schemes		
F.P.1	4.31	0.77				F.S.1	4.16	0.69
F.P.2	4.12	0.71				F.S.2	4.14	0.73
F.P.3	4.07	0.76				F.S.3	4.14	0.73
F.P.4	4.12	0.79				F.S.4	4.13	0.77
F.P.5	4.12	0.79				F.S.5	4.16	0.71
F.P.6	4.09	0.77				F.S.6	4.12	0.71
F.P.7	4.04	0.83				F.S.7	4.05	0.82
F.P.8	4.07	0.71						
Economic Growth								
E.G.1	4.42	0.72				E.G.5	4.10	0.79
E.G.2	4.04	0.72				E.G.6	4.05	0.74
E.G.3	4.02	0.82				E.G.7	4.09	0.81
E.G.4	3.99	0.79				E.G.8	4.14	0.81

Source: Authors-compilation through SPSS

Table 4.2 summarizes the demographic profile of the respondents included in the survey. Out of the total 1800 users, 58.33% were males, and 41.67% were females. Among the respondents, 43.33% were from rural and 56.67% from urban sectors. Regarding the age group, people above 51 years were less. The majority of respondents were from private-sector banks. There was a dominance of urban respondents in the sample. However, the

sample is a representative sample as per the India statistics, where the urban and male population dominates.

Table 4.2: Demographic profile.

Gender	Number of respondents	Valid percentage
Male	1050	58.33%
Female	750	41.67%
Age		
Less than 35	805	44.72%
35 to 50	625	34.72%
51 and above	370	20.56%
Educational Qualification		
Undergraduates	385	21.38%
Graduates	802	44.56%
Postgraduates	613	34.06%
Category of bank		
Public sector	621	34.05%
Private sector	859	47.72%
Small Finance Institution	320	18.23%
Region		
Rural	780	43.33%
Urban	1020	56..67%

Source: Authors-calculated through SPSS.

Thus, after presenting the sample characteristics and demographic profile, we proceeded ahead with measurement model assessment in section 4.2.

4.2 Measurement model assessment

After determining the features of the sample, an investigation into the suggested measurement model was carried out to validate the hypotheses created. The first step in this process was to evaluate the measuring scale's dependability. In the second step, we validated whether or not there was a link between the variables by analysing the relations the model had predicted would exist. The confirmatory factor analysis (CFA) was performed as an integrated aspect of assessing the measurement model, aiming to validate and refine the items and constructs in the model. Factor loadings of each instrument were

evaluated to determine its convergent validity (CV). Furthermore, the average variance extracted (AVE), composite reliability (CR), Cronbach's Alpha, and variance inflation factor (VIF) of each construct were also examined to determine the validity, reliability, internal consistency, and multicollinearity of the constructs. Individual item's reliability was assessed using the outer loadings, Cronbach Alpha and composite reliability. Composite reliability indicates the loadings of the reflective distinct variables with their associated latent variables. As per Hulland (1999), when the loading is more than 0.70, it shows that the item is reliable. The loadings in this study as depicted in table 4.3. Values for the composite reliability (CR) loadings should be higher than the cut-off of 0.70. (Holmbeck and Devine, 2009).

Table 4.3: Loadings, CR, AVE and Cronbach's Alpha

		Factor loadings	**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Access to Financial Services			0.831	0.841	0.898	0.747
i.	Usage	0.891				
ii.	Digitalization	0.865				
iii.	FinTech	0.836				
Financial Literacy			0.710	0.710	0.865	0.762
i.	FL Awareness	0.845				
ii.	FL Competency	0.900				
Financial Initiatives			0.770	0.777	0.897	0.813
i.	Schemes	0.913				
ii.	Policies	0.890				
Economic Growth			0.869	0.883	0.897	0.524
i.	EG1	0.695				
ii.	EG2	0.652				
iii.	EG3	0.655				
iv.	EG4	0.765				
v.	EG5	0.862				
vi.	EG6	0.700				
vii.	EG7	0.725				
viii.	EG8	0.714				

Source: Authors-calculated through PLS-SEM.

4.2.1 Internal consistency and convergent validity

Internal consistency and reliability are generally evaluated primarily using Cronbach's alpha, with values better than 0.70 demonstrating the dependability of the measured construct (Bonett & Wright, 2015; Hair *et al*., 2017). When utilizing PLS-SEM analysis, composite reliability is the chosen internal consistency metric; scores over 0.70 imply reliability, whereas scores above 0.90 indicate potential multi-collinearity inside the construct (Hair *et al*., 2017). When the measurements are not assumed to be similar, and all indicators are given equal weight, Cronbach's Alpha may understate the internal consistency dependability (Werts *et al.*, 1974). This research uses average variance extracted (AVE) to evaluate the need for reflective constructs' dimensions to be connected, or convergent validity, with values larger than 0.50 suggesting support (Fornell and Larcker, 1981). According to Urbach and Ahlemann (2010), convergent validity refers to the extent to which individual items measuring the same construct converge relative to the items measuring distinct constructs. It can be evaluated using the average variance extracted (AVE) value. As demonstrated in Table 4.3, Cronbach's Alpha, Composite reliability, and AVE results confirm the reflecting constructs' internal consistency and convergent validity, respectively.

4.2.2 Discriminant validity

In this study, Fornell and Larcker's (1981) criterion and cross-loadings are used to measure the discriminant validity of the measuring model. A measurement model has sufficient discriminant validity when: i) the square root of the AVE is higher than the relationships between the measure and all other measures, and ii) an indicator's loading is higher for its own construct than for any other construct. According to Urbach and Ahlemann, (2010), discriminant validity is used to separate measurements of a concept from one another. It also gauges how much overlapping conceptions vary from one another (Hair *et al*., 2014). In contrast to convergent validity, discriminant validity examines if the items accidentally measure something different from the intended concept. As provided in table 4.4, the results fulfil the criteria of discriminant validity as the Square root of AVE values shown diagonally are higher than the correlation of constructs.

Table 4.4 Fornell larker criteria.

	Access to Financial Services	Economic Growth	Financial Initiatives	Financial Literacy
Access to Financial Services	**0.864**			
Economic Growth	0.712	**0.724**		
Financial Initiatives	0.680	0.818	**0.902**	
Financial Literacy	0.882	0.848	0.594	**0.873**

Source: Authors-calculation through PLS-SEM

Heterotrait-monotrait (HTMT) ratio is a robust measure of discriminant validity that is advised to use, especially when performing PLS-SEM analysis (Hair *et al*., 2017), to ascertain whether the constructs of a reflective model are empirically distinct from one another. According to Hair *et al*., (2017) and Henseler *et al*., (2015), HTMT ratios should typically not be higher than 0.85 or 0.90 if the reflective constructs are closely connected. HTMT ratio as shown through Table 4.5, suggest that the cut-off value are below 0.85. All values are in the range of 0.803 to 0.847, hence fulfilling the criteria.

Table 4.5: Heterotrait-monotrait ratio (HTMT).

	Access to Financial Services	Economic Growth	Financial Initiatives	Financial Literacy
Access to Financial Services				
Economic Growth	0.842			
Financial Initiatives	0.847	0.846		
Financial Literacy	0.807	0.805	0.803	

Source: Authors-calculated through PLS-SEM

The next step was to check the outer and inner variance inflation factor (VIF). The VIF values are presented (Table 4.6). As highlighted, the outer and Inner VIF values are less than 3 and in the acceptable range. Thus, the collinearity is low, as indicated by a VIF value lower than 3; thus, no indicator was removed.

Table 4.6: Inner and Outer VIF values

Outer VIF		**Inner VIF**				
			Economic Growth (EG)	Access to Financial Services	Financial Initiatives	Financial Literacy
Digitalization	1.772	Access to Financial Services	2.422		1.000	
EG1	1.778	Economic Growth				
EG2	1.458	Financial Initiatives	1.861			
EG3	1.440	Financial Literacy	2.501			
EG4	2.073					
EG5	2.650					
EG6	1.695					
EG7	1.723					
EG8	1.775					
FL Awareness	1.385					
FL Competency	1.385					
FinTech	1.923					
Financial Policy	1.646					
Financial Schemes	1.646					
Usage	2.357					

Source: Authors-calculated through PLS-SEM

4.2.3 Common method variance

Richardson *et al*. (2009) defines common method variance (CMV) as the "systematic error variance shared among variables measured with and introduced as a function of the same method or source." CMV can be a source of bias when the same respondent gives both independent and dependent data collected on the same instrument, which is common in survey-based research (Eichhorn, 2014). When this difference is big enough, it can lead to common method bias (CMB), which means that the design of the survey tool changes the answers in an unnatural way. This would make it hard to trust the results of the study. Harman's One-Factor Test, also called Harman's Single-Factor Test, has been used to find disproportionate CMV. This test finds the variance explained by a single factor, including all indicators in the model. If the variance is less than 50%, there is no excessive CMV (Tehseen *et al*., 2017). Table 4.7 shows that 38.20% of the difference can be described by

one cause. This is well below the level of 50%, which would show CMB and make the study less reliable.

Table 4.7 Harman's one-factor test

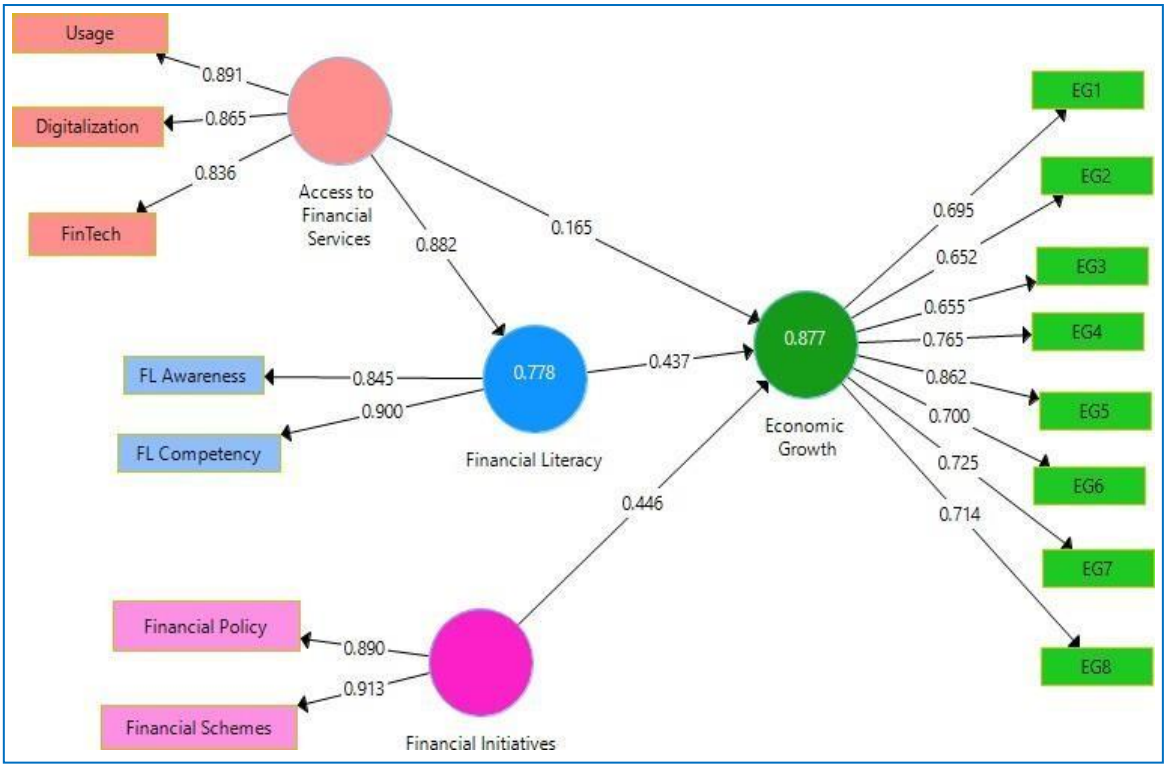
Component	Total	% of Variance	Cumulative Variance %
1.00	28.654	38.205	38.205

Source: Authors-compilation through SPSS.

4.3 Structural model assessment

After the measurement model has been validated effectively, only then is it possible to perform an analysis of the structural model. According to Urbach and Ahlemann (2010), validating the structural model may be helpful in determining, in a systematic manner, whether or not the data support the hypotheses represented by the structural model. An evaluation of a structural model is possible in PLS by using the coefficient of determination (R^2) and the path coefficients. Each path coefficient's effect size is calculated using the f^2 measure to represent how one construct affects the ability of other constructs to explain the phenomena, as reported by (Cohen, 1992; Hair *et al*., 2017).

Figure 4.1: SEM-PLS model relating determinants of financial inclusion with economic growth.



Source: Self compilation through smart PLS-SEM

Next, each endogenous construct's size and significance are assessed using the coefficient of determination (R^2). The study's theorized hypotheses are assessed to accept or reject them based on the structural model analysis. Figure 4.1 presents the findings of the PLS-SEM study and illustrates the composite reliability of the constructs and the route coefficients. In addition to this, the research models postulated mediation interactions are evaluated in this study with the help of Zhao *et al.*, (2010). The evaluation of the coefficient of determination (R^2) for each endogenous latent variable is the most important criteria for determining the quality of the structural model. The coefficient of determination (R^2) reflects the proportion of a latent variable's total variance that the model explains. According to Chin (1998b), a value of R^2 in the vicinity of 0.67 is considered considerable, while values in the vicinity of 0.333 are considered middling quality, and values of 0.19 and below are seen as having inadequate quality. As per Cohen (1988) the value of F^2 for particular independent variable in terms of dependent one is ≥0.02, then the effect size is small, ≥0.15 depict medium effect size and value ≥0.35 shows large effect size.

4.3.1 Coefficient of determination (R^2)

The coefficient of determination's value, also known as R^2, reflects the variation in a dependent variable that can be explained by the factors considered independent. The percentage denotes the amount of variability in the data that the measurement model can explain. This number should be high in order to provide a sufficient explanation for the variation of the endogenous latent variable; hence, a bigger R^2 value improves the structural model's capacity for prediction. In order to calculate the R^2 values for this dissertation, the function of the Smart PLS method was used. The R^2 value for economic growth is 0.877, and the adjusted R^2 is 0.876.

4.3.2 Path coefficients

Before we move to path coefficients, it was essential to check the significance of outer loadings. These have been represented in Table 4.8. The results suggest that all outer loadings are significant.

Table 4.8 Outer loadings of variables

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Usage <- Access to Financial Services	0.891	0.891	0.012	77.263	0.000***
Digitalization<- Access to Financial Services	0.865	0.865	0.013	66.193	0.000***
FinTech <- Access to Financial Services	0.836	0.836	0.018	45.748	0.000***
FL Awareness <- Financial Literacy	0.845	0.850	0.044	19.333	0.000***
FL Competency <- Financial Literacy	0.900	0.904	0.007	122.667	0.000***
Financial Policy <- Financial Initiatives	0.890	0.890	0.010	88.376	0.000***
Financial Schemes <- Financial Initiatives	0.913	0.913	0.006	147.271	0.000***
EG1 <- Economic Growth	0.695	0.695	0.027	25.557	0.000***
EG2 <- Economic Growth	0.652	0.650	0.030	22.028	0.000***
EG3 <- Economic Growth	0.655	0.676	0.074	8.847	0.000***
EG4 <- Economic Growth	0.765	0.766	0.019	39.562	0.000***
EG5 <- Economic Growth	0.862	0.864	0.011	78.008	0.000***
EG6 <- Economic Growth	0.700	0.700	0.024	29.353	0.000***
EG7 <- Economic Growth	0.725	0.724	0.023	30.864	0.000***
EG8 <- Economic Growth	0.714	0.714	0.024	29.795	0.000***

Source : Authors compilation *** p<.001; * p<.01; p*<0.05

Within the framework of the structural model, each path connects two latent variables that collectively stand for a hypothesis. Path coefficients provide the researcher with the ability to validate or invalidate each hypothesis, as well as get a deeper understanding of the nature and extent of the connection that exists between dependent and independent variables. Path coefficients, also known as standardised beta coefficients, are a kind of regression coefficient that may be determined using the ordinary least squares method. In conjunction with t-statistics, the bootstrapping with the subsample of 10,000 approaches is used to ascertain whether or not route coefficients are statistically significant. The path coefficients, t-statistics, and significance levels for all the hypothesized correlations are detailed in Table 4.9. With the use of the findings from the pathway analysis, each submitted hypothesis is either accepted or rejected. The next section will provide these findings in more detail.

Table 4.9: Structural model analysis

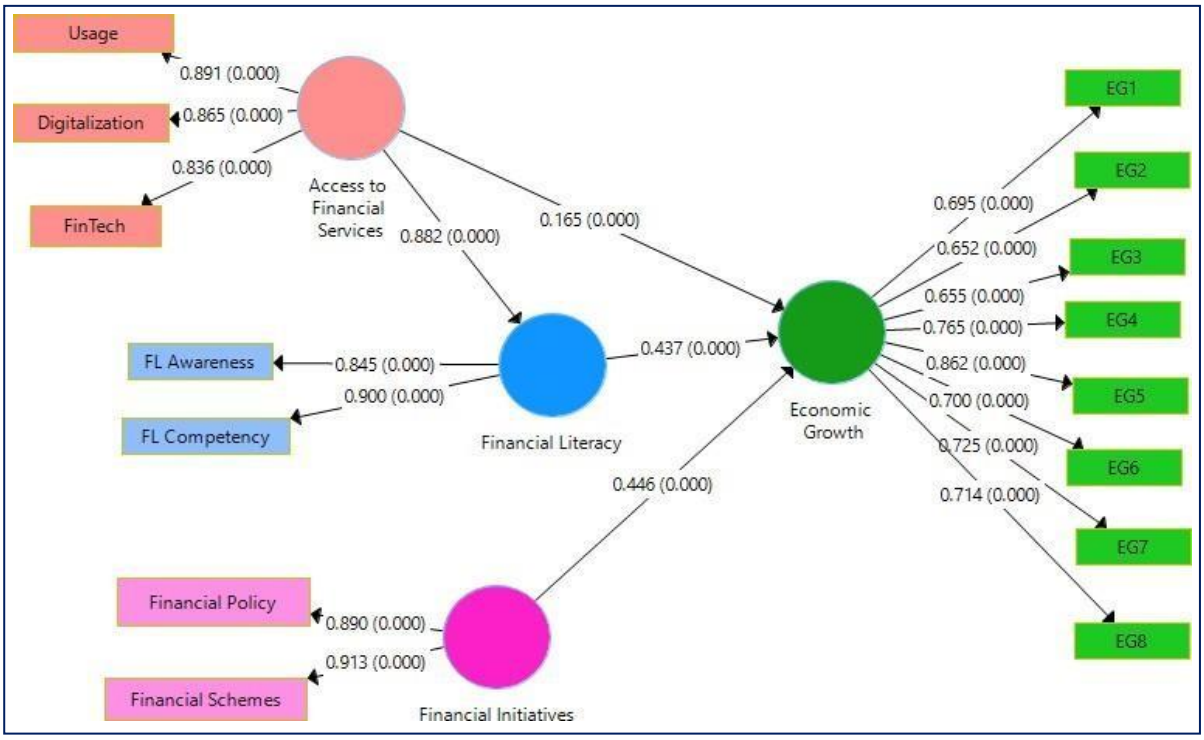
Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistics (|O/STDEV|)	P Values	F^2
Access to Financial Services -> Economic Growth	0.165	0.166	0.044	3.786	0.000***	0.040*
Access to Financial Services -> Financial Literacy	0.882	0.891	0.025	34.905	0.000***	3.500***
Financial Initiatives -> Economic Growth	0.446	0.442	0.031	14.394	0.000***	0.869**
Financial Literacy -> Economic Growth	0.437	0.439	0.038	11.580	0.000***	0.344**
Indirect Effect						
Access to Financial _Services -> Financial Literacy -> Economic Growth	0.385	0.392	0.038	10.041	0.000***	
		R-Square		Adjusted R-Square		
Economic Growth		0.877		0.876		
Financial Literacy		0.778		0.777		

Source: Authors compilation *** p<.001; * p<.01; p*<0.05 [Effect size: * Small; **Medium; ***large]

4.3.3 Testing of hypotheses

The proposed hypotheses and the structural model are put to examined by evaluating the path coefficients between latent variables. A path coefficient value of at least 0.1 is necessary to include a particular effect within the model (Hair *et al*., 2011; Wetzels *et al*., 2009).

Figure 4.2: SEM-PLS bootstrapping model relating determinants of financial inclusion with economic growth.



Source: Authors compilation

Table 4.9, along with Figures 4.1 and 4.2, will help understand the status of the hypotheses. The first hypothesis is *H1: Usage, digitalization and FinTech are important dimensions of access to financial services.* The outer loadings of usage are 0.891 and is significant too. It is highest amongst the first determinant of financial inclusion, viz. i) access to financial services. Hence, we accept *H1a: Usage is an important dimension of access to financial services.* The outer loading of digitalization is 0.865 and significant with p≤.001. Hence *H1b: Digitalization is an important dimension of access to financial services has been empirically supported.* For FinTech, the outer loading of FinTech is 0.836 and significant with p≤.001. This lends support to *H1c: FinTech is an important dimension of access to financial services. Thus, on the basis of outer loadings, we accept H1: Usage, digitalization and FinTech are important dimensions of access to financial services.* For examining the next hypothesis, *H2: Access to financial services (Usage, digitalization and FinTech) is an important determinant of financial inclusion and is positively associated with economic growth,* the Beta value of the relation of a*ccess to financial services* with economic growth was considered. The path coefficient (Beta value) is 0.165 (T-statistics 3.786; $p < 0.001$) are significant. Hence, this lends support to

H2: Access to financial services (Usage, Digitalization and FinTech) is an important determinant of financial inclusion and is positively associated with economic growth.

The next hypothesis, H3: Financial initiatives (Financial schemes and Financial policy is an important determinant of financial inclusion is positively associated with economic growth. As the loadings of financial initiatives' dimensions, *viz.* financial policy (0.890) and financial schemes (0.913), are high and significant, we accept that financial policy and financial schemes are important sub-dimensions of financial initiatives. The path coefficient of *Financial Initiatives-> Economic Growth* is 0.446 *(T: 14.3940;* $p < 0.001$). Thus, *H3: Financial initiatives (Financial schemes and Financial policy) is an important determinant of financial inclusion and is positively associated with economic growth* is empirically supported.

Further, it was time to investigate the association between financial literacy and economic growth. Financial awareness and financial competency, the sub-scales of financial literacy, had outer loadings greater than 0.850. Hence, it can be inferred that financial literacy comprises of FL awareness and FL competency. The literature suggests that financial literacy has a favourable effect on economic growth. Empirical results of our model suggest that for Financial Literacy->Economic Growth, the Beta value is 0.437 (*T: 11.580*; $p < 0.001$); hence *H4: Financial literacy (FL awareness and FL competency) is an important determinant of financial inclusion and is positively associated with economic growth* has been empirically supported.

This study further analyses whether financial literacy mediates between access to financial services and economic growth. For this, the direct path of access to financial services on economic growth and the indirect path through access to financial services with the mediation of financial literacy were considered. The results indicate that access to financial services directly influences economic growth. However, the indirect path coefficient is (0.882*0.437), and the t-statistics is also significant ($p < 0.001$) is higher than the direct effect. Thus, *H5: Financial Literacy mediates between access to financial services and economic growth* has been empirically validated. The outcome of the present study highlights that access to financial services, financial literacy, and financial initiatives, i.e., all three financial inclusion determinants, are positively associated with economic growth. These three determinants explain 87.7 percent of the variation in

economic growth. These results indicate that all three determinants of financial inclusion, viz., access to financial services, financial literacy, and financial initiatives, influence economic growth, although the degree of influence varied. This lends empirical support to *H6:* Access to financial services (with the mediation of *Financial literacy) and financial initiatives are positively associated with economic growth.*

4.4 Data analysis for examining financial inclusion among BRICS nations

The next two objectives are related with examining financial inclusion among BRICS Nations. These were analysed using Secondary data. The related objectives are:

O4: To compare financial inclusion in India with Brazil, Russia, China and South African' economies.
O5: To examine the impact of financial inclusion on the economic growth.

Initially, for comparing the financial inclusion of India with Brazil, Russia, China and South African' economies, the variables included are: i) the number of depositors and ii) ATM/user iii) Broad Money; iv) Bank Branches; v) Domestic credit to private sector by banks; vi) Internet Users; vii) Inflation; viii) Exchange Rate

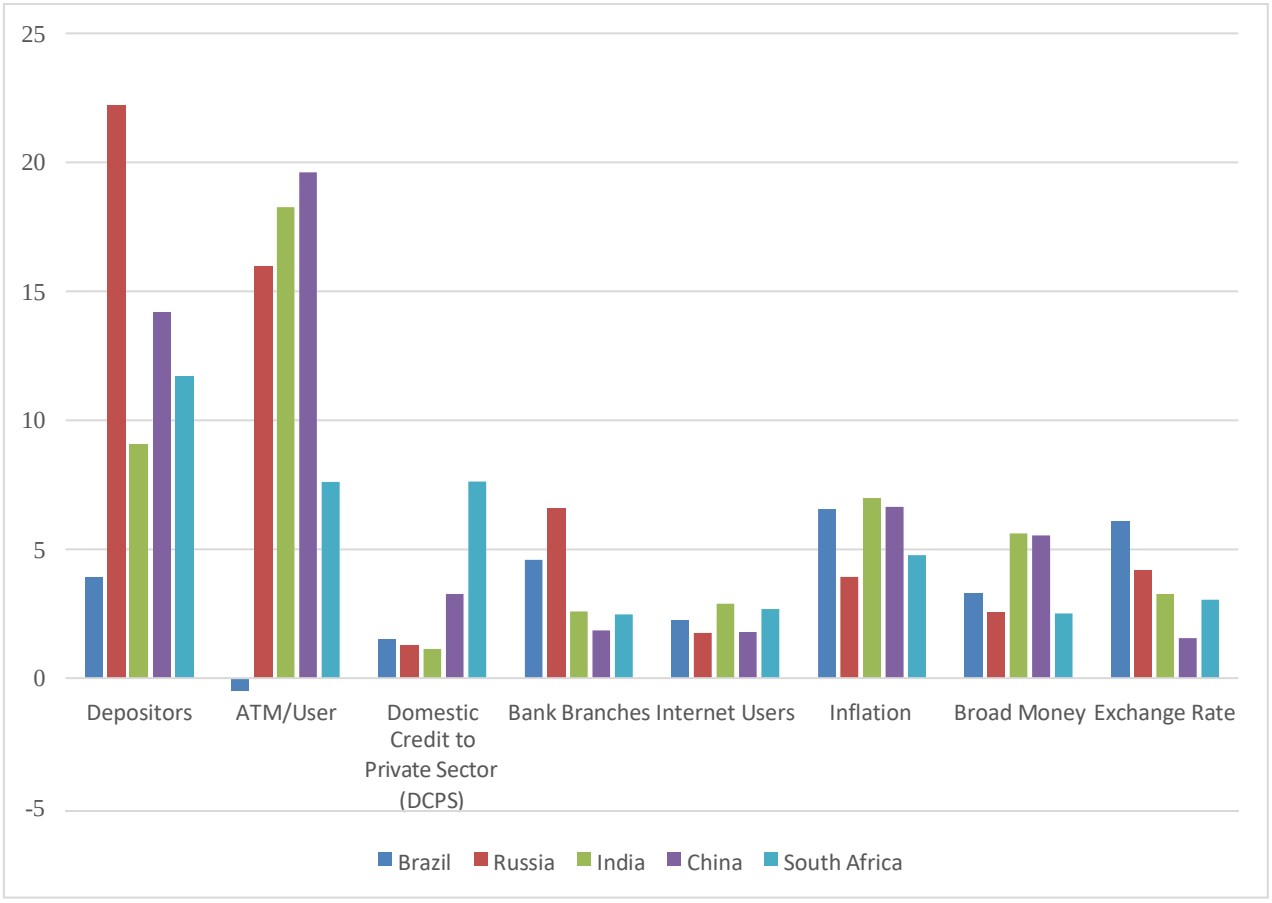
Table 4.10: Cumulative Annual Growth Rates (CAGR) of determinants of financial inclusion (2005-2019)

Determinants of financial inclusion	Brazil	Russia	India	China	South Africa
Depositors	3.91	22.19	9.05	14.18	11.69
ATM/User	-0.49	15.95	18.26	19.61	7.61
Domestic credit to private sector by banks (DCPS)	1.51	1.26	1.14	3.27	7.63
Bank branches	4.59	6.59	2.59	1.86	2.48
Internet users	2.24	1.75	2.89	1.79	2.68
Inflation	6.56	3.93	6.98	6.65	4.77
Broad money	3.31	2.55	5.62	5.54	2.51
Exchange rate	6.10	4.17	3.27	1.56	3.04

Source: Authors compilation

In terms of CAGR, as reflected in table 4.10 and Figure 4.3 for, the number of depositors for 2005-2019, in the case of India, was greater than that of China but lesser than that of other BRICS nations. This suggests that there is a need to improve financial inclusion in terms of the number of depositors. In terms of ATM/user, India had a CAGR of 18.26, which was higher than all BRICS nations except for China. Thus, it was performing well in terms of ATM/user. In the case of the Domestic credit to private sector by banks (DCPS), India had the lowest rate of 1.14, while the highest CAGR was recorded for South Africa (7.63). In the case of institutional financial performance, India was performing below other BRICS nations.

Figure 4.3: Cumulative annual growth rates (CAGR) of determinants of financial inclusion for BRICS (2005-2019)



Source: Authors compilation

In case of Bank Branches, the highest CAGR was recorded for Russia (6.59), followed by Brazil. India performed better than China and South Africa. India recorded the highest

CAGR for Internet users, i.e., 2.89, Followed by South Africa and Brazil. Inflation growth rate was highest in India; the lowest inflation existed in Russia. China and Brazil also had high CAGR in inflation. In Broad Money, India had the highest CAGR, with China closely following it. In the case of exchange rate, Brazil recorded the highest CAGR, followed by Russia and China. Thus, regarding determinants of financial inclusion, a broad picture is presented through CAGR, where we can see how India is performing in other BRICS economies. These broad indicators reflect that India performed well in terms of ATM/user and internet users, while it had to curb high inflation persisting in the economy. Similarly, in Institutional credit, the performance has to improve.

4.5 Specification of panel data analysis model

This section specifies an econometric model used to determine the key indicators influencing financial inclusion through panel unit root test framework with fixed-effect (FE) & cross section random-effect (RE). The stationarity has been checked with unit root using the Levin-Lin-Chu test for pooled t-statistics (Levin Lin and Chu, 2002). The test maintains the equivalent substitute for the coefficient of the 1st serial correlation. Im-Pesaran-Shim test (2003), an extended version of Levin Lin Chu, was used along with augmented Dickey-Fuller (ADF) statistics. ADF fisher unit root test is used as a non-parametric test introduced by (Maddala and Wu, 1999). The last test, Phillips–Perron, (1998), has indeterminate auto-correlation and heteroscedasticity in the error term of the test equation. At the first stage, unit root tests were carried out to check the stationarity of the data series at a level. But none of the variables was found to be stationary at level. Thus, stationarity was checked at the first difference; again, the data series were not found to be stationary at the first difference. At last, stationarity was checked at the second difference, and data series of different variables were found stationary at the second difference. Then model estimation was carried out using fixed effect and cross-section random effect.

4.5.1 Panel data estimation technique with fixed effect

The empirical results are obtained from the panel data approach. Unlike other studies, this research used many indicators for financial inclusion against the single indicator analysis usually undertaken in earlier studies. A panel data model containing a fixed and cross-section random effect set was employed. Generally, panel data fixed effect (FE) is used when we only want to analyse the influence of variables that diverge over a period of

time. FE helps to discover the association between exogenous and endogenous variables in the country (Torres-Reyna, 2007). Each country has its own individual characters that might affect the exogenous or explanatory variables. While applying FE, we accept that something within the single country influences the exogenous or endogenous variables that are required to be controlled, relying on the association between the entity's residual and explanatory variables. FE eliminates the influence of time-invariant descriptions and helps evaluate the exogenous variable's net result on the endogenous variable (Bell and Jones, 2015; Torres-Reyna, 2007). The equation for the fixed effects model is:

Yit = αi + β1Xit + e……4αi (i=1….n) is the intercept for each unit/country (n units/country-specific intercepts).

Yit: dependent variable (DV), with i (unit) & t (time)

Xit: one exogenous/explanatory variable.

β1: coefficient (exogenous variable)

e: error term

4.5.2 Panel data estimation technique with cross-section random effects

In panel data analysis Cross Section Random Effect (CSRE), unlike the FE model, the deviations crossways units/countries are presumed to be accidental and uncorrelated with the predictors considered (Torres-Reyna, 2007). The vital difference between FE and RE is whether the individual effect exemplifies elements associated with the repressors or whether the effects are stochastic (Mátyás and Sevestre, 2008). If dissimilarities across organizations/countries have some influence on the endogenous variable, then RE is recommended. In RE, we embrace time-invariant variables. On the other hand, in the FE model, variables are captivated by the intercept.

The random effects model

Yit = + α +βXit + uit + εit.....5

A: intercept; Yit: Endogenous variable; β: coefficient (exogenous variable); uit: Between organization/country error term; εit: within entry error.

Table 4.11: Panel unit root at level

	ATM	BROMO	DCPB	DEPO	ER	INFL	BB	GDP	IU	GDP/CAP
LLC										

Without C and T	0.32684 (0.6281)	3.31808 (0.0005)	0.36677 (0.6431)	0.70610 (0.7599)	1.15506 (0.8760)	-1.4728 (0.0704)	2.23522 (0.9873)	4.66632 (1.0000)	3.04350 (0.9988)	1.44167 (0.9253)
With C	0.29114 (0.6145)	- 1.84833 (0.0323)	-2.66366 (0.0039)	- 0.66043 (0.2545)	-0.02257 (0.4910)	-3.1003 (0.0010)	-1.07386 (0.1414)	-4.06938 (0.0000)	-2.03749 (0.0208)	2.26243 (0.9882)
With C and T	-0.23702 (0.4063)	-3.55919 (0.0002)	-2.80727 (0.0025)	-0.55701 (0.2888)	-2.92987 (0.0017)	-2.9854 (0.0014)	0.38270 (0.6490)	7.04157 (1.0000)	-1.44517 (0.0742)	-2.34096 (0.0096)
Im, Pesaran and Shin										
With C	0.68005 (0.7518)	0.14983 (0.5596)	-1.36018 (0.0869)	0.08921 (0.5355)	1.60134 (0.9453)	-2.53044 (0.0057)	0.91438 (0.8197)	-2.39184 (0.0084)	-0.71537 (0.2372)	1.15718 (0.8764)
With C and T	0.79904 (0.7879)	-2.07158 (0.4543)	-2.51839 (0.0059)	0.76014(0.7764)	-0.15951 (0.4366)	-1.64375 (0.0500)	1.68105 (0.9536)	0.64289 (0.7399)	0.01205 (0.5048)	0.06183 (0.5247)
ADF										
Without C and T	4.41147 (0.9269)	23.9239 (0.0078)	4.21385 (0.9372)	5.33125 (0.8680)	2.04082 (0.9960)	10.2073 (0.4225)	3.39671 (0.9705)	0.99557 (0.9998)	1.25912 (0.9995)	1.35507 (0.9993)
With C	5.23102 (0.8752)	8.22813 (0.6066)	17.8384 (0.0578)	10.8862 (0.3665)	5.44613 (0.8595)	24.4425 (0.0065)	7.07918 (0.7179)	-2.39184 (0.0084)	8.75204 (0.5558)	12.8012 (0.2350)
With C and T	4.54287 (0.9196)	21.5641 (0.0175)	24.6937 (0.0060)	6.76552 (0.7474)	9.71464 (0.4659)	20.7143 (0.0232)	2.88771 (0.9839)	0.64289 (0.7399)	9.24250 (0.5093)	11.9139 (0.2909)
PP										
Without C and T	4.01676 (0.9466)	25.0919 (0.0052)	1.15780 (0.9997)	7.64835 (0.6631)	3.53607 (0.9659)	13.0559 (0.2206)	2.51960 (0.9906)	4.78824 (0.9049)	0.06774 (1.0000)	0.19986 (1.0000)
With C	5.37814 (0.8645)	6.13870 (0.0000)	21.2901 (0.0192)	9.27011 (0.5067)	5.60904 (0.8470)	28.7323 (0.0014)	3.68676 (0.9604)	27.3641 (0.0023)	4.53168 (0.9202)	55.4211 (0.0000)
With C and T	3.45814 (0.9685)	38.4887 (0.0000)	23.8588 (0.0080)	9.86024 (0.4528)	7.78481 (0.6498)	28.6216 (0.0014)	3.79460 (0.9561)	36.9007 (0.0001)	9.79120 (0.4590)	29.3076 (0.0011)

Source: Authors-compilation through E-views

4.6 Panel unit root estimation results

Table 4.11 represents panel unit root test outcomes. These tests have been performed in 3 ways, i) without intercept & linear trends, ii) with intercept, iii) with intercept and linear trends. The outcome of Levin Lin Cheu indicates that data series of all, except inflation, aren't stationary with p-value >.05. Im Pesaran-Shin outcomes, only inflation highlights stationarity. ADF test shows that the data series of all the variables at the level are non-stationary, as the p-values of all variables are > 0.05. PP outcomes indicate that data series of maximum variables are stationary with a constant; and with constant & linear trends. However, the data series of all the variables without intercept & linear trends doesn't highlight stationarity (p-value>0.05). Overall, panel unit root outcomes at the level show that all the variables' data series don't depict stationarity. Thus, the panel unit root tests have been performed at first difference.

Table 4.12: Panel unit root at first difference

	ATM	BROMO	DCPB	DEPO	ER	INFL	BB	GDP	IU	GDP/CAP

LLC										
Without C and T	-3.78013 (0.0001)	-7.62744 (0.0000)	-5.81522 (0.0000)	-2.56495 (0.0052)	-4.75762 (0.0000)	-8.31360 (0.0000)	-2.88162 (0.0020)	-3.79540 (0.0001)	-1.36430 (0.0862)	-0.86723 (0.1929)
With C	-0.25886 (0.3979)	-6.27145 (0.0000)	-4.11823 (0.0000)	-2.34717 (0.0095)	-5.06406 (0.0000)	-5.44396 (0.0000)	-2.16310 (0.0153)	6.30723 (1.0000)	0.14512 (0.5577)	-4.93348 (0.0000)
With C and T	0.44246 (0.6709)	-6.17816 (0.0000)	-3.20733 (0.0007)	-2.44909 (0.0072)	-6.17223 (0.0000)	-6.50543 (0.0000)	-5.18513 (0.0000)	7.87503 (1.0000)	0.94583 (0.8279)	-6.42527 (0.0000)
Im, Pesaran and Shin										
With C	-0.48205 (0.3149)	-5.26720 (0.0000)	-3.22177 (0.0006)	-1.99542 (0.0230)	-2.74099 (0.0031)	-3.96392 (0.0000)	-1.38160 (0.0835)	-2.63346 (0.0042)	-0.71537 (0.2372)	-2.50266 (0.0062)
With C and T	0.80827 (0.7905)	-4.18023 (0.0000)	-1.58314 (0.0567)	-1.63957 (0.0505)	-2.90158 (0.0019)	-3.13261 (0.0009)	-2.04348 (0.0205)	-2.24169 (0.0125)	0.01205 (0.5048)	-2.82285 (0.0024)
ADF										
Without C and T	24.5628 (0.0062)	57.1137 (0.0000)	41.5438 (0.0000)	24.7923 (0.0058)	32.0170 (0.0004)	60.0266 (0.0000)	25.6692 (0.0042)	33.4518 (0.0002)	8.64844 (0.5658)	37.9984 (0.0000)
With C	9.99553 (0.4409)	44.3973 (0.0000)	29.1725 (0.0012)	20.4108 (0.0256)	25.3696 (0.0047)	33.8269 (0.0002)	15.3635 (0.1194)	24.4633 (0.0065)	15.6604 (0.1098)	24.2136 (0.0071)
With C and T	6.30356 (0.7891)	35.5948 (0.0001)	18.6530 (0.0449)	18.1362 (0.0527)	26.4697 (0.0032)	28.4215 (0.0015)	24.1139 (0.0073)	22.9551 (0.0109)	10.9611 (0.3606)	26.2265 (0.0034)
PP										
Without C and T	47.5743 (0.0000)	85.4238 (0.0000)	42.4539 (0.0000)	36.9399 (0.0001)	37.3885 (0.0000)	71.8665 (0.0000)	38.8583 (0.0000)	65.6003 (0.0000)	11.5017 (0.3198)	33.9374 (0.0002)
With C	26.0590 (0.0037)	92.9263 (0.0000)	32.5817 (0.0003)	39.4505 (0.0000)	24.8026 (0.0057)	51.2138 (0.0000)	25.7772 (0.0041)	66.3438 (0.0000)	29.7460 (0.0009)	28.0836 (0.0018)
With C and T	23.2437 (0.0099)	81.7859 (0.0000)	29.5582 (0.0010)	47.4475 (0.0000)	33.0944 (0.0000)	54.0432 (0.0000)	32.2103 (0.0004)	77.9936 (0.0000)	26.1108 (0.0036)	36.6530 (0.0001)

Source: Authors-compilation through E-views

Table 4.12 represents panel unit root tests at first difference. Levin Lin Cheu outcome at 1st difference indicates that the data series of inflation is only stationary. Im Pesaran-Shin test outcomes indicate that data series of, DCPS, inflation & GDP are stationary at 1st difference for levels with C; and with constant & linear trends. The remaining variables of the data series don't indicate stationarity (p-value > 0.05). For the ADF test, the series are not stationary for depositors, no. of ATMs, exchange rate, population and ATM, however the data series of other variables are stationary at three different levels, i.e., for without C & T, with C; and with C & T. PP (Phillips and Perron, 1988) results indicate significant values at three different levels for all the variables (p-value <0.05). It means the data series of all these variables are stationary at the level. However, the data series of all variables are not found to be significant as per the different panel unit root tests used. So, panel unit root tests have been conducted at the second difference.

Table 4.13: Panel unit root at the second difference

	ATM	BROMO	DCPB	DEPO	ER	INFL	BB	GDP	IU	GDP/ CAP
LLC										
Without C and T	-7.06351 (0.0000)	-11.5389 (0.0000)	-6.99052 (0.0000)	-8.13457 (0.0000)	-12.3809 (0.0000)	-11.0836 (0.0000)	-4.63907 (0.0000)	-11.3691 (0.0000)	-7.98757 (0.0000)	-9.16649 (0.0000)
With C	-0.78466 (0.0006)	-8.29643 (0.0000)	-4.00242 (0.0000)	-4.39278 (0.0000)	-10.9117 (0.0000)	-8.82909 (0.0000)	-5.53047 (0.0000)	-2.01695 (0.0219)	-3.93224 (0.0000)	-8.33739 (0.0000)
With C and T	0.84195 (0.0004)	-6.21769 (0.0000)	-3.06419 (0.0001)	-3.44977 (0.0003)	-10.0960 (0.0000)	-7.24729 (0.0000)	-5.18513 (0.0000)	-2.00431 (0.0225)	-3.21457 (0.0007)	-6.38138 (0.0000)
Im, Pesaran and Shin										
With C	-2.82747 (0.0023)	-6.38285 (0.0000)	-3.21970 (0.0006)	-4.30364 (0.0000)	-7.67876 (0.0000)	-5.43773 (0.0000)	-2.04348 (0.0059)	-5.86351 (0.0000)	-3.51785 (0.0002)	-5.23934 (0.0000)
With C and T	-1.35938 (0.0001)	-4.05150 (0.0000)	-1.86862 (0.0002)	-2.49867 (0.0062)	-6.03694 (0.0000)	-2.92360 (0.0017)	-4.24575 (0.0000)	-2.88170 (0.0020)	-1.68967 (0.0055)	-3.25404 (0.0006)
ADF										
Without C and T	50.5308 (0.0000)	83.5100 (0.0000)	54.7845 (0.0000)	64.2107 (0.0000)	89.3638 (0.0000)	74.5576 (0.0000)	24.1139 (0.0073)	65.5357 (0.0000)	48.3498 (0.0000)	64.4580 (0.0000)
With C	25.7509 (0.0041)	51.9952 (0.0000)	28.4755 (0.0000)	36.5645 (0.0001)	61.2412 (0.0000)	44.9350 (0.0000)	36.5022 (0.0000)	46.1430 (0.0000)	30.8608 (0.0006)	42.7829 (0.0000)
With C and T	16.2314 (0.0000)	34.5980 (0.0001)	19.9358 (0.0005)	23.8571 (0.0080)	47.7555 (0.0000)	29.9309 (0.0009)	24.5245 (0.0063)	28.6121 (0.0014)	20.5301 (0.0006)	28.7167 (0.0014)
PP										
Without C and T	106.806 (0.0000)	96.8135 (0.0000)	77.8665 (0.0000)	82.7894 (0.0000)	103.039 (0.0000)	92.5230 (0.0000)	32.2103 (0.0004)	95.2717 (0.0000)	66.8817 (0.0000)	88.6356 (0.0000)
With C	86.6582 (0.0000)	115.912 (0.0000)	61.1633 (0.0000)	80.0674 (0.0000)	85.8292 (0.0000)	90.7456 (0.0000)	67.0547 (0.0000)	102.562 (0.0000)	46.5675 (0.0000)	71.5694 (0.0000)
With C and T	76.9518(0.0000)	89.3954 (0.0000)	47.3690 (0.0000)	62.9848 (0.0000)	68.3869 (0.0000)	70.0087 (0.0000)	54.6774 (0.0000)	81.2396 (0.0000)	38.4349 (0.0000)	69.6011 (0.0000)

Source: Self-compilation through E-views

As pointed out in Table 4.13, according to ADF, PP and Im, Pesaran and Shin tests, the data series of all variables highlight stationarity at the 2nd difference (p-value<0.05). The outcome of panel unit root indicates that the variables' data series are stationary at 2nd difference. The overall outcome of panel unit root indicates that the variables' data series are stationary at 2nd difference. Thus, having achieved data stationarity, it was considered necessary to proceed with model estimation using fixed and cross-sectional random

effects. Differencing helps stabilize the mean of a time series by removing changes in the level of a time series, reducing trend and seasonality so that it is not dependent on past value (Kwiatkowski *et al*., 1992). The stationarity of the data series reflects that the data series of different variables don't follow the particular trend of different variables used in the study. Since all the variables have been made stationary at the second difference, the data series of all the variables are not going to follow a particular trend and independent variables used in the study would reflect true predictors of dependent variables used in the study. Most forecasting techniques suppose that if the data series of variables is not stationary, then it is made stationary before estimating the model. The economic significance of stationarity is that we can avoid the problem of auto-covariance and auto-correlations and thus allow only explanatory variables to contribute to the variance of the model. Unexpected or strange behaviours, such as t-ratios that do not follow a t-distribution or high r-squared values ascribed to variables that are not at all associated, might result from a lack of stationarity (Bierens and Guo, 1993).

Table 4.14: Panel least squares with cross section random and fixed effect (Gross Domestic Product)

	5.1 WITHOUT FIXED AND RANDOM EFFECT		5.2 FIXED EFFECT		5.3 CROSS-SECTION RANDOM EFFECT	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Depositors	0.865348	12.27608 (0.0000)***	0.359112	5.920658 (0.0000)***	0.338494	4.690617 (0.0000)***
ATM/User	0.167271	2.204455 (0.0310)*	0.579363	9.378088 (0.0000)***	0.514116	7.277239 (0.0000)***
Broad Money	-0.010980	-1.450499 (0.1517)	0.002398	0.745135 (0.4590)	0.002691	0.684221 (0.4962)
Bank Branches	0.058098	9.591037 (0.0000)***	0.000345	0.034875 (0.9723)	0.010777	0.965056 (0.3380)
Domestic credit to private sector by banks	0.007733	3.684194 (0.0005)**	0.001523	0.568166 (0.5720)	0.000770	0.250362 (0.8031)
Internet Users	-0.009069	2.604246 (0.0114)	0.000591	0.408932 (0.6840)	0.000361	0.203678 (0.8392)
Inflation	-0.052154	-3.470043 (0.0009)**	-0.012252	-1.953109 (0.0553)	-0.013072	-1.702101 (0.0934)
Exchange Rate	-0.000227	-0.092646 (0.9265)	-0.013570	-4.519079 (0.0000)***	-0.010678	-3.069719 (0.0031)**
Constant	21.53616	39.97627 (0.0000)***	24.29740	71.36239 (0.0000)***	24.21831	43.61211 (0.0000)***

Cross-section random S.D. / Rho						0.852463 (0.9676)
Idiosyncratic random S.D. / Rho						0.155966 (0.0324)
R-squared		0.912830		0.971655		0.777531
Adjusted R-squared		0.902264		0.966169		0.750565
S.E. of regression		0.317831		0.186993		0.183167
F-statistic		86.39258 (0.0000***)		177.1122 (0.0000)***		28.83382 (0.0000)***

Source: Authors compilation through E-views *** p<.001; * p<.01; p*<0.05

Table 4.14 represents panel data estimation using GDP as the dependent variable. The estimation was conducted without fixed and cross-section RE, with FE and cross-section RE. Model 5.1 reflects results without fixed and cross-section RE. The number of depositors, inflation, and Domestic credit to private sector by banks and bank branches were significant at p-value<0.01). ATM per user and internet user was significant at p-value<0.05. It means all these financial inclusion indicators influence GDP. Exchange rate and broad money shows a negative influence on GDP in the BRICS region. The explanatory power is high (R^2: 0.91), i.e., 91% variance explained by predictors. The model is a good fit, and difference between R-square and adjusted R-square is less than 0.01. The next model 5.2 of panel data estimation deals with FE. Depositors, ATM per user and exchange rate are found to be significant (p-value<0.01), and inflation is significant at 10% (p-value<0.10). Internet users, Domestic credit to private sector by banks, bank branches and broad money negatively impact GDP at a 10% confidence level (p-value<0.10). In the case of FE, the explained variance is quite high (R^2: 0.97) and 97% of FI (GDP) variance is elucidated by predictors. Lesser the difference between R^2 & adj. R^2 authenticates the described variance of the FE model.

Model 5.3 has been developed with a cross-section random effect. In this model, there are eight significant variables. The internet users, depositors and ATM per user are highly influential in BRICS nations. These variables are found to be significant at a 1% level. The result of cross-section RE indicates that heterogeneity across countries doesn't influence the result of panel data estimation. In the cross-section random effect, the associated R-Square is 0.7753. It means around 77.53% of FI (GDP) variance is explained by indicated predictors. The model is a good fit (F: 28.83: p<0.01).

Table 4.15: Panel Least Squares with Cross section Random and Fixed Effect (GDP/Capita)

	6.1 WITHOUT FIXED AND RANDOM EFFECT		6.2 FIXED EFFECT		6.3 CROSS-SECTION RANDOM EFFECT	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Depositors	0.308477	7.308099 (0.0000)***	0.210914	3.464668 (0.0010)**	0.226996	4.064401 (0.0001)**
ATM/User	0.371020	8.165643 (0.0000)***	0.360311	5.811086 (0.0000)***	0.397996	7.346859 (0.0000)***
Broad Money	0.016135	3.559536 (0.0007)	0.002109	0.653106 (0.5161)	0.002114	0.690276 (0.4924)
Bank Branches	0.007605	2.096677 (0.0399)	0.019765	1.991262 (0.0509)*	0.014339	1.680269 (0.0276)
Domestic credit to private sector by banks	0.003567	2.837596 (0.0060)	0.009192	3.415996 (0.0011)**	0.007652	3.241579 (0.0019)**
Internet Users	0.005021	2.407956 (0.0188)*	0.000365	0.251460 (0.8023)	0.000536	0.387937 (0.6993)
Inflation	0.016558	1.839834 (0.0703)	-0.001919	-0.304810 (0.7615)	-0.001167	-0.194992 (0.8460)
Exchange Rate	-0.002521	-1.720817 (0.0900)	-0.004762	-1.580194 (0.1192)	-0.006163	-2.304185 (0.0244)
C	7.981943	24.74315 (0.0000)***	4.983188	14.58253 (0.0000)***	4.994869	12.17675 (0.0000)***
Cross-section random S.D. / Rho						0.656545 (0.9456)
Idiosyncratic random S.D. / Rho						0.157420 (0.0544)
R-squared	0.931809		0.981531			0.697254
Adjusted R-squared	0.923544		0.977956			0.660557
S.E. of regression	0.190319		0.102194			0.110911
F-statistic	112.7346 (0.0000) ***		271.0390 (0.0000) ***			19.00052 (0.0000) ***

Source: Authors compilation with E-views 11, *p value<0.01 ** p value<0.05 ***p value<0.10

Table 4.15 depicts the results of panel least squares without cross-section RE & FE using GDP/Capita as the dependent variable. For panel least squares (Model 6.1), Depositors, ATM/user, Domestic credit to private sector by banks, and Broad Money highlight a

positive & significant impact on GDP/Capita with p-value <0.01. It means that these variables across different BRICS countries encourage growth through financial inclusion. Internet users and bank branches also positively and significantly influence GDP/Capita (p-value<0.05). This reflects that these two variables also encourage financial inclusion in BRICS economies. Exchange rate and Inflation exhibit a negative and insignificant. Thus, Exchange rate and Inflation across different BRICS nations discourage financial inclusion. The results of the panel least square in the case of FE (Model 6.2) are somehow similar to Model 6.1. The depositors, ATM/users, and Domestic credit to private sector by banks are significant in BRICS countries. Bank branches positively and significantly impact GDP/Capita with (p-value<0.05). In the case of simple panel least square (without fixed effect and cross-section random effect) (Model 6.1), the associated R^2: is 0.93 and in FE (Model 6.2), R^2 is 0.98. Thus, FE has higher explanatory power. As depicted by model 4.6, the cross-section random effect results are different from 6.1 and 6.2, i.e., Depositors, ATM/user, and Domestic credit to private sector by banks (p<0.01). It indicates a positive association with GDP/CAPITA as these three variables are significant in all three models. Higher F-statistics of all three models indicate that they are significant (p-value <0.01). These statistics reflect that all three models are good fit models to predict GDP/Capita. The overall results of the status of hypotheses for all models have been highlighted in Table 4.16.

Table 4.16: Status of hypotheses

	Hypotheses	**Results and Decision**		
	Endogenous Variable: GDP	**Model 1**	**Model 2**	**Model 3**
H7	Financial Inclusion determinants (Number of depositors; ATM/Users; Broad Money; Bank Branches; Domestic credit to private sector by banks; Internet users; Inflation, and Exchange Rate) are important predictors of economic growth measured through Gross Domestic Product (GDP).			
H7a	Number of depositors is an important predictor of GDP.	Positive & significant	Positive & significant	Positive & significant
H7b	ATM/User is an important predictor of Gross Domestic Product.	Positive & significant	Positive & significant	Positive & significant
H7c	Broad Money is an important predictor of GDP.	Negative & insignificant	Positive & Insignificant	Positive & Insignificant
H7d	Bank branches are an important predictor of GDP.	Positive & significant	Positive & Insignificant	Positive & Insignificant
H7e	Domestic credit to private sector by banks (DCPB) to private sector is an important predictor of GDP	Positive & significant	Positive & Insignificant	Positive & Insignificant
H7f	Internet users are an important predictor of GDP	Negative &	Positive &	Negative &

		significant	Insignificant	significant
H7g	Inflation is an important predictor of GDP.	Negative & significant	Negative & Significant	Negative & Significant
H7h	Exchange rates are an important predictor of GDP.	Positive & Insignificant	Negative & Significant	Negative & Significant
H7	**Overall Results (Based on Adj. R^2)**	***Empirically Supported***	***Empirically Supported***	***Empirically Supported***
Endogenous Variable: GDP/Capita				
H8	Financial inclusion determinants (Number of depositors; ATM/User; Broad Money; Bank Branches; Domestic credit provided by bank (DCPB); Internet users; Inflation and Exchange Rate) are important predictors of economic growth measured through Gross Domestic Product per Capita (GDP/Capita).			
H8a	Number of depositors is an important predictor of economic growth/Capita	Positive & significant	Positive & significant	Positive & significant
H8b	ATM/User is an important predictor of Gross Domestic Product /Capita.	Positive & significant	Positive & significant	Positive & significant
H8c	Broad Money is an important predictor of Gross Domestic Product /Capita.	Positive & significant	Positive & Insignificant	Positive & Insignificant
H8d	Bank branches are an important predictor of Gross Domestic Product /Capita.	Positive & significant	Positive & Significant	Positive & Significant
H8e	Domestic credit to private sector by banks to private sector is an important predictor of Gross Domestic Product /Capita.	Positive & significant	Positive & significant	Positive & Significant
H8f	Internet users are an important predictor of Gross Domestic Product /Capita.	Positive & significant	Positive & Insignificant	Positive & Insignificant
H8g	Inflation is an important predictor of Gross Domestic Product /Capita.	Positive & Significant	Negative & Insignificant	Negative & Insignificant
H8h	Exchange Rate is an important predictor of Gross Domestic Product /Capita.	Negative & Significant	Negative & Insignificant	Negative & Insignificant
H8	**Overall results (Based on Adj. R^2)**	***Empirically Supported***	***Empirically Supported***	***Empirically Supported***

Source: Authors compilation

4.7 Hausman test

The Hausman test is used to check if the panel model has endogeneity. Using panel data has many benefits over using only cross-sectional or time series data, but it is very important to choose the right model if you want stable results. The Hausman test is one of the ways to figure out which model is best. It tells whether a fixed effects or a cross section random effects model should be used. When choosing a model for panel data, the exogeneity of the independent variables and knowledge of the individual-specific components must be taken into account. Two hypotheses, that is, H7 and H8 tests are utilized to choose the best model. The Hausman test (Table 4.17) was used to check the

presence of endogeneity in the explanatory variables and to examine whether a fixed or random effects model is appropriate.

Table: 4.17.: Hausman Test

Variable	Chi-Square- Statistics	Degree of freedom	Prob.
GDP	5.760992	7	0.6740
GDP/Capita	7.242601	8	0.5633

Source: Authors compilation

The Hausman test is sometimes described as a test for model misspecification. Acceptance of the null hypothesis or failure to reject the null hypothesis indicates that the random model is best suited for the given data series (Sheytanova, 2015). While acceptance of the alternate hypothesis demonstrates that the fixed effect model is best fitted for the given data series (Amini *et al.*, 2012). In the present study, Hausman test is performed two times. First, it is performed by using GDP as a dependent variable. In this case, the associated value of Chi-Square statistics (5.760992) is quite low and the p-value> 0.05, which means the failure to reject the null hypothesis and the rejection of the alternate hypothesis. This indicates that the cross-section random model is a good fit when using GDP as the dependent variable with i) the number of depositors and ii) ATM/user, iii) Broad Money; iv) Bank Branches; v) Domestic credit to private sector by banks; vi) Internet Users; vii) Inflation; viii) Exchange Rate as independent variables. Secondly, the Hausman test uses GDP/Capita) as a dependent variable. Again, in this case, the associated Chi-Square value of the model is (7.242) quite low and the p-value>0.05. In the case of GDP/Capita, the cross-section random effect model is the best-suited model compared to the fixed effect model.

4.8 Discussion

The aggregative result of the study in terms of the status of hypotheses has been shared through Table 4.18.

Table 4.18: Results of hypothesis

Hypotheses	**Status**
H1: Usage, digitalization and FinTech are important dimensions of access to financial services.	*Empirically Supported*

H1a: Usage is important dimension of access to financial services.	*Empirically Supported*
H1b: Digitalization is an important dimension of access to financial services	*Empirically Supported*
H1c: FinTech is an important dimension of access to financial services.	*Empirically Supported*
H2: Access to financial services (Usage, Digitalization and FinTech) is an important determinant of financial inclusion and is positively associated with economic growth.	*Empirically Supported*
H3: Financial initiatives (Financial schemes and Financial policy) is an important determinant of financial inclusion and is positively associated with economic growth	*Empirically Supported*
H4: Financial literacy (FL awareness and FL competency) is an important determinant of financial inclusion and is positively associated with economic growth.	*Empirically Supported*
H5: Financial literacy mediates between access to financial services and economic growth.	*Empirically Supported*
H6: Access to financial services (with mediation of *Financial literacy) and financial initiatives are positively associated with economic growth.*	*Empirically Supported*
H7: Financial inclusion determinants (Number of depositors; ATM/User; Broad Money; Bank Branches; Domestic credit to private sector by banks; Internet users; Inflation and Exchange Rate) are important predictors of economic growth measured through Gross Domestic Product (GDP).	*Empirically Supported*
H8: Financial inclusion determinants (Number of depositors; ATM/User; Broad Money; Bank Branches; Domestic credit to private sector by banks (DCPB); Internet users; Inflation and Exchange Rate) are important predictors of economic growth measured through Gross Domestic Product per Capita (GDP/Capita).	*Empirically Supported*

Source: Authors compilation

The results indicate the status of hypotheses based on primary and secondary data analysis. Hypothesis 7 and 8 are related with Panel data analysis with data from BRICS Nations from 2005-2019. The determinants considered for the study are *i) Access to financial services, ii) Financial Literacy and iii) Financial Initiatives.* The study collected data through questionnaire to cover the status of financial inclusion and the relation of determinants of financial inclusion with economic growth. The initial determinant of financial inclusion considered was access to financial services, with Usage, Digitalization and FinTech as important dimensions. The outcomes highlight Usage, Digitalization and FinTech as important dimensions of access to financial services. Earlier results by Bhandari (2009), has also highlighted usage assisted in access to financial services and hence positively influenced financial inclusion. Further Gu, Lee and Suh, (2009) emphasized trust and usage as important indicators inducing m-banking in emerging economies. The results of the current study emphasize that usage emerges as the most important dimension of access to financial services, followed by digitalization and

FinTech. Kajol, Singh & Paul, (2022) suggest that companies providing digital financial products need not offer this specifying uniqueness and charging excess price. Further, it is highlighted that banks may utilise social media channels to raise necessary awareness by disseminating information about apps. Focusing on this and digitalization will help improve financial inclusiveness and economic performance.

The empirical findings of Duncombe and Boateng, (2009) and Barbu Militaru, (2019) reveal that technological innovations, viz., connectivity, improve access to financial products for the public. This has also been reflected in the current research as FinTech emerges as an important dimension of access to financial services. The thoughts of Kim *et al*., (2018) support the FI-economic development goal nexus for the Organization of Islamic Cooperation (OIC) economies, and similar results were also reverberated by (Sharma, 2016). Other studies have also related financial inclusion with economic growth (Owen and Pereira, 2018). Ryu and Ko, (2020) suggest customers' hesitancy to adopt FinTech, suggesting effort is needed to promote it. This may also be important for stressing the importance of FinTech. Chithra and Selvam (2013) supported a positive relationship between deposit and credit penetration on FI in India. Financial initiatives help boost financial inclusion. The present study highlights a positive relation of financial initiatives on economic growth. This has been endorsed in earlier studies by (Sarma and Pais, 2011 and Fungáčová and Weill, 2015). However, in contrast to earlier studies, presenting a staggered and scattered picture, the present research depicts a holistic picture by relating determinants of financial Inclusion (access to financial services; financial initiatives; and financial literacy) with economic growth measured through customers' perceptions regarding the success of FI through the achievement of economic growth.

The strategic collaboration of FI and financial education leads to the financial stability of society and the economy (Grohmann, Klühs and Menkhoff, 2018). The present study underlines the importance of determinants of financial inclusion, viz i) access to financial services, ii) financial literacy and iii) financial initiatives for economic growth. A strategy toward meaningful financial inclusion is needed to unlock the potential for reducing gender inequalities for dynamizing and sustaining growth. The recent works on financial inclusion underscore that access to financial services and products and the marginalized population can help manage income in a better and more conducive manner (Anand and Chhikara, 2013; Dahiya and Kumar, 2020). This will assist in diminishing poverty (Gul,

Usman and Majeed, 2018; Makina and Walle, 2019) and enhancing economic growth (Nwafor, 2018). However, as Bateman and Chang (2009) indicated, caution may be followed by undue reliance on a traditional model of MFI. This reliance on financial initiatives is essential for sustainable economic growth. This also underlines the importance of financial literacy, as with literacy, the essence of access to financial services can be achieved, and thus is an important step towards promoting economic growth. Hence, from the above analysis, it can be concluded that access to financial services (Usage, Digitalization and FinTech) is an important determinant of financial inclusion and is positively associated with economic growth. Further results have validated the importance of other determinants of financial inclusion, financial literacy and financial initiatives on economic growth. They are positively and significantly influencing economic growth.

The present research demonstrates that financial inclusion enables consumers to use formal financial services and systems to increase their investment and risk management to perform numerous common financial activities more quickly and safely. In comparing financial inclusion determinants of BRICS economies, the CAGR of determinants of financial inclusion highlighted a positive performance in the case of ATM/user. The results indicated a need to improve India's performance in terms of number of depositors. Similarly, for domestic credit to private sector by banks, India's performance was quite insignificant in comparison to other BRICS nations. Institutional finance is one of the most significant growth-promoting factors (Nyasha and Odhiambo, 2014; Kjosevski, 2013). Therefore, it is widely understood that the benefits of rapid growth will not trickle down to the average citizen until all members of society are included in the purview of institutional finance. As a result, the vast majority of people will be denied access to the advantages of rapid development. Therefore, the need for financial inclusion goes beyond only being a political or social need. The findings by Robin, Salim and Bloch, (2018) divulge that the GDP growth effect may not be a key factor for enhancing bank profitability, though CPI inflation has a positive impact on the profitability of the sample banks in Bangladesh. This study considers the policy impact on bank performance and is not reporting a major impact. This highlights the need to examine how institutional banking is related with financial inclusion. Recent research (Beck, Kunt and Peria, 2007; Kim *et al*., 2018) indicates that depositors and ATM per user are affordable and strongly affect development and increase the GDP, hence instilling economic growth. As

highlighted by (Kavitha and Gopinath, 2020; Baijal *et al*., 2012), there is a need to focus on increasing Internet users. Increased access through the internet could go a long way in promoting financial inclusion and economic growth. The results also suggest a dedicated focus to increase the population's awareness and understanding of financial indicators, like the inflation rate and exchange rate in BRICS nations, as highlighted through earlier studies (Mbutor & Uba, 2013; Das *et al*., 2013; Kim *et al*., 2018). The empirical outcome by (Garg & Goyal, 2019) revealed data analytics as an important component of the organizations' dynamic capabilities, and investing in data analytics could offer a competitive advantage.

This study's results may help focus on the selected determinants of financial inclusion to help encourage economic growth. In light of the empirical evidences of the BRICS region, it can be inferred that the increase in access to financial services should include expanding the number of ATMs and bank branches and encouraging people to deposit their savings in banks. This finds support through Corrado and Corrado (2017), indicating that income inequality is mitigated as a result of economic growth. The key to driving development is to increase financial inclusion, which has several advantages for eradicating poverty and fostering prosperity. Hence, in order to evaluate progress, it was crucial to investigate the determinants of financial inclusion across BRICS. Lynn, Lytle and Bobek, (2000) perceive that private banks' financial performance and service orientation are better than state banks, indicating that service orientation may enhance firm performance in transitional economies. Results by Sharma *et al*., (2019) and Katanaev *et al*., (2022) highlighted that Russia and Belarus could learn from the Chinese experience that simultaneous financial system and industry modernization was needed to stimulate economic growth. Data from the US, India, and Japan were examined by Liu (2018) using the event study approach. The results show that stock declines are a result of financial market disruptions; however the severity of the fall differs by country. The outcomes suggest that culture influences planning and preparedness. Economic development levels and market maturity affect the impact, and finance and stock market regulations also have an effect.

4.9 Chapter summary

This chapter is the main essence of the thesis. The chapter provides empirical support to how the study's objectives were achieved through different methods. The study used a

mixed method approach and primary and secondary data to analyse and present a complete picture of financial inclusion in India and in BRICS nations. SEM-PLS analysis helped to achieve the first six objectives, and Panel data analysis helped to create a model relating determinants of financial inclusion with economic growth with reference to BRICS nations. This research was undertaken to analyze the factors influencing the financial inclusion of BRICS economies, using determinants like: i) the number of depositors and ii) ATM/user, iii) Broad Money; iv) Bank Branches; v) Domestic credit to private sector by banks; vi) Internet Users; vii) Inflation; viii) Exchange Rate as explanatory variables. The dependent variables were GDP and GDP/capita in BRICS nations. The study highlights the importance of financial inclusion and indicates the important determinants to achieve economic growth.

Chapter 5
Findings, implications and future research

Financial inclusion is unquestionably a crucial topic, and many economies have recognized the advantages of highly inclusive financial systems. This study contributes to the comprehension of the socio-economic and macroeconomic determinants of financial inclusion. This study sincerely attempts to determine and analyses the factors influencing financial inclusion. The identified factors may not be all conclusive, as the number of potential inclusion-influencing factors is vast. This chapter discusses the main findings based on the researcher's analysis of the nexus between financial inclusion and economic growth in India and BRICS region. In addition, this chapter discusses the study's findings in the context of the research objectives, which aids in drawing conclusions. The chapter also addresses prospective research recommendations and scope.

5.1 Major findings of the study

Since there is a lack of consensus in the research community regarding the influence of financial inclusion on economic growth, this study aims to contribute by examining whether financial inclusion actually has an effect on economic growth. This study's primary research question is whether financial inclusion is essential for economic development. The relation between financial inclusion and economic growth is inconsistently assessed based on the theories and empirical findings. The results of the survey highlighted that all determinants of financial inclusion, viz. access to financial services; financial literacy; and financial initiatives were positively related with economic growth. Similar results reverberated through the secondary data related with BRICS nations. A brief summary of the results are indicated in this section.

Given the prior literature and seeing a gap in earlier studies, we deemed it essential to investigate the relations between the determinants of financial inclusion and economic growth in the context of BRICS nations. In this regard, secondary panel data for these countries from 2005 to 2019 were collected. We ran a panel unit root test using the specified sample time frame and observation nations. This further prompted us to use the Hausman test to do a panel comparison. The latter provided us with the information we needed to respond to the study's research objectives. One important finding from our

analysis is that Bank Branches; ATM/users, number of depositors, Exchange Rate; Inflation Rate; Internet Users; Broad Money and Domestic credit to private sector by banks, greatly impacted economic growth. Additionally, this research discovered actual data confirms Schumacher claim that there is a connection between financial inclusion and economic development, demonstrating that financial inclusion is a significant element in economic growth.

This research highlights the significance of financial inclusion and demonstrates that financial inclusion is a substantial driver of economic growth in our sample nations, illuminating a new facet of the finance-growth connection. Governments and policymakers must thus devise strategies to deal with regulatory issues while simultaneously advancing economic growth in financially inclusive nations through financial inclusion. It would also be easier for policymakers to develop and implement measures that would increase access to financial services, thus helping to lower income inequalities. Social awareness campaigns and statewide efforts should be launched to educate the public on the many advantages of routinely utilizing financial services. Informal transactions decline when financial services are used more often, especially by underprivileged people. The rising cost of such services may be decreased by offering financial services online (via mobile banking and internet banking). Government initiatives like direct benefits transfers to the poorest members of society should be supported since they may increase the unbanked population's usage of formal banking, especially in rural areas. To get individuals to utilize banking services and products, it's important to establish trust and spread awareness of new financial channels. Thus, high loadings of usage, digitalization and fin-tech on access to financial services in primary research and increased impact of No of depositors, ATM/Users in BRICS reflects a shift towards enhancing financial inclusiveness. However, in Institutional credit, there is still a case for improvement.

According to our empirical findings, digital financial inclusion through internet access has a positive effect on GDP per capita. However, traditional financial inclusion has a greater impact on GDP per capita in BRICS countries than digital financial inclusion. The sub-dimensions also indicate that traditional branch access is more reflective than digital access. This was the case due to the BRICS's well-established banking infrastructure, while digital finance access points are in their infancy. In these nations, however, digital

usage impacted economic growth more than traditional usage. This reflects the limitations of credit access in traditional financial inclusion, whereas the digital platform has provided efficient payment and savings methods to those unconnected to formal financial institutions. Second, the income level may play a role in how each financial inclusion disaggregates affects per capita income. Third, increasing the number of ATMs and bank branches encourages people to deposit their savings with banks and encourages businesses to use these to fund investments and operating capital to improve access to financial services. Finally, our findings suggest that improved governance would be most advantageous for nations with relatively low financial access to services. In order to maximize the influence of financial access on economic development, policymakers should establish national plans, programs, and policies targeted at increasing the level of governance.

As lack of financial literacy is one of the factors preventing financial inclusion in India, it was important to examine the role of financial literacy in financial inclusion. Based on the main information gathered from 1800 respondents in 21 Indian cities, we looked at whether financial literacy as a mediator led to higher financial inclusion, thus achieving economic growth. We attempted to determine the relationship between several financial initiatives' variables and economic growth. Our findings indicated a strong relation between outcomes of financial inclusion and financial literacy on economic growth. These findings imply that one's level of financial literacy may significantly influence the use of financial services. In order to comprehend the parameters linked to the greater degree of financial inclusion, we also performed a PLS-SEM. Our findings support financial literacy's positive and significant mediating role between access to financial services and economic growth.

5.2 Policy implications

Access to financial services for everyone remains an important policy goal for developing nations. Access to financial services helps alleviate poverty and disparities while boosting food security and access to health care, among other things. Financial inclusion enables faster, safer and less expensive remittance flows and additional alternatives for leveraging these as sources of productive investment. Financial services that are accessible, inexpensive, and available help the most vulnerable populations, such as women, young people, people experiencing poverty, those living in rural areas, undocumented workers,

migrant workers, and MSMEs, to become more empowered. Despite recent tremendous advances towards financial inclusion, many people remain excluded, especially in developing nations. Several issues, including a lack of discretionary income on the part of prospective users, high service charges, physical distance from service providers, onerous procedures, and a lack of confidence, may restrict access to financial services. In order to ensure that their initiatives to promote financial inclusion are as successful as possible, policymakers and regulators must evaluate these underlying issues. It may also be explored to implement policies that increase consumer empowerment and financial literacy in order to increase demand for financial services.

The COVID-19 pandemic has made it more important to have better access to banking services, but it has also made it harder to do so. Millions of people who rely on these flows for food, schooling, health care, and housing are affected by less money coming in and more people losing their jobs. This makes the economic effects of the pandemic problem even worse. This shows how important it is to put policies on financial inclusion at the top of policy goals, especially in developing countries.

The implementation of digital financial services, such as mobile money, has been especially useful during COVID-19 to get around mobility limitations and problematic value chains. This has been a significant contributor to the improvement of access to financial services. These solutions have shown to be particularly helpful in expanding access to financial services for individuals living in distant and rural regions, young people, and nations not well-served by bank branches' physical networks. Hence, Policymakers might investigate whether there is a need to increase the supply of digital and non-digital financial services via development banks, microfinance providers, or community banks. These institutions can target certain demographic groups more effectively, such as those with low incomes and small and medium-sized enterprises (MSMEs).

The policy consequences of the results are that a BRICS nation does not have a big problem with financial inclusion, as measured through owning a bank account. Thus, the government in these nations could further improve the number of people with official bank accounts by removing hurdles linked to demographics. All of these changes would have an effect in the long run. A study by Fungacova and Weill, (2015) showed that more

official accounts are being used in China compared to Brazil, India, Russia and South Africa. This highlights how important it may be initially to possess a bank account. From a policy point of view, improving countrywide access to wireless internet, smartphones, supporting the provision of safe online financial goods and services could boost financial inclusion, which in turn can help reduce poverty. This could make it easier for people to understand how internet-based banking services work. A study by Evan (2018) on African countries and by Lenka (2018) on South Asian-Association of Regional Cooperation countries highlighted that using the internet and mobile phones positively affected financial inclusion, improving economic growth. In fact, high internet and mobile phone use were linked to more people having access to financial services.

5.3 Practical implications

The findings from this study have several policy implications. Unquestionably, many country-level features and economic aspects must undergo substantial enhancements to increase financial inclusion. Our analysis conclusively demonstrates the importance of determinants of financial inclusion. Countries may focus on these indicators of financial inclusion to enhance financial inclusiveness across the globe. Emerging economies such as India must promote financial inclusion to ensure more people can access banking facilities. As investigated by the study, the variables will benefit policymakers when considering these factors for expanding banking facilities. The current study highlights that the number of internet users is strongly associated with the number of depositors in BRICS economies and may be taken as a strong indicator to promote financial inclusion. Policymakers must initiate the requisite actions to start technology revolution campaigns in their respective countries to enhance the number of internet users. Another important step that the governments must take is to maintain adequate banking facilities as per the population in the respective country. We argue that pursuing these steps concurrently might have significant advantages, including more effective credit resource allocation, increased reliance on the formal, regulated financial sector, and increased access to a broad range of financial goods and services. In addition, our study's results make it abundantly clear that technological advancement is critical to the process of financial inclusion. We suggest that authorities collaborate on developing strategies for reducing the digital divide in our modern societies.

The ecosystem that supports the supply of financial services is another important consideration while developing policies for financial inclusion. The availability of a regulatory and oversight framework and supporting infrastructure like electricity and ICT services is necessary for adequate access to financial services. This underlines the necessity for a combination of policies that strengthens both the delivery of financial services and the supportive environment needed for such services.

Therefore, in order to encourage people and businesses to accept banking goods and services, it is necessary to ensure trust in modern banking networks and their sensitivity via increased financial literacy. For instance, the Indian government successfully increased account ownership by introducing biometric identity cards in 2014 (Barik and Sharma, 2019). In order to include global financial development into their process of economic growth, particularly in the near term, governments should pay greater attention to the Fintech revolution in their economies. Small and medium-sized businesses (SMEs) are also the main forces behind regional development, economic expansion, job creation, and poverty alleviation (Rasheed *et al*., 2019). However, many agree that the biggest obstacle to individuals' and businesses' development is access to money (Cheng Ioannou and Serafeim, 2014). Providing micro-credit via a formal procedure is beneficial to the growth of a country's small and medium-sized enterprise (SME) sector. Compared to other parts of the world, BRICS has higher prevalence of public sector banks. Therefore, public banks may promote inclusive development by reaching out to underserved communities by opening many, subsidized bank branches in outlying locations. It is also crucial at this stage of development for the government to intervene in the distribution of credit and the growth of the financial sector.

However, India requires national policies and strategies on financial literacy. In the majority of developing nations, the central bank has led such initiatives. This study recommends the establishment of a robust ecosystem and policies centred on domestic economics, financial literacy, and financial inclusion. In addition, the government should implement campaigns and programmes to strengthen financial inclusion through its central bank and other government organizations. There is a need for a future-focused national financial education strategy, as the results of this study indicate an important role of financial literacy. Recommendations may be made for efficient structures for public entities to collaborate with the private sector and consider the requirements of financially

excluded and semi-urban populations. Financial literacy and knowledge may assist in avoiding frequent errors and making the right financial decisions. Results of this study support ease of transactions and robust financial product arrangements, as is evident from our empirical analysis suggesting the significance of ATMs. Addressing concerns of banking outreach through bank branches as reported in results. Results also highlight facilitating cross-border payments through the internet, and these measures would enhance financial inclusion.

5.4 Theoretical implications

The empirical findings of the present study specify valuable implications for practitioners. Understanding the constructs in the proposed research model is crucial for promoting financial inclusiveness for bankers in India and bankers in emerging economies. To enhance financial inclusiveness and its transmission to sustainable growth, it is necessary to continue informing customers about changes in digitalization and FinTech. This study also examines the impact of access to financial services on economic growth through the mediation of financial literacy. The research has empirically corroborated the significant & positive impact of access to financial services with the mediation of FL on economic growth. This study has a rich contribution as it also depicts the positive effect of financial initiatives on economic growth. This will help other BRICS economies to have proper initiatives for enhancing growth through financial initiatives focusing on financial policy and schemes.

The introduction of inclusive digital financial services (such as mobile money, online accounts, electronic payments, insurance, and credits) by banks has significantly impacted the economic growth of BRICS nations. Many poor nations presently employ FinTech as one of the new technologies (Arner *et al*., 2020; Senyo and Osabutey, 2020). Since they are currently uncommon in the area, introducing Fintech applications (like PayPal, Paytm, Google-Pay) aids in attracting the younger generation. In order to better serve their clients, both public and commercial organizations actively compete in implementing innovative financial technology based on digital platforms. Due to the expansion of investment and consumption patterns, the country's money circulation is accelerated, resulting in rapid economic development. In terms of environmental factors, rising financial demand, brought on by increased financial inclusion, fosters market competition and increases the comparative benefits of employing financial innovations.

Further, there is a need to focus on the determinants of financial inclusion to enhance its success. These implications will help to highlight the interdependence of access to financial services and financial literacy for achieving economic growth. The relation, as highlighted through the findings, supports sustainable growth's impact. Thus, a segregated policy must be intertwined with financial literacy to enhance financial inclusiveness and sustainable growth.

5.5 Limitations of the study

This study provides empirical evidence of the close positive relationship between financial inclusion and economic growth in only BRICS nations. Specifically, we examined the WDI and FAS data of the World Bank and IMF pertaining to financial inclusion and economic growth. These data demonstrate the clear correlation between financial inclusion and economic growth in BRICS nations. The limitation of the research is that economic growth was measured using gross domestic product (GDP) and gross domestic product (GDP) per capita in a specific nation. The independent variables included in the study are: i) the number of depositors and ii) ATM/user iii) Broad Money; iv) Bank Branches; v) Domestic credit to private sector by banks; vi) Internet Users; vii) Inflation; viii) Exchange Rate as explanatory variables. Future studies can include more variables and other financial inclusion determinants to add depth and enhance its applicability in other developing countries.

There are other limitations to this study as well. First, the growth model lacks institutional controls. The amount of financial inclusion that various institutional frameworks in different countries aim to achieve may impact the strength of the relationship between financial inclusion and economic development. Second, the robust fixed effects estimates did not significantly address the issue of dynamic panel bias, also known as Nickel bias, which seems to be another flaw of this work. These disadvantages motivate intriguing research on financial inclusion and its impact on macroeconomic variables in the future.

In view of the primary analysis of the study's limitations, it can be emphasized that the sample size was constrained by time and resource limits. As with any survey-based research, the replies could have been subject to cognitive bias and recollection problems. We utilized straightforward, impartial questions with short recollection intervals to lessen these biases. In order to lessen these biases, we also thoroughly educated the enumerators

so that they could answer the questions in a straightforward and understandable way. Due to the dearth of available standard questionnaires and variables assessing financial inclusion and financial awareness in the Indian context, the variables and indicators for the financial inclusion and awareness indices were chosen based on earlier literature. The author's definition of the indices was based on the literature on financial inclusion and awareness, which minimized conceptual biases in creating these measures.

5.6 Future research

In addition to providing empirical evidence showing financial inclusion has a positive link with economic development; the results of this study may also aid future research in the field to improve knowledge of the relationship between financial inclusion and economic growth. This is because the results can help expand understanding of the relationship between financial inclusion and economic growth. The favorable relation between mobile phone penetration and financial institution expansion was one of the findings that stood out. As was said before, this proxy was statistically significant, and in addition to that, it was the most significant of the three proxies that suggested a positive association with economic growth. This proxy revealed a positive relation with economic growth.

Despite the study's findings, there are a few areas that we think future research in this field may benefit from and that could be interesting to look into. To start, several fundamental adjustments may be made, such as extending the sample period to include more years or include more nations to collect more observations and, therefore, more data. Change the unit of measurement to months to remedy the issue and fill in any gaps in the data, if there are any. Future research might also be improved by adding other approaches that strengthen the findings and uncover more evidence for them. Future research on the factors with the greatest individual effects on economic development might be fascinating. This could be accomplished by utilizing a test of goodness of fit to determine the extent to which each variable contributes to the explanation of economic growth. Future research could investigate and identify various models that could be applied to the current financial system to make it more inclusive. Future research may be extended to include heuristics, as indicated by Bykov *et al*., (2022). In addition, these models' effects can be discussed to determine an appropriate strategy for reducing financial exclusion in emerging economies.

5.7 Chapter summary

The study's conclusions have consequences for academics, marketers, content creators, and politicians. Based on the shortcomings of the current study presented in this study recommendations for future research are presented. Future research can overcome this study's shortcomings.

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Appendix

Questionnaire

Profile of Respondent & Bank Details		
Section A		
1.	Name of respondent:	
2.	Designation of respondent	
3.	Age:	❑ Less than 35 ❑ 35 to 50 ❑ 51 onwards
4.	Gender:	❑ Male ❑ Female
5.	Educational Qualification	❑ Postgraduate ❑ Graduate ❑ Under Graduate
6.	Income	❑ Less than Rs 5 lakh ❑ Rs 5-10lakh ❑Greater than 10 lakhs
7.	Name of Bank	
8.	Category of the bank	❑ Public sector bank ❑ Private sector bank ❑ Foreign bank
9.	Area where bank is situated	❑Rural ❑ urban ❑semi-urban

Section B

Kindly rate the following on a scale of 1 to 5 with 1 being lowest priority and 5 being highest.

Determinants of Financial Inclusion		
	D1: Access to Financial Services	
	Usage	
i.	Financial inclusion has led to increase in depository accounts.	1 2 3 4 5
ii.	Financial inclusion has led to increase in usage of ATM services.	1 2 3 4 5
iii.	Financial inclusion has led to increase in usage of Credit/Debit services.	1 2 3 4 5
iv.	Financial inclusion has led to increase in usage of mobile banking.	1 2 3 4 5
v.	Financial inclusion has led to increase in Internet Banking.	1 2 3 4 5
vi.	Financial inclusion has led to increase in wire transaction.	1 2 3 4 5
	Digitalization	
i.	Digitalization leads to greater financial inclusion.	1 2 3 4 5
ii.	Digitalization helps to expand basic services to individuals.	1 2 3 4 5
iii.	Digitalization helps poor customers move from cash-based transactions to formal digital financial transactions.	1 2 3 4 5

iv.	Digitalization helps to provide convenient access to diverse range of financial products and services.	1	2	3	4	5
v.	Digitalization helps to expand financial services to non-financial sectors.	1	2	3	4	5
vi.	Digitalization connects people, processes, and things intelligently.	1	2	3	4	5
vii.	Digitalization minimised the risk of loss and theft of financial crimes in terms of cash based transaction.	1	2	3	4	5
viii.	Digitalization promotes digital finance that can lead to examine the impact on banking performance in the country.	1	2	3	4	5
ix.	Digitalization helps to reduce manual paper work and documentation.	1	2	3	4	5
x.	Digitalization helps to reduce the cost of services.	1	2	3	4	5
	FinTech					
i.	Effectively use the power of mediums like a computer, mobile and internet enables people to have the knowledge about financial instruments.	1	2	3	4	5
ii.	**Adoption of the Core Banking Solutions (CBS)** has facilitated customers to avail banking services from any branch of the bank on CBS network.	1	2	3	4	5
iii.	Leveraging mobile phone penetration and mobile phone service have helped bring the unbanked populations into the formal economy.	1	2	3	4	5
iv.	Extensive reach of mobile phones offers an innovative low-cost channel.	1	2	3	4	5
v.	Extensive reach of mobile phones expand the reach of banking and payment services especially to the large section of rural mobile subscribers.	1	2	3	4	5
vi.	Technology has helped to break down geographical constraints.	1	2	3	4	5
vii.	Mobile banking reduces the cost of financial transactions as it involves little or no infrastructure cost to the bank and no additional investment from the customers.	1	2	3	4	5
viii.	Technology made convenient, faster, and secure to avail financial services without any difficulties.	1	2	3	4	5
D2	**Financial inclusion initiatives**					
i.	Financial inclusion policy helps to bridge economic gap between rural and urban India.	1	2	3	4	5
ii.	Financial inclusion policy ensures availability of banking facilities within the reach of every village.	1	2	3	4	5
iii.	Financial inclusion policy ensures the banks to facilitate the opening of accounts by villagers.	1	2	3	4	5
iv.	Financial inclusion policy has allowed financially excluded citizens to invest in education, save and launch businesses.	1	2	3	4	5
v.	Financial inclusion has facilitated the banks to offer need-based credit.	1	2	3	4	5
vi.	Financial inclusion has facilitated an increase in number of	1	2	3	4	5

	products/services offered by the banks.					
vii.	Financial inclusion has facilitated the banks to offer remittance facilities to transfer funds from one place to another	1	2	3	4	5
viii.	Schemes like 'Pradhan Mantri Jan-Dhan Yojana (PMJDY)' have facilitated access to all kinds of financial services to the excluded sections of society.	1	2	3	4	5
ix.	Schemes like PMJDY ensures universal access to bank facilities,	1	2	3	4	5
x.	Schemes like PMJDY have helped increase the level of financial literacy	1	2	3	4	5
xi.	Schemes like PMJDY have helped to provide access to credit, insurance and pension services.	1	2	3	4	5
xii.	Schemes like Pradhan Mantri Suraksha Bima Yojana (PMSBY) Pradhan Mantri Jeevan Jyoti Yojana and Atal Pension Yojana to facilitated the insurance services among poor-people and citizens in the unorganised sector.	1	2	3	4	5
xiii.	Schemes like Pradhan Mantri Vaya Vandana Yojana helped to provide social security at old age.	1	2	3	4	5
xiv.	Financial inclusion has mitigated the exploitation of vulnerable sections by the usurious money lenders by facilitating easy access to formal credit.	1	2	3	4	5
xv.	Kisan Credit Cards (KCC), General Credit Cards (GCC), and other specific products have improved financial inclusion in India.	1	2	3	4	5
D3	**Financial Literacy**					
i.	Financial literacy awareness programs provide basic financial knowledge.	1	2	3	4	5
ii.	Financial literacy awareness programs help people avoid mistakes.	1	2	3	4	5
iii.	Financial literacy awareness programs helps people develop a culture of savings	1	2	3	4	5
iv.	Financial literacy awareness programs enables people to prioritise their needs over wants.	1	2	3	4	5
v.	Financial literacy awareness programs helps in providing knowledge of consumer rights.	1	2	3	4	5
vi.	Financial literacy awareness programs enables people make right financial choices.	1	2	3	4	5
vii.	Financial literacy awareness programs have encouraged women to open bank accounts.	1	2	3	4	5
viii.	Financial literacy awareness programs help reduce gender gap.	1	2	3	4	5
ix.	Financial literacy awareness programs help people use higher-quality products.	1	2	3	4	5
x.	Financial literacy awareness programs help make better decisions.	1	2	3	4	5
xi.	Financial knowledge helps to differentiate financial product and services for personal use.	1	2	3	4	5

xii.	Financial knowledge helps to differentiate financial product and services for business use.	1	2	3	4	5
xiii.	Financial education is the most powerful antidote against risky investment traps.	1	2	3	4	5
xiv.	Financial knowledge brief about how to build a wealth plan custom fitted to your unique values, skills, and resources.	1	2	3	4	5
xv.	Financial knowledge helps people take effective decisions regarding the use and management of money.	1	2	3	4	5
xvi.	Financial literacy helps people understand basic financial concepts like compound interest, EMI etc.	1	2	3	4	5
xvii.	Financial knowledge helps to reduce the risks and assists in risk management	1	2	3	4	5
xviii.	Financial knowledge protects the common person from the elements of market failure, attributable to, de facto, information asymmetries.	1	2	3	4	5
xix.	Financial knowledge helps to diversify your portfolio to increase returns	1	2	3	4	5
	Economic Growth					
i.	Financial inclusion helps to boost the gross domestic product of the economy.	1	2	3	4	5
ii.	Financial inclusion leads to greater economic stability.	1	2	3	4	5
iii.	Financial inclusion provides low-income individuals with the possibility to save for the future and fosters financial stability.	1	2	3	4	5
iv.	Greater levels of financial inclusion facilitate increased participation by different sectors of the economy in the formal financial system.	1	2	3	4	5
v.	Financial inclusion helps in reducing the poverty level or to tackle poverty in an economy.	1	2	3	4	5
vi.	Financial inclusion provides a platform to facilitate increase in aggregate expenditure.	1	2	3	4	5
vii.	Financial inclusion helps to generate higher tax revenue arising from increase in the volume of financial transactions.	1	2	3	4	5
viii.	Financial inclusion provides low-income individuals with the possibility to save for the future and fosters financial stability.	1	2	3	4	5

Publications

Sr. No.	Title of the paper	Authors	Journal	Impact factor
1	Investigating the Impact of Financial Inclusion Drivers, Financial Literacy and Financial Initiatives in Fostering Sustainable Growth in North India.	Amit Pandey, Ravi Kiran, Rakesh Kumar Sharma. *14*(17), 11061, *2022*	SSCI	3.889
2	Investigating the Determinants of Financial Inclusion in BRICS Economies: Panel Data Analysis Using Fixed-Effect and Cross-Section Random Effect.	Amit Pandey, Ravi Kiran, Rakesh Kumar Sharma. *15*(2), 1603, *2023*	SSCI	3.889

Paper presented in conference

S. No.	**Title of paper**	**Year**	**Name and place of conference**
1.	Examining the role of Behavioural factors in promoting financial inclusion and shaping public policy.	2023	***IIM Ahmedabad*** NSE Centre for Behavioral Science. Behavioral Science in Management Conference (BSIM) 2023
2.	Measuring financial inclusion success through drivers of financial inclusion, financial literacy and financial initiatives.	2022	***IIT BOMBAY*** 4th INTERNATIONAL CONFERENCE ON FINANCIAL MARKETS & CORPORATE FINANCE SJMSOM, IIT BOMBAY 7-9 July 2022
3.	Role of financial initiatives with mediation of financial literacy on achieving inclusive green finance (IGF)	2023	***IIT ROORKEE*** International Conference on Sustainable Business Management SBM 2023 in DoMS

	Examining the intricacies of relation of financial initiatives, determinants, usage indicators and their influence on financial inclusion.	2020	***IIM SIRMAUR*** INTERNATIONAL CONFERENCE

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Article

Investigating the Impact of Financial Inclusion Drivers, Financial Literacy and Financial Initiatives in Fostering Sustainable Growth in North India

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Abstract: The present study examines how successful we are in achieving financial inclusiveness, investigating the influence of the drivers of financial inclusion (FI), financial literacy, and financial initiatives on sustainable growth. The drivers of FI considered are digitalization, technology, and usage. This study proceeds with a difference and investigates the impact of the drivers on sustainable growth through the mediation of financial literacy. The basic purpose is to understand whether mediation assists in enhancing the impact of the drivers of FI on sustainable growth. Sustainable growth is measured by knowing customers' perceptions regarding FI success through the achievement of the SDGs, viz., SDGs 1, 3, 5, 8, 9, 10, 11, and 17, especially related to poverty alleviation; removing gender inequality; and promoting industrial growth. The study uses PLS-SEM modeling to investigate the impact of the drivers of FI, financial literacy, and financial initiatives on sustainable growth. The results highlight that usage, digitalization, and FinTech emerged as significant drivers of FI. The study assesses the direct impact of the drivers of FI on sustainable growth and the indirect effect through the mediation of financial literacy. This is indicative of the importance of financial literacy in accentuating the impact of the drivers on sustainable growth. However, financial initiatives positively impact sustainable growth in the northern region of India as well.

Keywords: financial inclusion; financial literacy; sustainable development goals (SDGs); financial policy; digitalization; technology; PLS-SEM

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1. Introduction

Across the globe, there is an increased emphasis on FI, especially in emerging economies, with the motive to enhance economic growth and decrease poverty [1]. However, there are widespread disparities existing worldwide with regard to access to financial services [2]. Many researchers have also highlighted how financial exclusion could hinder people from leading a normal life. According to Carbo Gardener and Molyneux [3], financial access has a robust causal association with social exclusion. Claessens [4] backed this viewpoint on social exclusion. Further, Basu and Srivastava [5] found that 70% of rural marginal/farmers lacked access to bank accounts and 87% lacked access to loans. This is prevailing despite researchers' consensus that financial inclusiveness is a basic pillar of sustainable growth. To tackle the disparity of the reach of financial services to weaker sections and unbanked areas and sectors, many countries are focusing on microfinance agencies [6]. Owing to the deficient infrastructure and poor economic conditions, the rural poor in developing economies end up having lower access to financial services [7]. Bhanot et al. [8] highlighted region-wise disparity and pointed to the low level of FI in the northeast region of India. They pointed at the vital role that could be played by self-help groups (SHGs) and education to improve inclusion. As suggested by Gwalani and Parkhi [9], due to diversity and prevalent diversification, there is a need in India for a more innovative and developed model for growth. Sharma [10] indicated bank branch penetration, availability, and the affordability of financial/banking services as the main dimensions of FI. Liu and

Walheer [11] stress the importance of catching-up effects for countries with lower levels of FI. The authors also claim that governments have improved the climate for FI in the majority of countries. Despite this, the magnitude is relatively smaller; hence, more efforts are needed. Hence, a sustainable development goal (SDGs) has been introduced to achieve financial inclusiveness and sustainable growth in society.

According to a number of studies, poverty and a lack of knowledge about financial services have been shown as the major barriers to formal financial services access. Financial literacy is the possession of knowledge of fundamental financial concepts to manage financial resources [12,13]. Financial literacy assists in the acquisition of skills essential for financial efficiency. However, it is financial knowledge, along with financial competencies, which will help to provide not only the "ability to act" but also an "opportunity to act", Huang et al. [14]. There is a need to examine how financial literacy can be related to achieving FI and sustainable growth. Many financial initiatives and policy change programs were undertaken in India to enhance FI and the economy's growth. In 2014, the government of India commenced Pradhan Mantri Jan Dhan Yojana (PMJDY) for attaining effective FI. As indicated by Poonam and Chaudhry [15], the attainment of FI has improved in many states. Despite this, the country's large populace is still excluded from the formal financial system [16]. Thus, in view of this, it is important to gauge the perception of bank customers to analyze how they relate the success of these initiatives and policies and associate it with sustainable growth.

Thus, our research is figuring out how FI is linked with sustainable growth, which is a crucial question demanding the attention of researchers. A few researchers investigating the relationship have suggested a strong association between financial development and economic growth [17]. Researchers such as Klapper et al. [18] indicate that FI enhances accessibility to credit, encourages investment facilitation along with the entry of new firms and thus improves economic growth. In the long run, FI could generate employment opportunities and ensure economic and financial stability [19]. Wang and Guan [20] highlighted the need for a sound financial system and considered financial literacy and communication technology as important determinants of FI. Greater FI may help to promote inclusive and sustainable economic development, which may result in poverty alleviation along with economic and social growth of the economy [21].

The current FI argument is based on the belief that inclusive financial institutions help people escape poverty by stimulating economic development in their societies [22]. Therefore, to overcome the issue of poverty, the Indian government, with the support of the reserve bank of India, prepared the National Financial Inclusion Strategy (NFIS). The Pradhan Mantri Jan Dhan Yojna (PMJDY) plan was also propelled in 2014 to empower the under-banked/unbanked people [23]. The United Nations sustainable development goals (SDGs) indicate FI as a crucial facilitator for sustainable growth. The United Nations SDGs policy has 17 significant objectives. SDGs 1, 2, 5, 8, and 9 are directly related to FI. SDG-1 stresses that the more inclusive a country's financial institutions are, the more capable its poorer portions will be in achieving their economic aspirations, such as establishing new enterprises and increasing their children's non-cognitive and cognitive development [24]. SDG-2 indicates that financially included farmers can make more investments to give higher yields and better food security. FI assists in providing them with insurance to defend their assets from external shocks. SDG-5 covers gender equality, and it is also entwined with FI, as it will result in women's social-economic development. This will reduce their risk of exploitation in the informal sector and enable them to engage in productive economic activities. With financial constraints and the inability to keep collateral, women often cannot procure loans [25]; and FI will assist in potential financial development possibilities [26]. This will improve household well-being and enable them to invest in the health and education of their kids, too [27].

SDG-8 promotes long-term, inclusive, and sustainable economic development; full and productive employment; and decent work for all people, regardless of their background. Therefore, the formal financial institutions around the world are taking many significant

steps to provide full finance to the needy, small entrepreneurs and those unbanked. Microfinance institutions (MFIs) have been set up and helped by many development agencies all over the world so that these customers who are not banked can get financial help [28]. MFIs have contributed significantly to the development of a self-sustaining financial system for the poor and increased entrepreneurial talent [29] and socio-economic development [30–35]. SDG-8 focuses on fostering sustainable economic growth and full and productive employment, and SDG-9 focuses on supporting innovation and sustainable industrialization.

The fundamental purpose of the current research is to examine the prevailing research on FI and sustainable growth and suggest answers to the following research questions:

RQ1: What are the significant themes of research in this domain?
RQ2: Which drivers influence more in achieving financial inclusiveness?
RQ3: How can drivers of FI with the mediation of financial literacy influence sustainable growth?
RQ4: How are financial initiatives related with sustainable growth?

To find answers to these pertinent questions, the present research was undertaken. Using a survey technique with inputs from customers using bank services, the study examines the major drivers of FI. It attempts to understand how drivers of FI through the mediation of financial literacy (FL) influence sustainable growth. It also attempts to investigate the financial initiative's direct impact on sustainable growth. The study uses a Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique to relate drivers of FI, FL, and financial initiative with sustainable growth measured through the achievement of the SDGs.

The related research objectives are:

O1: To identify the impact of the drivers of FI on sustainable growth.
O2: To analyze financial literacy's mediation effect between the FI drivers and sustainable growth.
O3: To investigate the impact of financial initiatives on sustainable growth.
O4: To design a model relating the drivers of FI, financial literacy, and financial initiatives with sustainable growth.

Section 1 introduces the concept of FI, financial literacy, and financial initiatives on sustainable growth. Based on the need for the study, it raises the research questions. Section 2 examines FI from the perspective of the drivers of FI, such as technology, usage, and digitalization. This section also reviews the financial initiatives covering financial programs and policy. Section 3 highlights the research design and methods used to achieve the objectives. Section 4 presents the measurement and structural model. Two control variables were used, and the results are reflected through the two models; the second model is with the control variables. The study designs a PLS-SEM model to examine the impact of the FI drivers through financial literacy and financial initiatives on sustainable growth. Section 5 covers the discussion and conclusions section, reporting the new findings and a comparison with research in a similar area. The last section suggests the implications, limitations, and areas for future research.

2. Review of Literature and Hypothesis Development

The study covers a comprehensive review to lay the foundation for the conceptual model. The review of the literature in the current research has been classified under the following headings:

2.1. Drivers of FI

2.1.1. Usage

Swamy [36] applauded the FI efforts of India's government, especially from 1991 to 2005, to make banks reach out to rural areas. Bassant [37] highlighted that for achieving growth with equality, commercial banks must opt for cost-effective technology, such as zero-balance bank accounts, point of sale, mobile banking, and ATMs. Consequently, Camara and Tuesta [38] covered three dimensions of FI: usage, access, and barriers. Usage covers having a financial product, a savings account, and a loan. Access covered the

approachability of ATMs, the no. of bank branches, and financial products and services. Barriers included affordability, documentation, distance, and trust. Gine and Townsend [39] revealed a positive linkage between economic development and geographic outreach. Beck et al. [40] considered outreach through access and usage dimensions, and they concluded that usage plays the most prominent role and enables customers to facilitate payments through a debit card and through a savings account, and it allows for asset purchasing, owning a home, educating children, and also to maintain reserves for retirement. Allen et al. [41] cogitate FI through the usage of formal deposit accounts. A stream of thought has focused on the usage of and access to formal financial services [42–44]. In light of these, it is pertinent to consider usage in the present study. Therefore, the related hypothesis is:

H1a. *The usage indicator is positively associated with financial inclusion.*

2.1.2. Digitalization

The introduction of information and communication technologies (ICTs) and m-banking has given a new face to digitalization [45,46]. Similarly, Demombynes and Thegeya [47] concluded that m-banking with the latest financial services helped transform the lives of the Kenyan population. Many countries have initiated digitalization through ICTs to provide fast, cheap, and accessible financial services. There are many examples of countries using ICT as a medium like mobile money: CELPAY in Zambia; M-PESA in Kenya; and WIZZIT in South Africa. In India, we have the facility of cash transfer through (UIADI) Aadhar and the Unified Payments Interface (UPI). Thus, it is evident that digitalization is an essential driver of FI. GPFI [48] reported that digitalization encourages the user to access digital services and financial products efficiently. The ease of access through digitalization will remove the barriers to FI. Ghosh [49] has reaffirmed that the (Adhar) biometric identification system, with its linkage to bank accounts and other financial services, has a positive influence on FI.

Similarly, Onaolapo [50] suggested that FI can be delivered smoothly in the country through information and communication technology (ICT). Thus, the literature indicates that digitalization is playing an essential role in establishing a financial network in society. Financial technology, including digital payments and mobile money accounts, has helped boost FI [51,52]. Therefore, we have taken digitalization as one of the drivers of FI. Hence, we hypothesize:

H1b. *Digitalization is positively associated with financial inclusion.*

2.1.3. FinTech

Financial Technology (FinTech) is the new technology to improve and automate the delivery and use of financial services. The first wave of FinTech ushered in innovation across all phases of the customer life cycle; however, the reach was limited to the affluent sections of society. Thus, it becomes evident that without considering FinTech as a driver of FI, the research may not be complete. Point-of-sale devices and networks communicate between the post office agent, retail agent, and financial service provider. Fintech, along with fund transfer and the payment of bills, also facilitates online trading and mutual fund investment [53]. Though massive efforts are being taken to push digital payments, the picture is rather gloomy as only 2% of merchants enabled point-of-sale-based cashless payments [54]. Thus, as technology changes very fast, it was thought to understand from the customer's perspective how relevant FinTech was in inducing a change in FI. As the target population approached a rural segment too, it was pertinent to include their opinion and draw a unified perception of urban and rural customers.

Moreover, the focus of FinTech is changing from facilitating e-payments or transactions to building a relationship. Based on these views, in the current study, it was considered a separate driver of FI and digitalization was taken to have customers' perceptions regarding digital financial services. Kass-Hanna et al. [55] suggest that national FI strategies continue to lean toward digital finance with the FinTech movement.

Therefore, we hypothesize that:

H1c. *FinTech is positively associated with financial inclusion.*

Thus, the first hypothesis is:

H1. *Usage, digitalization, and FinTech are positively associated with FI.*

After reviewing the drivers of financial inclusion, the following section deals with financial literacy.

2.2. Review of Financial Literacy

Financial literacy (FL) enables financial planning and also assists in making effective financial decisions [56]. In view of Lusardi and Mitchell [57], financially sound people were more effective in financial planning and debt management. Lusardi et al. [12] opined that financially literate individuals have better knowledge about how to generate, spend, invest, and save money. Similarly, Grohmann et al. [58] related the expansion of bank branches in rural and urban areas to be associated with improved financial literacy and enhanced FI. Researchers across the globe believe that FI can be achieved through financial competencies by improving financial literacy. However, Atkinson and Messy [59] considered a low level of financial skill and knowledge as the major reason for lower levels of FI in any economy. They recommended that policymakers induce banks and financial institutions to conduct training programs to improve the FI level. Ramakrishna and Trivedi [60] recognized that technology positively influences FI. This was also reverberated by Rastogi and Ragabiruntha [61]. Innovation and technology through literacy can intensify FI, because it can circumvent prevailing structural and infrastructural challenges and directly reach the needy ones [62]. Thus, that is the reason we have taken financial literacy as a mediating variable. Okello et al. [63] have also used financial literacy as a mediator between social networks and FI. Both the direct and indirect effects of FL with FI emerge as significant, which indicates the important role played by FL in FI. Taking this as a pointer for future research, we want to examine the mediation effect of FL between the drivers and sustainable growth in this study. The drivers of FI with the mediation of FL should lead to sustainable growth. Hence, we hypothesize that:

H2. *Financial literacy mediates between the drivers of financial inclusion and sustainable growth.*

Next, the research examines the relation of the financial initiative on sustainable growth.

2.3. Financial Initiatives

The financial initiatives may play a critical part in the development of FI by allowing the nation to be financially accessible to all people. In the study, financial schemes and policies have been examined to provide enabling environments that are financially well sound. The literature related with financial policy and financial schemes has been presented in this section.

2.3.1. Financial Schemes

Many national and international institutions are leading major policy initiatives and schemes to bridge the gap between FI. Around 35 countries have adopted a National Financial Inclusion Strategy (NFIS) to accelerate sustainable growth. Some countries have modified and restructured their NFIS [64]. In India, major steps have been initiated by RBI in Basil-III norms. Along with increased regulations and supervision of financial institutions, there is a need for the expansion of bank branches in unbanked/rural areas. Policy changes are being introduced for safer banking, risk management, and for accelerating liquidity [65].

Moreover, Italy is an example where poverty levels are reduced through various schemes [66]. Other schemes related with easy access to financial services and zero-balance savings accounts offered by the Nepal government to female heads of households led

to around 84% of women opening their B/As [67]. Similarly, the Indian government has initiated several programs like Pradhan Mantri Jan Dhan Yojna. Therefore, we have analyzed whether financial initiatives taken in India have been helpful in achieving FI and sustainable growth.

Kaboski and Townsend [68] indicated that the Thailand government has taken the initiative to provide micro-credit loans to rural areas by introducing the "Village Fund Program". The Reserve Bank of India, in 2006, permitted banks to use intermediaries as business facilitators (BFs) or business correspondents (BCs) for delivering financial/banking services. Joshi [69] has highlighted a significant role played by financial intermediaries in FI. As indicated by Dugyala [70], reinforcing the initiatives of financial intermediaries such as microfinance institutions and banks is needed. RBI initiated to encourage savings for the Chiller bank program in 2015 to encourage children to open and operate savings bank accounts independently.

2.3.2. Financial Policy

FI has been widely accepted as a goal for the financial sector and economic growth during the last several years by policymakers throughout the world. Cohen [71] opined that government and financial institutions should make effective policies, especially on FL in rural and urban areas, for financial intermediaries' involvement. The financial intermediaries and banking channels can deliver financial literacy programs effectively [72]. The Reserve Bank of India focuses on unique programs and policies to successfully achieve FI in the country. It employs a bank-led approach, such as Basic Savings Bank Deposits (BDSD) accounts for the economically disadvantaged, simple Know Your Client (KYC) norms, and directions to open more bank branches in rural areas. The common service centers (CSC) have been set up in rural areas, providing electronic commercial services and e-governance to rural residents. Therefore, financial policies play an essential role in attaining FI and fostering sustainable growth.

The related hypotheses are:

H3. *Financial schemes and financial policy have a positive relation and are sub-dimensions of financial initiatives.*

H4. *There is a positive relation between financial initiatives and sustainable growth.*

The current research has used sustainable growth measured through SDGs 1, 3, 5, 8, 9, 10, 11, and 17 as a dependent variable. Thus, examining the existing literature on sustainable development goals and how the drivers of FI, financial literacy and financial initiatives are related to sustainable growth is mandatory.

2.4. Sustainable Growth

The basic purpose of any economy is to have sustainable growth, which offers basic financial services to unbanked and rural areas and reduces disparities. SDG-1 focuses on eliminating extreme poverty. It also states that the poor and the vulnerable should have equal rights to access financial services, including microfinance. Similarly, SDG-5 is about promoting gender equality. Access to financial services, such as credit, helps women assert their economic power [25]. We would also like to refer to SDG-9, promoting innovation and sustainable industrialization. Sustainable growth advocates equitable opportunities for people during economic growth. It ensures benefits for all income groups.

Examining the researchers' perspectives on economic development in sustainable and inclusive growth is necessary. McKinnon and Shaw [73] concluded that expanding bank branches in rural/urban areas positively affects economic growth. Levine [74] and Beck et al. [40] also found a well-established financial system to be positively linked with the economy's growth. Khan [75] supported that a well-defined financial system encourages investment and promotes growth. Indeed, Bertram et al. [76] concluded that FI served as a prerequisite for inclusive economic development in Nigeria. Hariharan

and Marktanner [77] supported the impact of FI economic growth and development as they observed a high positive correlation between FI and total factor productivity (TFP), which translates to growth. The same thoughts were reverberated by Kim et al. [78] in their research of 55 member countries of the Organization of Islamic Cooperation (OIC), where a positive relation of FI was observed with economic growth. Park and Mercado [79] found FI to be positively correlated with per capita income. Ibor et al. [80], in a study on Bangladesh, concluded that financial inclusiveness has helped in alleviating poverty and an improvement of living standards.

However, Zins and Weill [81] used a probit model on 37 African countries and found that educated, richer, and older individuals are more financially included. Access to formal financial services in an economy provide new and equal opportunity for investment for individuals/businessmen [82]. Increased FI improved indicators such as income, the standard of living, health, education, and poverty reduction [83]. Thus, it becomes essential to find out how FI drivers and financial initiatives have helped in achieving sustainable growth. Sustainable growth has been measured by the customer's perception regarding how FI helps in achieving dimensions covering aspects from reducing inequalities and enhancing health to fostering growth and innovation through SDGs 1, 3, 4, 5, 8, 9, 10, 11, and 17. SDGs were adopted in 2015 by the United Nations (UN) with the aim of ending human poverty in all of its forms in the world. Access to formal financing assists in achieving broader goals, such as ending poverty (SDG-1), improving health and education (SDGs 3 and 4), reducing gender inequality (SDG-5); improving entrepreneurial activity and innovation and growth (SDGs 8 and 9) [84–86]. SDG-10 is about reducing inequality SDG-11; making cities and other places where people live safe, resilient, and sustainable is related to SDG-17, i.e., reinvigorating the global cooperation for sustainable development by strengthening the implementation mechanisms. The study will also be able to focus on which SDG has a higher loading in sustainable growth as per the customer's perception. There are SLR studies covering FI and SDGs; however, such a study covering a survey-based analysis has not been undertaken. Thus, the related hypothesis is:

H5. *Sustainable growth is measured through the consumer's perception of how FI helps in achieving dimensions covering aspects from reducing inequalities and enhancing health to fostering growth and innovation through various SDGs, viz., SDGs 1, 3, 5, 8, 9, 10, 11, and 17.*

H6. *Drivers of FI with the mediation of financial literacy and financial initiatives positively influence sustainable growth.*

3. Research Design and Methodology

Research design and methodology section covers research framework, data, research methodology, and operationalization.

3.1. Research Framework

There are no synergies regarding FI drivers, financial literacy, financial initiative, and sustainable growth. The outcomes of drivers of FI and their impact on sustainable growth vary significantly, which was the prime reason for undertaking the current study. We theorize that drivers of FI are positively related to sustainable growth. This relation is strengthened through the mediation effect of financial literacy. We also theorize that there is a positive relation between financial initiatives and sustainable growth. The research framework is presented in Figure 1.

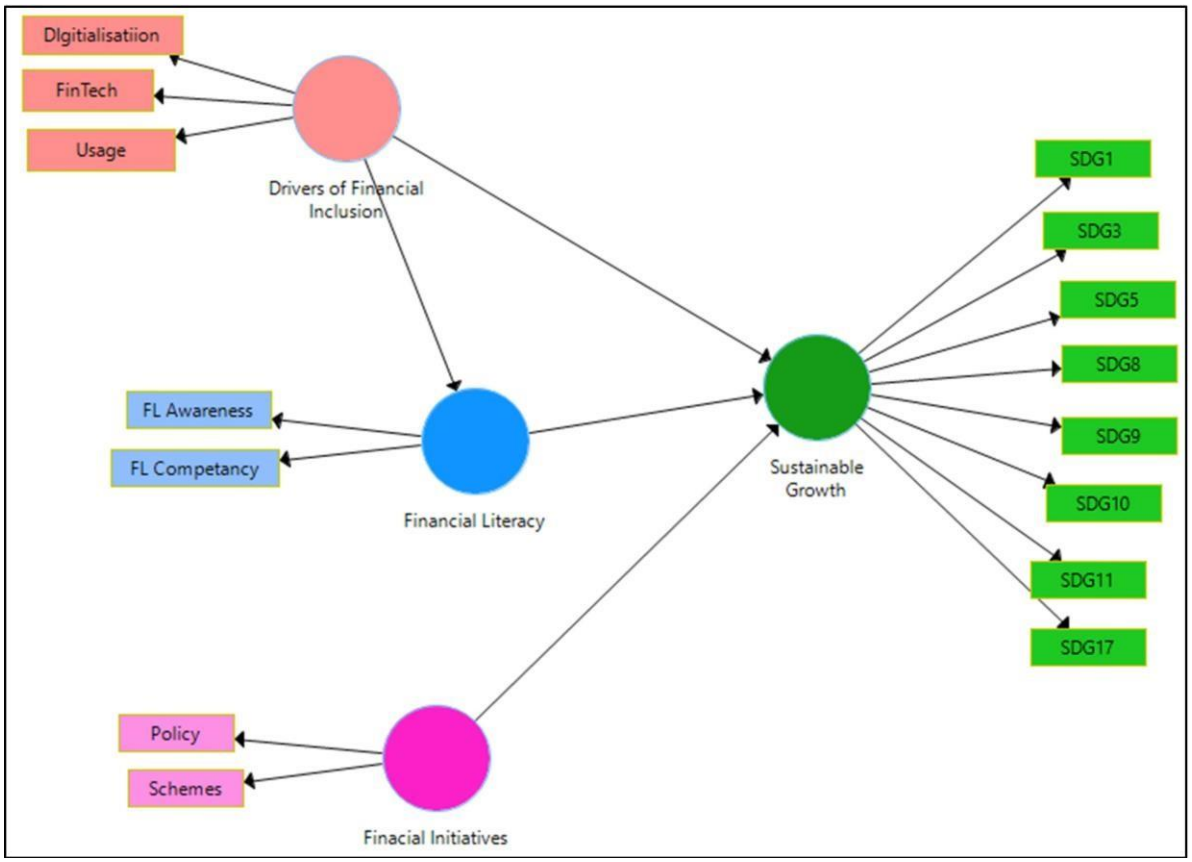

Figure 1. Research framework. Source: Author's creation.

3.2. Data

A cross-sectional design was used for this research and data were collected through a structured questionnaire from customers. The data collection timeline was from August 2019 to October 2020. The population for this research was drawn from customers from different north Indian states, which are Haryana, Punjab, Himachal Pradesh, New Delhi, Chandigarh, and Uttarakhand. The study used a 5-point Likert scale survey. To ensure the questionnaire's content validity, it was first delivered to a convenience sample of 90 persons. Academicians and business professionals were included in this pilot group. The feedback from the pilot group was used to improve the questionnaire. The pilot group also recommended adding a few items in drivers of FI to cover developing nations still in their development stage. We distributed 1993 surveys and received 1325 replies, resulting in a response rate of 66.4 percent. To represent the overall population, the sample included both urban and rural locations, genders, graduates and postgraduates, service class persons, and self-employed people. The attempt was made via revisits to increase sample participation. This was possible after the researcher personally visited banks to collect customer data, and a third party was not employed.

Table 1 summarizes the characteristics of the customers surveyed. Out of the total 1325 users, 51% were males and 49% were females. Among the respondents, 37% were from rural and 63% from urban sectors. Regarding age group, the people above 51 years were less. The majority of respondents were from private sector banks. There was a dominance of urban respondents in the sample. However, the sample is a representative sample as per the North India statistics, where there is a dominance of the urban and male population.

Table 1. Demographic detail.

	Number of Respondents	Valid Percentage
Gender		
Male	676	64.7%
Female	649	35.3%
Age		
Less than 35	505	38.11%
35 to 50	555	41.8%
51 and above	265	20%
Educational Qualification		
Undergraduates	284	21.43%
Graduates	602	45.43%
Postgraduates	439	33.13%
Category of bank		
Public sector	452	34.11%
Private sector	735	55.47%
Small finance institution	138	10.41%
Region		
Rural	490	36.98%
Urban	835	63.01%

Source: Self-calculated through SPSS.

3.3. Methodology

The current research has used the variance-based Partial Least Squares-Structural Equation Modeling (PLS-SEM). It is a multivariate analysis method based on a series of ordinary least squares regressions and has higher levels of statistical power than covariance-based SPSS-AMOS [87]. The study uses Smart PLS 3.2.0 [88] to compute the path model. The further bootstrapping technique has been used to examine the loadings' significance. The next section discusses the results. Initial results are based on factor analysis. This is followed by a model designed using PLS-SEM

3.4. Operationalization

The study used structured questionnaires to collect data from respondents. The survey was conducted in three rounds from August 2019 to December 2019, February 2020 to August 2020, and November 2020 to December 2021. To see whether there is a nonresponse bias, the mean differences in critical variables across early (n = 714) and late respondents (n = 611) were tested. There were no significant changes between the two samples, which means there was no non-response bias.

Normal distribution plots, skewness, and kurtosis have been used to evaluate the assumption of normal distribution (Table 2). For the normal distribution, the skewness should be near zero and a negative value indicates skewness toward the left. Similarly, the kurtosis values are less than 3; thus, the data fulfill the criteria for normal distribution.

Table 2. Sample characteristics.

	Mean	Standard Deviation	Kurtosis	Skewness
Drivers of FI				
Usage	4.193	0.391	−0.549	−0.410
Digitalization	4.124	0.451	0.725	−0.434
FinTech	3.850	0.511	1.604	−0.492
Financial Literacy				

Table 2. *Cont.*

	Mean	Standard Deviation	Kurtosis	Skewness
FL Awareness	4.150	0.471	−0.272	−0.201
FL Competency	3.805	0.430	−0.617	−0.345
Financial Initiatives				
Financial Schemes	4.102	0.435	−0.718	−0.240
Financial Policies	3.978	0.430	−0.617	−0.345
Sustainable Growth (SDG)				
SDG1	4.137	0.460	1.199	−0.425
SDG3	4.152	0.491	−0.424	−0.463
SDG5	3.838	0.732	−0.431	−0.453
SDG8	4.146	0.438	0.001	−0.671
SDG9	4.076	0.674	1.120	−0.405
SDG10	4.121	0.560	−0.120	−0.470
SDG11	3.542	0.438	−0.113	−0.410
SDG17	4.187	0.499	−0.165	−0.591

Source: Self-calculated through SPSS.

4. Data Analysis and Results

The data analysis process is divided into two sections. The first confirms the factor structure of the measurement items of the drivers of FI, financial literacy, financial initiatives, and sustainable growth. The second stage investigates the relative importance of FI, financial literacy, and financial initiatives in explaining sustainable development. The measurement model helps to decide the properties of the scales and the structural model to establish the relationships among the variables.

4.1. Measurement Model

The results are represented through a measurement model to check the reliability and for validation in Section 4.1. This is followed by the structural model highlighting the results in Section 4.2. The measurement model could be examined through construct reliability, convergent validity, and discriminant validity.

As depicted in Table 3, the composite reliability (CR) values are more significant than the recommended threshold criterion of 0.70 [89]. The Cronbach alpha value for all constructs is between 0.770 and 0.893. The composite reliability values have a range of 0.881 to 0.948 (Table 3). This highlights that the construct validity and the reliability of the model are good and acceptable. According to Fornell and Larcker [90], the convergent validity of the constructs is examined by factor loadings and the average variance extracted (AVE). The value of the factor loadings and average variance extracted (AVE) should exceed the minimum requirement of 0.50 [91] for the explained variance to be greater than the measurement error. In the current study, the resulting value of the factor loadings is 0.611 to 0.914, and the AVE lies between 0.502 and 0.813. This condition is also satisfied. The indicators in the reflective measurement model show satisfactory levels of indicator reliability. As shown in Table 3, the outer loadings are greater than 0.70 for most of the items. However, in the case of SDG3, the value of the factor loading is 0.644; for SDG 5, it is 0.648; and for SGD 9, it is 0.611. As these are important for research, few researchers have suggested retaining the items if the values are greater than 0.60. Hence, we have retained them for further analysis.

The average variance extracted (AVE) greater than 0.50 supports the measures' convergent validity. The discriminant validity [90] was measured by comparing the values of the square root of AVE. It is recommended that the value of the square root of AVE should be larger than the inter-construct correlations (Table 4). The results confirm that the reflective constructs exhibit discriminant validity.

Table 3. Measurement model.

	Factor Loadings	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Sustainable Growth		0.847	0.857	0.881	0.502
SDG1	0.711				
SDG3	0.644				
SDG5	0.648				
SDG8	0.758				
SDG9	0.611				
SDG10	0.725				
SDG11	0.712				
SDG17	0.740				
Drivers of FI		0.831	0.903	0.895	0.740
Usage	0.893				
Digitalization	0.878				
FinTech	0.840				
Financial Literacy		0.893	0.884	0.948	0.730
FL Awareness					
FL Competency					
Financial Initiatives		0.770	0.776	0.897	0.813
Schemes	0.914				
Policies	0.889				

Source: Self-calculated through PLS-SEM.

Table 4. Heterotrait-monotrait ratio (HTMT).

	Sustainable Growth	Drivers of FI	Financial Initiatives	Financial Literacy
Sustainable Growth				
Drivers of FI	0.842			
Financial Initiatives	0.840	0.847		
Financial Literacy	0.683	0.816	0.831	

Source: Self-calculated through PLS-SEM.

The next step was to check the outer and inner variance inflation factor (VIF). The VIF values are presented (Table 5). As highlighted, the outer and Inner VIF values are less than 3 and in the acceptable range [92]. Thus, the collinearity is low, as indicated by a VIF value lower than 3; thus, no indicator was removed.

4.2. Structural Model

The results of the measurement model highlight that the construct reliability, convergent validity, and discriminant validity are all in the acceptable range. When the measurement model had been verified, the relationship dimensions of the model and sustainable growth were performed. The structural model results, as depicted in Figure 2, show that the beta value between the drivers of FI and financial literacy is 0.877 and between financial literacy and sustainable growth is 0.370. The indirect effect is 0.324 (0.877× 0.370), while the direct effect of the drivers of FI and sustainable growth is 0.152. Further financial initiatives are positively and directly related to sustainable growth, and the beta value

is 0.472. The results indicate that with the mediation of FL, the impact of the drivers on sustainable growth improved and was significant too.

Table 5. Outer and Inner VIF.

Outer VIF		Inner VIF				
	VIF		**Sustainable Growth (SDG)**	**Drivers of FI**	**Financial Initiatives**	**Financial Literacy**
Digitalization	2.357	Sustainable Growth				
FinTech	1.923	Drivers of FI				1.000
Financial Literacy	1.000	Financial Initiatives	1.442			
Policy	1.646	Financial Literacy	1.442			
SDG1	1.773					
SDG10	1.743					
SDG11	1.553					
SDG17	1.842					
SDG3	1.370					
SDG5	1.359					
SDG8	1.894					
SDG9	1.424					
Schemes	1.646					
Usage	1.772					

Source: Self-calculated through PLS-SEM.

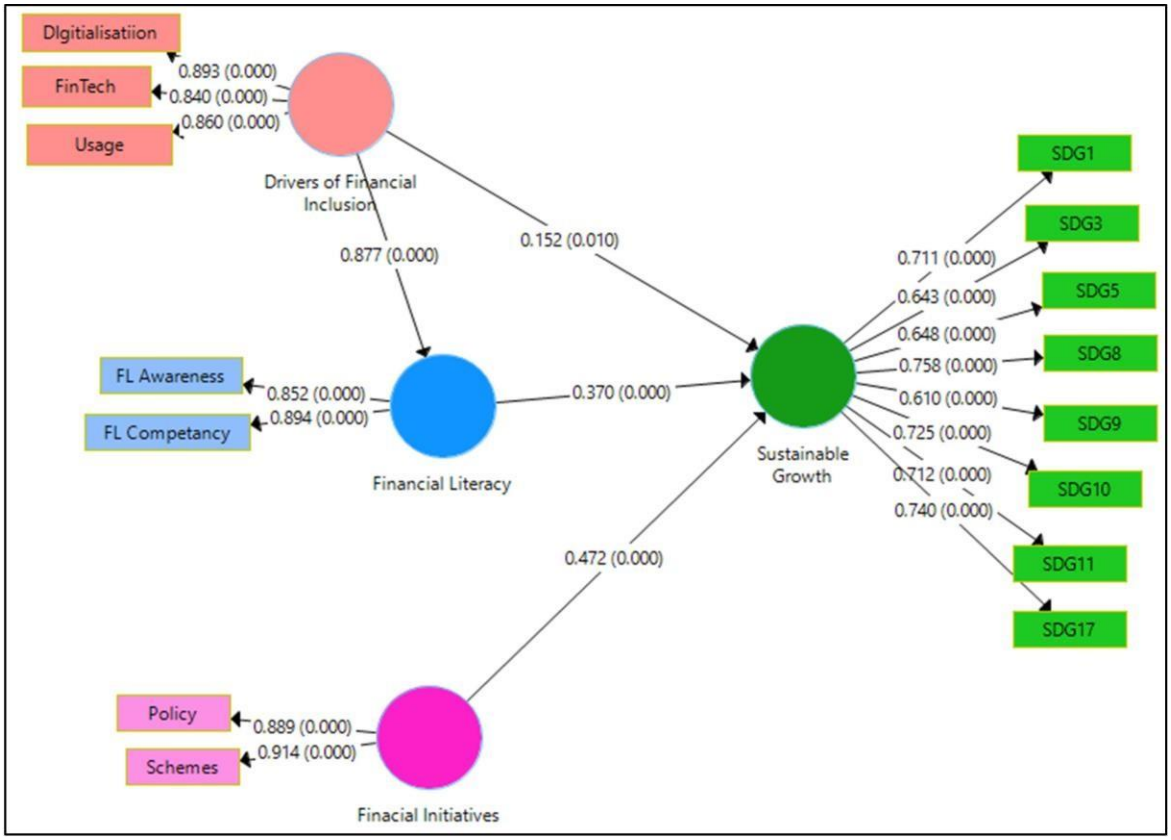

Figure 2. PLS-SEM bootstrapping model relating drivers of FI, financial literacy, and financial initiatives with sustainable growth. Source: Author's calculation through the help of PLS-SEM.

Figure 2, along with Table 6, will help understand the status of the hypotheses. The outer loadings of usage are 0.860 and are the highest amongst the drivers of FI. Hence, we accept H1a, that usage is positively associated with FI. The outer loading of digitalization is 0.893; thus, we accept H1b: Digitalization is positively associated with FI. For FinTech, the outer loading of FinTech is 0.840. Thus, H1c: FinTech is positively associated with FI and has also been accepted. Thus, the first hypothesis that H1: Usage, digitalization and

technology are positively associated with FI has been accepted as all the dimensions have high outer loadings.

Table 6. Structural model analysis with control variables.

	Model 1					Model 2 (with Control Variables)				
	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p Values	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p Values
Drivers of Financial Inclusion -> Financial Literacy	0.152	0.885	0.027	32.490	0.000 ***	0.152	0.160	0.059	2.555	0.011 *
Drivers of Financial Inclusion -> Sustainable Growth	0.877	0.484	0.046	10.421	0.000 ***	0.877	0.886	0.027	32.285	0.000 ***
Financial Initiatives -> Sustainable Growth	0.472	0.468	0.040	11.763	0.000 ***	0.472	0.468	0.040	11.788	0.000 ***
Financial Literacy -> Sustainable Growth	0.372	0.366	0.046	8.019	0.000 ***	0.372	0.371	0.048	7.673	0.000 ***
Gender -> Sustainable Growth						−0.018	0.015	0.021	0.708	0.379
Region -> Sustainable Growth						0.016	0.016	0.021	0.783	0.430
	R Square					R Square Adjusted				
Sustainable Growth	0.786					0.786				
Financial Literacy	0.769					0.769				

Source: Self-calculated *** $p \leq 0.001$; * $p \leq 0.05$.

The next hypothesis was that H2: Financial literacy mediates between the drivers of FI and sustainable growth. Financial awareness and financial competency had outer loadings greater than 0.850. Hence, it can be inferred that financial literacy comprises FL awareness and FL competency. The literature suggests that financial literacy will have a positive impact on sustainable growth. This study tries to analyze whether financial literacy mediates between the drivers of FI and sustainable growth. For this, we need to access the direct path of FI's influence on sustainable growth and the indirect path through financial literacy as a mediator. The results indicate that the FI drivers influence the economy's sustainable growth. The direct path coefficient is 0.152 (t-statistics 32.490) and is significant ($p < 0.001$). The indirect path co-efficient is (0.877×0.370) and the t-statistics are also significant ($p < 0.001$). The strength of the relationship has improved with the mediation of financial literacy. *Thus, H2: Financial literacy mediates between drivers of financial inclusion and sustainable growth has been empirically validated.*

The next hypothesis is H3: Financial schemes and financial policy have a positive relation and are sub-dimensions of financial initiatives. As the loadings of both the dimensions, financial policy (0.889) and financial schemes (0.914), are high, we accept H3: Financial schemes and financial policy have a positive relation and are sub-dimensions of financial initiatives. It is now important to examine the relation between financial initiatives and sustainable growth. A beta value of 0.472 and a t-value of 11.763 and ($p < 0.001$) support the acceptance of the hypothesis, viz., *H4: There is a positive relation between financial initiatives and sustainable growth.*

The results of the present study highlight that the drivers of FI, financial literacy, and financial initiatives influence sustainable growth. These three predictors explain

78.6 percent of the variation in sustainable growth. These results indicate that all the predictors considered in the study influenced sustainable growth, although the degree of influence is varied. The results confirm *H5: Sustainable growth is measured through the consumer's perception of how FI helps in achieving dimensions covering aspects from reducing inequalities and enhancing health to fostering growth and innovation through various SDGs, viz., SDGs 1, 3, 5, 8, 9, 10, 11, and 17*, as all outer loadings are high for the undertaken SDGs. The findings highlight that the drivers of FI with the mediation of financial literacy emerge as an important predictor. An important finding is that emerging financial initiatives also significantly impact sustainable growth. This lends support to *H6: Drivers of FI with the mediation of financial literacy and financial initiatives positively influence sustainable growth.*

4.3. Structural Model with Control Variables

In the next stage, we introduced the control variables and checked the structural model results again (Figure 3). Region and gender were introduced as the control variables. The results were almost similar. The beta value between financial initiatives and sustainable growth (SDG) was 0.472. The values were significant for relations between the drivers of FI and financial literacy, and between financial literacy and sustainable growth (SDG). The results were also significant for financial initiatives and sustainable growth (SDG). The model also depicts that results were not significant for gender and sustainable growth (SDG) and also for the region and sustainable growth. Furthermore, the beta value for gender is " -0.018" (*p*-value: 0.379), indicating that the results are supportive for males rather than females.

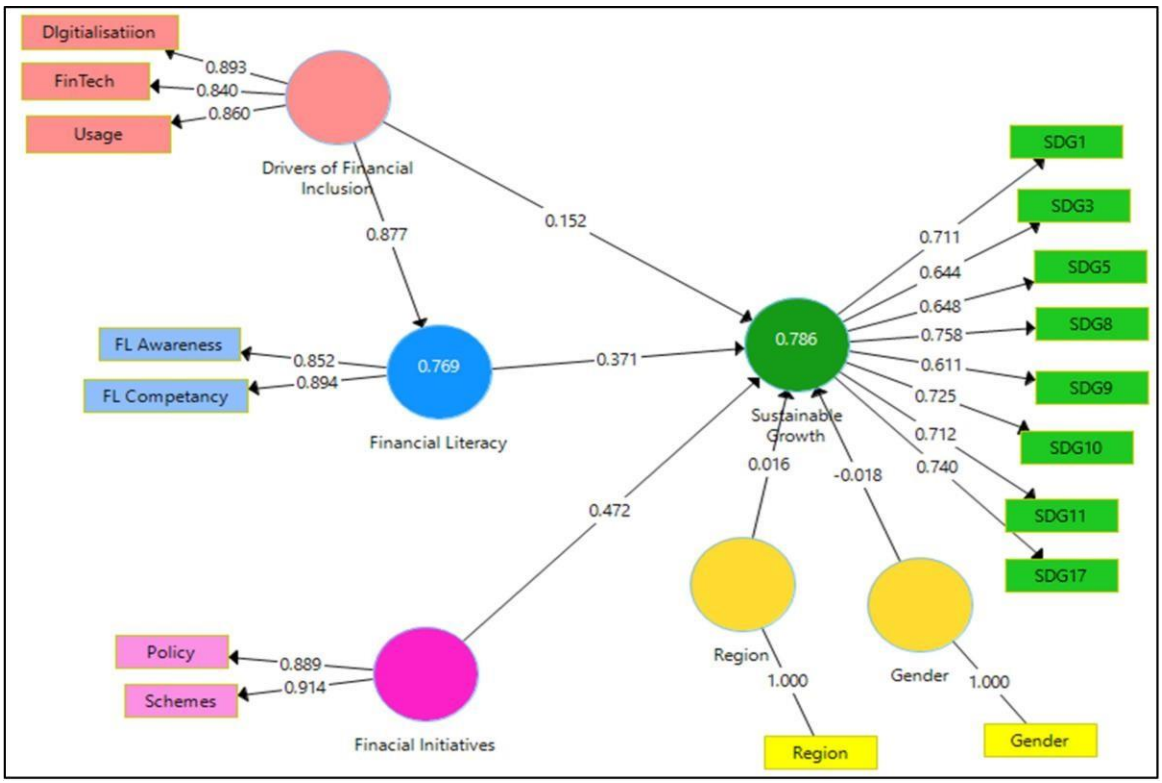

Figure 3. PLS-SEM model with a control variable. Source: Author's calculation through the help of PLS-SEM.

Similarly, the beta value for the region is 0.016 (*p*-value: 0.430), indicating a positive relation with the urban rather than rural sector. Women with access to financial services may control personal and have productive expenditures [93]. Thus, we accept *H7: Gender and region are the control variables and do not influence the endogenous variable, viz., sustainable growth*. However, the results of the current study highlight the advantage for males. Thus,

this may be taken as a lacuna and FL may be provided to females to avail advantages of financial inclusiveness and its transmission to sustainable growth.

5. Discussion and Conclusions

The aggregative result of the study in terms of the status of hypotheses has been shared in Table 7.

Table 7. Status of hypotheses.

Hypotheses	Status
H1: Usage, digitalization, and FinTech are positively associated with FI.	*Empirically Supported*
H1a: Usage indicator is positively associated with financial inclusion.	*Empirically Supported*
H1b: Digitalization is positively associated with financial inclusion.	*Empirically Supported*
H1c: FinTech is positively associatedwith financial inclusion.	*Empirically Supported*
H2: Financial literacy mediates between the drivers of financial inclusion and sustainable growth.	*Empirically Supported*
H3: Financial schemes and financial policy have a positive impact and are sub-dimesions of financial initiatives.	*Empirically Supported*
H4: There is a positive relation between financial initiatives and sustainable growth.	*Empirically Supported*
H5: Sustainable growth is measured through consumers' perception of how FI helps in achieving dimensions, covering aspects from reducing inequalities and enhancing health to fostering growth and innovation through various SDGs, viz., SDGs 1, 3, 5, 8, 9, 10, 11, and 17.	*Empirically Supported*
H6: Drivers of FI with the mediation of financial literacy and financial initiatives positively influence sustainable growth.	*Empirically Supported*
H7: Gender and region are the control variables and do not influence the endogenous variable, viz., sustainable growth (SDG).	*Empirically Supported*

Source: Self-calculated.

The results indicate that all the hypotheses have been accepted. Starting primarily with the drivers of FI, viz., usage, digitalization, and FinTech, the results suggest that these are significant drivers of FI and are positively influencing FI. Bhandari [94] has also highlighted penetration and usage as important dimensions of FI. An earlier study by Gu, Lee, and Suh [95] emphasized trust and usage as important indicators inducing m-banking in emerging economies. The results of the current study emphasize the digitalization indicator emerges as the most important driver, followed by usage and FinTech. The empirical findings of Duncombe and Boateng [96] and Barbu et al. [97] reveal that technological innovations, viz., connectivity, improve access to financial products for the public. This has also been reflected in the current research as FinTech emerges. The thoughts of Kim et al. [78] support the FI-sustainable development goal nexus for the Organization of Islamic Cooperation (OIC) economies and similar results were also reverberated by Sharma [10]. FI is related to sustainable growth [75,98,99]. This is also endorsed by Ryu and Ko [100] suggesting customers' hesitancy to adopt FinTech, suggesting effort is needed to promote it.

Chithra and Selvam [101] supported a positive relation between deposit and credit penetration on FI in India. Financial initiatives help boost FI. The present study highlights a positive relation of financial initiatives on sustainable growth. This has been indicated in earlier studies by Sarma and Pais [102] and Fungáčová and Weill [103]. The present research depicts a holistic picture by relating drivers of FI, financial literacy, and financial initiatives with sustainable growth measured through customers' perceptions regarding the success of FI through the achievement of the SDGs considered in the model. The strategic collaboration of FI and financial education leads to the financial stability of society and the economy [104]. The present study underlines the importance of FI drivers with the mediation that financial literacy enhances sustainable growth.

A strategy toward meaningful FI is needed to unlock the potential for reducing gender inequalities for dynamizing and sustaining growth. The recent works on FI underscore that through access to financial services and products, and the marginalized population can also manage income in a better and more conducive manner [105,106]. This will diminish poverty [107] and enhance economic activity [108]. However, as indicated by Bateman and Chang [109], caution may be followed by undue reliance on a traditional model of MFI. This along with reliance on financial initiatives is essential for sustainable growth. This also underlines the importance of financial literacy, as with literacy, the essence of FI drivers can be achieved, and thus is an important step toward sustainable growth.

Hence, from the above analysis, it can be concluded that drivers of FI, viz., the usage indicator, digitalization, and FinTech, are positively associated with financial inclusion and with the mediation of financial literacy, and they positively influence sustainable growth. Sustainable growth has been measured through customers' perceptions regarding the success of FI through the achievement of selected SDGs, viz., SDGs 1, 3, 5, 8, 9, 10, 11, and 17. Further, it can be concluded that there is also a positive relation between financial initiatives and sustainable growth. The study has added importance as it considers gender and region as control variables and creates a model taking all predictors along with the control variables.

6. Implications of the Study

The empirical findings of the present study specify valuable implications for practitioners. Understanding the constructs in the proposed research model is crucial for promoting financial inclusiveness for bankers in India and bankers in emerging economies. To enhance financial inclusiveness and its transmission to sustainable growth, there is a need to continue informing customers about changes in digitalization and FinTech. This study examines the impact of drivers on sustainable growth through the mediation of financial literacy on sustainable growth. The research has empirically corroborated the significant and positive impact of the drivers of FI with the mediation of FL for achieving sustainable growth as measured through the impact on various SDGs. In addition, the study has a rich contribution as it depicts a positive effect of financial initiatives on sustainable growth. This will help other economies to have proper initiatives for enhancing growth through financial initiatives focusing on financial policy and schemes. The results also highlight the importance of using the mentioned FI drivers, financial literacy, and financial initiatives for the achievement of financial inclusiveness success and sustainable growth.

The major purpose of the research was to assess the impact of FI on sustainable growth. Sustainable growth is measured by asking for customers' perceptions about FI success through the achievement of the mentioned SDGs. This study moves beyond the systematic literature covering FI and SDGs and empirically validates the relevance of FI for attaining sustainable growth. The results reflect that customers considered that FI helped in achieving sustainable growth with respect to SDG-8, i.e., improve entrepreneurial activity and innovation and growth, which had the highest loading, followed by SDG-17, to strengthen the means of implementation and revitalizing global partnership for the sustainable development goal. SDG-8, reducing inequalities, was the next priority for consumers. The results were also good for SDG-1: ending poverty. However, there is a need to improve in terms of SDG-3, improving health and education, and SDG-5, reducing gender inequality.

Further, there is a need to focus on the drivers of FI to enhance the success of FI. These implications will help to highlight the interdependence of the drivers of FI and financial literacy for achieving sustainable growth. The relation, as highlighted through the findings, supports the impact on sustainable growth. Thus, segregated policy needs to be intertwined with a dose of financial literacy to enhance financial inclusiveness and sustainable growth.

7. Limitations and Future Research

Like any survey-based study, the present research also has some limits and confines. The first constraint has to do with the results' generalizability. As the current research was conducted in North India, validating this research in other Asian countries could test the precision of the findings. This would also be helpful in examining the relation from different cultural perspectives. Secondly, there could be a few drivers which we may have missed. Our endogenous variable of sustainable growth is based on the certain SDGs considered in the model. Earlier FI- and SGD-based research papers focused on secondary data. Moreover, because of time constraints, the study considered survey-based results only. The study has taken gender and region as the control variables. This offers a lot of space for academics to consider the moderating role and experience.

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Investigating the Determinants of Financial Inclusion in BRICS Economies: Panel Data Analysis Using Fixed-Effect and Cross-Section Random Effect

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Abstract: The current research empirically analyses the determinants of financial inclusion (FI) for BRICS (Brazil, Russia, India, China and South Africa) nations using the no. of depositors and Automated Teller Machines/user as dependent variables, a proxy for FI from 2004 to 2019. The study employs fixed-effect, cross-section random-effect and simple panel least square techniques to determine FI for different BRICS countries. The empirical findings of fixed effect and cross-section random highlight that population and internet users affirmatively and significantly influence FI. Simple panel least square analysis indicates that domestic credit to the finance sector, population, internet users and bank branches positively influence the no. of depositors in these economies. Gross domestic product (GDP) and domestic credit to private sector (DCPS) inversely affected FI. Results of the second measure of FI (ATM per user) show the exchange rate of domestic credit to the private sector, and GDP positively influences FI. These findings will induce policymakers to take corrective actions by considering the significant factors to boost FI in respective BRICS economies.

Keywords: financial inclusion; panel data analysis; fixed effect; cross section random effect; gross domestic product; ATM per user; BRICS economies

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1. Introduction

Access to financial goods and services smoothly among individuals on a global level is recognized as a chief constraint for economic and social development. For sustainable long-term economic growth, financial inclusion (FI) has the utmost importance for policy-makers. FI is gaining perceptible recognition around the globe due to its indispensability for socio-economic development. Many empirical studies have revealed that FI plays a pivotal part in lowering income gaps, helping to slash poverty, and assisting in the smooth consumption of economic goods and services [1–3]. FI ensures the affordability, convenience and accessibility of financial goods and services to all [4]. The G-20 Summit in 2019 recognized FI as playing an integral role in inclusive development across the globe. Thus, financial institutions and development banks are focusing on promoting FI to ensure inclusive growth.

Demirgüc-Kunt and Klapper [5] have examined FI via the World Bank's Global Findex database, covering 148 countries. The results revealed that FI is influenced by bank credit, savings bank accounts, and account ownership. Luring researchers from developed and developing economies, FI studies are gaining momentum. Ghosh [6] has found that promoting development through FI is highly beneficial for the economy. Likewise, Cull, Demirgüc-Kunt, and Lyman [7] have also supported the impact of FI on financial stability. Kim, Yu, and Hassan [8] have also supported its role in economic growth. Regarding factors influencing FI, Ozili [9] illustrated innovation in banking services and technology infrastructure as stimulants of FI. Consequently, Mitchell and Scott [10] link FI with an increase in public revenue in a study based on the Argentinian economy. The government of Argentina used FI to connect people with the financial system and reported an increase

in ATM usage and credit. Correspondingly, branch bank networking, the number of depositors, and the number of credit facilitators emerged as contributing to FI in India [11].

Zins and Weill [12] covered the FI of 37 African countries and supported that access to banking and credit facility improved economic growth. Comparably, Internet penetration and mobile services in Africa enabled and improved accessibility to essential financial services [13]. This was further supported by Allen et al. [14], suggesting that innovative financial products and services helped many African regions to overcome infrastructural difficulties while enhancing their access. Fungacova and Weill [15] reiterated that greater use of formal accounts and savings helped China, with higher inclusiveness than other BRICS nations. Apart from this, the internet facility and growth of innovative fintech products and services have increased due to digitization in China, and the government encouraged web-based services to promote inclusion in the economy [16].

While the influence of FI on development has been thoroughly documented in previous research, macroeconomic effects on FI have not been significantly investigated. However, not many academics and researchers have shed light on the significance of domestic credit given by banks to the private sector, domestic credit provided by the financial sector (DCFS), exchange rates, inflation, bank branches, population, GDP and internet users in promoting FI in BRICS countries. Against the above backdrop, this research has focused on FI in BRICS nations. Therefore, the current study, by focusing on two major issues, makes an earnest attempt to fill the gaps in the existing literature:

RQ1: Which macroeconomic factors assist in achieving financial inclusion in the BRICS countries?

RQ2: Does any positive relationship exist between financial inclusion and macroeconomic factors in these countries?

The BRICS are an intriguing set of nations for investigating these issues, since all of the BRICS nations have selected a financial inclusion strategy as their main objective for inclusive growth. FI is a crucial element of financial development in terms of supporting the financial industry and institutions. It is also thought to be very important for fostering economic development [17]. Thus, FI may be a mitigating factor for BRICS nations which are striving to improve their living standards by raising levels of inclusiveness [18]. These nations are also undertaking financial sector reforms at a high pace. Thus, understanding which macroeconomic factors influence FI is a major concern in this paper.

This research's basic objective is to understand the contributing factors of FI in the BRICS region. The empirical study focuses on determinants responsible for achieving inclusion in BRICS economies. The study initially examines the level of FI in BRICS nations, as these are emerging economies having high growth. This research is intended to contribute in the following way. First, it identifies the determinants of FI, and second, it analyses the impact of FI on BRICS regions. Diversely, our findings have direct policy implications for determinants of FI in the BRICS region.

Theoretical Underpinning: The Intersection of FI and Economic Growth

Several studies have empirically examined FI, and some researchers have also concluded that FI is affirmatively related to economic growth [19,20]. Earlier studies have covered different perspectives of FI. FI provides access to financial services [21–24]. FI promotes financial goods/services, assists in the timely access of financial products, and helps to expand its usage to all segments of society [25,26]. Theoretically, the primary function of financial markets and institutions is to promote coordination and lower transaction costs. Other fundamental theories revolve around flaws in the capital market, such as information asymmetry and transaction costs. As a result of flaws in the market, underprivileged people and small businesses lacking collateral, credit histories, and connections may find it difficult to obtain the resources they need to grow. As a result of this, they have few opportunities, which aggravates poverty and inequalities. Galor and Zeira [27] suggest that financial market frictions are the reason why impoverished people do not invest in their education. These theories suggest that a lack of financial access causes income disparity

and poverty traps, and reduces economic development. Claessens [28] has classified access to financial services, such as deposits, credit, savings and loans, as common individuals' basic necessities, which will be possible through FI. Thus, FI has become a prime objective for emerging countries' policymakers to embed financially excluded populations into the formal financial system [29]. FI may be analyzed using New Keynesian and neoclassical theory. According to the neoclassical approach, small businesses and consumers are the primary economic actors, and are competitive, self-interested and possess all the knowledge required to make informed choices that would increase their well-being. Additionally, the public goods theories of FI suggest that everyone, irrespective of income level and status, should benefit from FI. Financial inclusiveness promotes sustainable development, wherein all sections of society, particularly the disadvantaged, access financial services at reasonable rates [30]. Researchers such as Pradhan [31], Lee and Wang [32] and ul et al. [33] support its positive relation with growth. A broad conceptual framework of determinants of FI and economic growth is depicted in Figure 1. The details of why these variables have been included, with the literature support, are provided in the next section through Table 1. The researchers are still working to produce a consistent method to measure FI. Additionally, two main routes theoretically support the link between FI and economic development. First, providing inexpensive financial services to the needy and disadvantaged will promote economic activity, national productivity, and welfare [34–36]. Second, the potential availability of deposits and insurance services to the unbanked would encourage the vulnerable to save in banks and non-bank financial institutions, facilitating money flow to the financial markets [37–39].

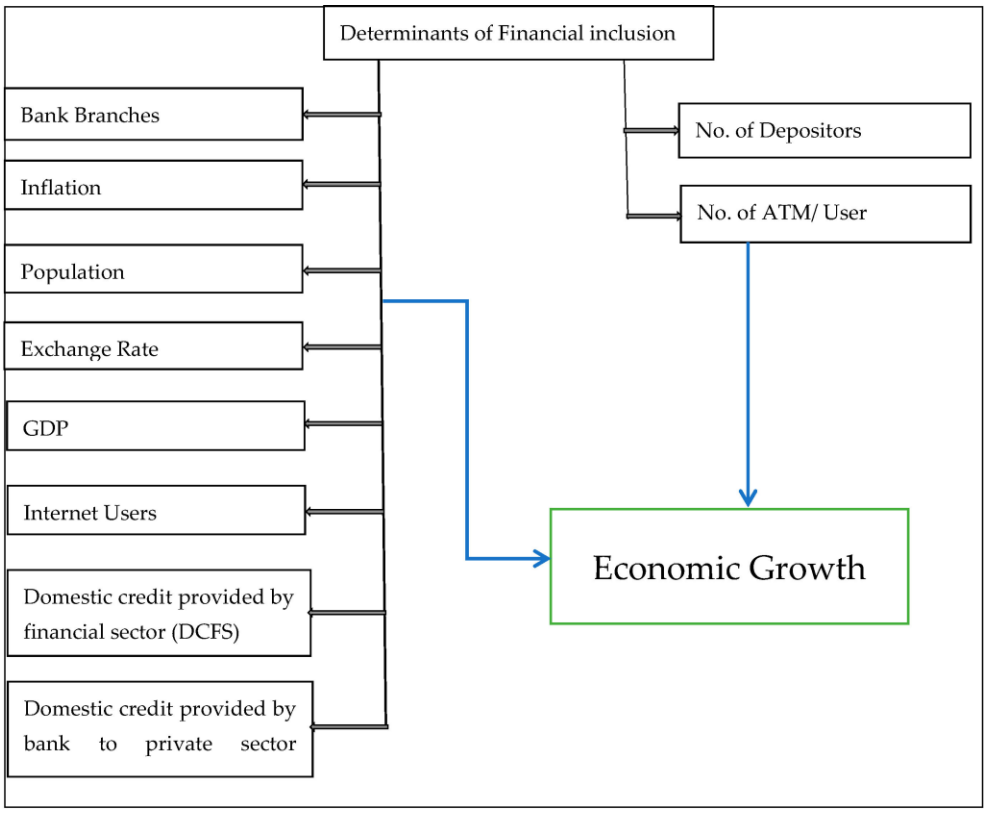

Figure 1. Determinants of FI and economic growth relation. Source: Authors' compilation.

The major question that arises is how to measure FI. Is there a comprehensive measure of FI? It has been well accepted that FI is a multi-dimensional concept expanding beyond individual indicators, viz., bank account ratios or the no. of ATMs [40]. Like many earlier studies, the current study also relies on banking penetration, availability of banking

services and usage [41,42]. Different studies project diverse dimensions, viz., the proportion of the adults having access to formal financial services, viz., bank accounts [43], savings, borrowings and risk management of adults [44]. FI is constructed by taking five dimensions, viz., ATMs, bank branches, borrowers, depositors and domestic credit/GDP. Based on the earlier literature, we will use the no. of ATMs/depositors as the measure for FI.

The next issue was to select the determinants of FI. Which macroeconomic factors may be included in the study? The predictors of FI vary from broad macroeconomic indicators, such as inflation, population, GDP and exchange rate, to bank branches or internet users. Other factors include domestic credit by the financial sector (DCFS) or domestic credit by a bank to the private sector (DCBPS). As the earlier literature majorly focused on using Fixed-Effect (FE) or Cross Section Random-Effect (RE), this study, too, is based on panel data analysis for all BRICS economies. The outcome would be helpful in the choice of model (Fixed-Effect—FE or Cross Section Random-Effect—CSRE). It is a sincere effort to unearth the determinants of FI for BRICS nations to help policymakers focus on the right dimensions.

2. Review of the Empirical Literature

Despite the wide variation, all BRICS nations have clearly highlighted the promotion of FI as their primary policy objective. An increasing corpus of empirical research demonstrates that FI has various beneficial implications on development outcomes in emerging countries such as BRICS. Eventually, economic development is better in economies with higher levels of FI since improved access to financial services enables the poor and other excluded groups to participate in entrepreneurial activity [45]. As is apparent from the literature, there is a link between the financial system and economic development. According to Schumpeter [46], the banking system plays a crucial role in economic growth. King and Levine [47] have found that a well-structured banking system with financial intermediation boosts economic growth and productivity. Similarly, McKinnon [48] and Goldsmith [49] also suggested that a systematically organized fund from banks to the public enhances financial development in an economy. FI has strongly influenced the minds of many economists and policymakers. Since the beginning of the 19th century, FI has gained much attention due to the increased financial exclusion of weaker sections of societies [50]. Rajan and Zingales [51] opined that the development of a nation directly and indirectly depends upon the progress of a financial system. Increased evidence suggests that financial knowledge [52], aversion to risk [53], knowledge of securities traded on the exchange, motives for saving, and trust in financial systems, play a positive role in a person's decision to invest in the stock market. Chakrabarty [54] considers financial exclusion to be a stringent barrier to growth. Chibba [55] has supported the view that the inclusive system assists in managing poverty. Wait et al. [56] analyzed datasets from BRICS and non-BRICS developing nations to investigate how BRICS' financial market openness led to greater growth. The results showed that, in the BRICS nations, larger levels of lending to the private sector and greater financial depth contributed more to financial inclusiveness. In general, the expansions of the banking sector and internet connections are complementary in fostering FI, which instigates economic growth. Guru and Yadav [57] have used financial intermediaries, credit-to-deposit ratio, and domestic credit to the private sector of BRICS nations as determinants to investigate the factors that influence FI. They found that all these factors positively and significantly influenced FI. Olaniyi and Adeoye [58] examined the factors of FI in Africa from 2005 to 2014. The results indicated that per capita income, GDP, literacy, internet access, and Islamic banking significantly influenced financial inclusion in Africa. According to Wang and Guan [59], other macroeconomic factors, such as financial depth and bank health status, were also significant determinants of a country's level of FI.

However, Demirgüc-Kunt and Klapper [44] have used the Global Findex data base of 148 economies to measure the FI in these nations and revealed that almost half of the adults had their accounts in formal financial institutions through inclusiveness. The results also highlight that the main reasons for financial exclusion were escalated cost, distance, and

lack of documentation. Further, it was pointed out that credit, savings, risk management and payment methods were also the constraint of FI in economies. Boukhatem [60] opined that money supply and bank credit not only improve the well-being of individuals but also encourage the growth of small entrepreneurs through a credit facility. Hence, they drive prospects to amass assets and support effortless consumption. The research used 67 countries' data from 1988 to 2012 to investigate the level of FI. The results revealed that an enhancement of financial development spearheads inclusion. Thus, these are pointers relating to access to financial services, strongly related to FI. The low cost and high accessibility of the banking system increased the use of accounts. The simple documentation and low-free accounts motivate people to connect with the bank [14].

A strong reliance on financial institutions strengthens access. Apparently, Van der Werff et al. [61] have ascertained the link amid FI and social factors based on Global Findex data of 31 OECD nations. They suggested that increased confidence in government and formal financial institutions improved FI. Similarly, Sarma and Lenka [62] investigated the influence of FI on the Indian economy, considering the period from 1980 to 2014. Principal component analysis (PCA) has been applied for generating the FI index using an autoregressive distributed lag (ARDL) and error correction model (ECM). The findings indicate a positive association between FI and growth. Moreover, Sethi and Acharya [63], analyzing thirty-one economies through panel co-integration methods, also suggest that FI and economic growth are related in the long run.

Furthermore, by comparing data from the worldwide Findex database, Asuming, Osei-Agyei and Mohammed [64] examine FI in 31 Sub-Saharan African nations. They concluded that the overall level of financial inclusion improved considerably between 2011 and 2014. They found that the levels and rates of progress differ greatly amongst nations. According to their research, the determinants of FI include covariates at the individual level (age, education, wealth, and gender), macroeconomic factors (GDP growth rate and the number of financial institutions), and Business Freedom. FI has a positive externality on the economy because it allows for the more effective execution and transmission of monetary policy by allowing a bigger portion of the economy to participate in the formal financial system. Thus, greater financial inclusion enables interest rates to serve as a valuable policy instrument and enhances the process by which Central Banks may stabilize prices [65]. Beck and Cull [66] investigated Africa's banking systems, especially those in Sub-Saharan Africa, and explored new financial innovations that have the potential to enhance classical African models. They demonstrated that the African financial system is weak, yet stable. Although African banks are adequately capitalized and liquid, they lend less to the private sector than the banks in other emerging nations. Additionally, the authors concluded that consumers and businesses do not use financial services as often, due to a lower level of inclusiveness.

Demirgüç-Kunt, Klapper and Singer [67] pointed out that the usage diversity and possession of an account was higher among rich, educated and employed persons. The Chinese economy demonstrated high FI because of education and trust in the formal banking system. Supporting this, Fungácová and Weill [15] also indicated that income and education enabled people in China to be more aware of the costs of financial products/services and enhanced their trust in the banking system. However, women had lower FI, primarily due to male dominance in account ownership and their lack of awareness of documentation procedures. Sophastienphong and Kulathunga [68] opined that financial development improved loan deposits in Sri Lanka. Sarma [69] conducted a study on 100 countries and indicated that FI has associated with three dimensions: bank penetration; service accessibility; and service usage. Bourainy, Salah and Sherif [70] analyzed the influence of FI on inflation rates in 37 developing countries from 2009 to 2018. Initially, Principal Component Analysis (PCA) was used to create a new multidimensional Financial Inclusion Index (FII) based on three dimensions (access, utilization, and quality of financial services), and the Generalized Method of Moments (GMM) was used to assess the impact of FI on the inflation rate empirically. The researchers found that higher FI has an effect on reducing

inflation rates in emerging nations. These results suggest that policymakers in emerging nations regard FI as a strategy for lowering inflation rates. Mbutor and Uba [71] also investigated the influence of FI on monetary policy in the Nigerian economy for the period of 1980 to 2012. The findings supported that increased financial inclusion will enhance the efficacy of monetary policy because inflation would fall as the percentage of total loans rises.

Beck and Torre [72] have highlighted that access and usage to financial goods/services are of utmost importance in FI. Subsequently, Beck et al. [73], covering 99 nations, suggest that outreach of financial services improved the reach of the banking sector. In fact, the access to and usage of financial services are correlated. Access is related to the geographic and demographic dispersion of banks and ATMs. Usage is measured by credit and deposit accounts/capita, loan/income ratio and loan/deposit ratio. The quality of institutions and the accessibility of infrastructure also impacted financial services. Camara and Tuesta [40] have used three main dimensions of FI. The first dimension, viz., usage, consists of owning a minimum of one financial product, and possessing savings accounts and loans. This was followed by the next dimension, covering the barriers and obstacles of accessibility to financial services. The last aspect was insufficient documentation, affordability and trust in the banking system. Any country's economic growth depends upon the development of the financial sector, as it invariably provides a wide array of financial services to all categories [74]. Academics agree that a nation's financial structure significantly impacts the extent to which its citizens may participate in the financial system. Owen and Pereira [75] suggest that increased levels of competitive pressure may incentivize innovation and growth of financial services. This reduces the cost of these services, broadens the risk spectrum of individuals, and finally increases FI. Using creative financial instruments and developing new financial goods/services may be restricted by capital, stringency and banking activity limit, which impede financial inclusion [76]. Restricted demand and supply for financial services reflect the country's socio-economic restrictions and macroeconomic vulnerabilities in terms of per capita income. Zhang and Wei [77]'s findings also indicate that increased policy uncertainty negatively affects business innovation. Due to policy uncertainty and instability, financial inclusion may be particularly crucial in the BRICS region.

Kpodar and Andrianaivo [78], in their study on African economies for the period 1988–2007, analyzed financial variables, such as the no. of depositors, loans/head, internet/user and population covering ICT impact on FI. The ICT indicators include mobile dissemination fees and call charges. Major findings support the invincible role of ICT in FI. Unlike conventional banking, which still relies on physical restrictions for the spread of business outlets, digital payments may significantly reduce financial exclusion [79]. Mobile phone developments encouraged digital access to financial services and injected growth into the economy. Evans [13] has also reiterated that the internet, mobile phones and FI are associated. The study was based on a modified OLS method and Granger causality. Sha'ban, Girardone and Sarkisyan [80] built a multidimensional financial inclusion index for a worldwide sample of 95 countries from 2004 to 2015. The data used were from the IMF's Financial Access Survey. They found a positive and substantial relationship between FI and variables, including GDP per capita, employment rates, bank competitiveness, human development, government transparency, and internet penetration as well.

Lenka and Barik [81] evaluated how internet and mobile services influenced FI for SAARC nations for 2004–2014. The study revealed that internet facilities and mobile phones had a vital affirmative relation with FI. Sharma [82], using the VAR model and Granger causality, explored how FI is related to growth. The findings support an affirmative impact of FI on GDP. Granger causality analysis revealed a two-way link between growth and geographical outreach but a single-sided relation of the no. of deposits and loan accounts with GDP. Siddik [83] employed a fixed effects regression technique for the period 2004–2016 for SAARC nations, and the outcome supports a positive effect of FI on economic development. The findings indicate that the wide availability of financial services would

increase total income and investments in businesses, and would lead to a decrease in the unemployment rate.

Thus, as evidenced by the literature, there are studies on FI in BRICS economies. However, they are relatively scarce and are based on a few variables. In view of this, it was decided to use the no. of depositors; ATM per user as dependent variables and a range of independent variables, viz., Bank Branches (BB); Gross Domestic Product (GDP); Exchange Rate (ER); Inflation Rate (INFL); Internet User (IU); Population (POP); Domestic credit provided by financial sector (DCFS); and Domestic credit provided by bank to private sector (DCBPS). An in-depth analysis was undertaken for BRICS economies to obtain a holistic picture of FI. Thus, on the basis of the literature review, the following hypotheses have been proposed:

H1a. *Bank branches have a positive relation with number of depositors*.

H1b. *Bank branches have a positive relation with ATM per user*.

H2a. *GDP has a positive relation with number of depositors*.

H2b. *GDP has a positive relation with ATM per user*.

H3a. *Exchange rates have a positive relation with number of depositors*.

H3b. *Exchange rates have a positive relation with ATM per user*.

H4a. *Population has a positive relation with number of depositors*.

H4b. *Population has a positive relation with ATM per user*.

H5a. *Domestic credit provided by the bank to the private sector positively affects the number of depositors*.

H5b. *Domestic credit provided by the bank to the private sector positively affects ATM per user* .

H6a. *Domestic credit provided by the financial sector positively affects the number of depositors*.

H6b. *Domestic credit provided by the financial sector positively affects ATM per user*.

H7a. *Inflation rate has a positive relation with number of depositors*.

H7b. *Inflation rate has a positive relation with ATM per user*.

H8a. *Internet users have a positive relation with number of depositors*.

H8b. *Internet users have a positive relation with ATM per user*.

3. Research Methodology

3.1. Description of Data

The current research analyses how growth parameters relate to FI for the BRICS economies. The study has used secondary data, choosing indicators of the FI index from the World Bank's Global Findex database, IMF and balance sheets of BRICS banks. The panel data set consists of all five BRICS nations, covering 2005–2019. The currency value of all countries has been converted to USD. The two indicators used as dependent variables include depositors/1000 (DEPO) and ATM/user. Based on a few important studies, the independent variables selected are: BB; GDP; ER; IR: IU; PoP; DCFS and DCBPS. The indicators of the study, along with the literature support, are shown in Table 1. Kim et al. [8] included ATM/100,000; BB/100,000 adults and depositors/1000 as the measures of FI. ATMs offer impressive benefits, such as convenience, reduction in transaction costs and reduction of the workload of banks. GDP is the indicator used for economic growth as it is one of the most crucial factors influencing FI [82,84]. Domestic credit to the private sector is one of the indicators of FI which significantly affects economic growth [85], and has been included as an independent variable. Other indicators such as internet users [86], inflation rate [87] and population [84] have also been considered in the current research.

Table 1. Variable and references.

S.No.	Variable	Description	Independent or Dependent	Literature Support	Source of Data
1	Depositors (DEPO)	Natural logarithm of depositors	Dependent	Beck, Kunt and Peria [73], Kim et al. [8]	World bank database
2	ATM per User	No. of ATM/depositors	Dependent	Mbutor and Uba [71], Chatterjee [86], Kim et al. [8]	World bank database
3	Bank Branches (BB)	Natural logarithm no. of bank branches	Independent	Sarma [4,41,69] Kim et al. [8]	World bank database
4	Gross Domestic Product (GDP)	Natural logarithm of Gross Domestic Product	Independent	Dabla-Norris et al. [88]. Chibba [55], Omar and Inaba [84]	Global Findex
5	Exchange Rate (ER)	Exchange rate of USD of respective country's currency	Independent	Mbutor and Uba [71]	Global Findex
6	Inflation Rate (IR)	Inflation rate in respective country	Independent	Chatterjee [86], Lenka and Bairwa [89] Mbutor and Uba [71], Kim et al. [8]	Global Findex
7	Internet User (IU)	Natural logarithm no. of internet user (IU)	Independent	Durai and Stella [90], Bayar et al. [91]	World bank database
8.	Population (PoP)	Natural logarithm population in respective country	Independent	David et al. [92], Kim et al. [8]	World bank database
9.	Domestic credit provided by financial sector (DCFS)	Natural logarithm domestic credit provided by financial sector (DCFS)	Independent	Chauvet and Jacolin [93], King and Levine [47]	Global Findex
10.	Domestic credit provided by bank to private sector (DCBPS)	Natural logarithm of domestic credit provided by bank to private sector	Independent	Hannig and Jansen [94], Bhaskar [95]	World bank database

Source: Authors' calculations.

3.2. Specification of Model

This section specifies an econometric model used to determine the key indicators influencing FI through a panel unit root test framework with fixed-effect (FE) and cross section random-effect (RE). The stationarity has been checked with unit root using the Levin–Lin–Chu test for pooled t-statistics [96]. The test maintains the equivalent substitute for the coefficient of the first serial correlation. The Im–Pesaran–Shin test, an extended version of Levin–Lin–Chu [97], was used along with augmented Dickey–Fuller (ADF) statistics. The ADF Fisher unit root test is used as a non-parametric test introduced by [98]. The last test, Phillips–Perron [99], has indeterminate auto-correlation and heteroscedasticity in the error term of the test equation. At the first stage, unit root tests were carried out to check the stationarity of the data series at a level. However, none of the variables were found to be stationary at level. Later, stationarity was checked at the first difference; again, the data series were not found to be stationary at the first difference. At last, stationarity was checked at the second difference, and data series of different variables were found stationary at the second difference. After that, the data series of all the independent and dependent variables were converted into a second difference. Then, model estimation was carried out using fixed effect and cross-section random effect.

3.3. Panel Unit Root Estimation Technique

The empirical results are obtained from the panel data approach. Unlike other studies, this research used many indicators for the FI index compared to the single indicator analysis usually undertaken. We employed a panel data model containing a set of fixed effect and cross-section random effects. Generally, panel are FE is used when we only want to analyze the influence of variables that diverge over a period of time. FE helps to discover the association between exogenous and endogenous variables in the country [100]. Each country has its own individual characteristics that might affect the exogenous or explanatory variables. While applying FE, accept that something within the single country influences the exogenous or endogenous variables are required to be controlled, relying on the association between the entity's residual and explanatory variables. FE eliminates the influence of time-invariant descriptions and helps to evaluate the net result of the exogenous variable on the endogenous variable (Brandom, 2008; Kohler and Kreuter, 2009). The equation for the fixed effects model is:

Yit = αi + β1Xit + e ..... 4αi (i = 1 ... n) is the intercept for each unit/country (n units/country-specific intercepts).
Yit: dependent variable (DV), with i (unit) and t (time)
Xit: one exogenous/explanatory variable.

β1: coefficient (exogenous variable)
e: error term

3.4. Panel Data Analysis with Cross-Section Random Effects (CSRE)

In panel data analysis CSRE, unlike the FE model, the deviations crossways units/countries are presumed to be accidental and uncorrelated with the predictors considered [100]. The vital difference between FE and RE is whether the individual effect exemplifies elements associated with the repressors, and not whether the effects are stochastic [101]. If dissimilarities across organizations/countries have some influence on the endogenous variable, then RE is recommended. In RE, we embrace time-invariant variables. On the other hand, in the FE model, variables are captivated by the intercept.

The random effects model:

$$Yit = \alpha + \beta Xit + uit + \epsilon it \quad \ldots\ldots 5$$

α: intercept; Yit: Endogenous variable; β: coefficient (exogenous variable); uit: Between organization/country error term; ϵit: within entry error.

4. Econometric Results

Table 2 represents panel unit root test outcomes. These tests have been performed in three ways, (i) without intercept and linear trends; (ii) with intercept; (iii) with intercept and linear trends. The outcome of Levin–Lin–Chu indicates that the data series of all, except inflation, are not stationary with a *p*-value > 0.05. Im–Pesaran–Shin outcomes for all except inflation do not highlight stationarity. The ADF test shows that the data series of all the variables at the level are non-stationary, as the *p*-value of all variables are >0.05. PP outcomes indicate that the data series of maximum variables are stationary with constant, with constant and linear trends. However, the data series of all the variables without intercept and linear trends do not highlight stationarity (*p*-value > 0.05). Overall, the panel unit root outcomes at the level show that the data series of all the variables do not depict stationarity. Later, the panel unit root tests were performed at first difference.

Table 2. Panel unit root at level.

LLC	ATM	DCPFS	DCPSB	DEPO	ER	INFL	BB	GDP	IU	POP	ATM/User
Without C and T	1.19808 (0.8846)	2.84695 (0.9978)	0.95274 (0.8296)	3.94267 (1.0000)	0.96745 (0.8333)	−1.4728 (0.0704)	7.29784 (1.0000)	4.66632 (1.0000)	8.63505 (1.0000)	11.4892 (1.0000)	0.80662 (0.7901)
With C	6.6666 (1.0000)	5.34001 (1.0000)	0.81523 (0.7925)	18.1093 (1.0000)	7.22215 (1.0000)	−3.1003 (0.0010)	3.07696 (0.9990)	−4.06938 (0.0000)	−5.32916 (0.0000)	36.6246 (1.0000)	179.727 (1.0000)
With C and T	37.1606 (1.0000)	12.3989 (1.0000)	13.2268 (1.0000)	25.9219 (1.0000)	8.69718 (1.0000)	−2.9854 (0.0014)	12.8400 (1.0000)	7.04157 (1.0000)	4.44680 (1.0000)	2103.29 (1.0000)	571.303 (1.0000)
Im, Pesaran and Shin											
Without C and T											
With C	0.58515 (0.7208)	1.69064 (0.9545)	−0.42671 (0.3348)	6.36271 (1.0000)	1.42691 (0.9232)	−2.53044 (0.0057)	1.01126 (0.8441)	−2.39184 (0.0084)	−2.66975 (0.0038)	4.87271 (1.0000)	−1.12864 (0.1295)
With C and T	2.01280 (0.9779)	−0.11476 (0.4543)	0.80769 (0.7904)	2.26659 (0.9883)	0.33478 (0.6311)	−1.64375 (0.0501)	0.72765 (0.7666)	0.64289 (0.7399)	−0.09343 (0.4628)	−1.23924 (0.1076)	1.61997 (0.9474)
ADF											
Without C and T	1.29021 (0.9995)	1.33730 (0.9994)	3.80906 (0.9555)	0.90730 (0.9999)	2.63856 (0.9887)	10.2073 (0.4225)	2.61783 (0.9890)	0.99557 (0.9998)	0.02077 (1.0000)	0.12635 (1.0000)	4.82788 (0.9024)
With C	10.4278 (0.4038)	3.84149 (0.9542)	13.3412 (0.2052)	4.04089 (0.9455)	3.54100 (0.9657)	24.4425 (0.0065)	1.01126 (0.8441)	−2.39184 (0.0084)	30.0687 (0.0008)	0.33955 (1.0000)	15.6768 (0.1093)
With C and T	3.02179 (0.9809)	14.1422 (0.1666)	11.2570 (0.3378)	7.83733 (0.6447)	6.68244 (0.7550)	20.7143 (0.0232)	0.72765 (0.7666)	0.64289 (0.7399)	14.3742 (0.1566)	20.8800 (0.0219)	6.75208 (0.7486)
PP											
Without C and T	29.1270 (0.0012)	15.4556 (0.1163)	10.4037 (0.4058)	18.8968 (0.0416)	16.4075 (0.0885)	13.0559 (0.2206)	6.93649 (0.7314)	4.78824 (0.9049)	4.32092 (0.9317)	5.98884 (0.8162)	40.0848 (0.0000)
With C	34.1688 (0.0002)	39.7516 (0.0000)	43.4427 (0.0000)	44.3710 (0.0000)	35.9442 (0.0001)	28.7323 (0.0014)	36.2175 (0.0001)	27.3641 (0.0023)	23.9118 (0.0078)	57.4836 (0.0000)	55.7535 (0.0000)
With C and T	46.9104 (0.0000)	58.4410 (0.0000)	62.2313 (0.0000)	40.1362 (0.0000)	60.2081 (0.0000)	28.6216 (0.0014)	43.3265 (0.0000)	36.9007 (0.0001)	80.0993 (0.0000)	56.9510 (0.0000)	19.7336 (0.0319)

Source: Authors' calculations with Eviews11.

Table 3 Levin–Lin–Chu outcomes at first difference indicate that the data series of all the variables except inflation are not stationary. Im–Pesaran–Shin test outcomes point out that the data series of DCPFS, DCPSB, inflation and GDP are found to be stationary at first difference for levels with C and with constant and linear trends. The remaining variables of the data series do not indicate stationarity (p-value > 0.05). For the ADF test, the data series of variables except for depositors, no. of ATMs, exchange rate, population and ATM per user at three different levels, without C and T, with C, and with C and T are stationary. The test results of PP (Phillips and Perron, 1988) also show significant values at three different levels for all variables (p-value < 0.05). It means the data series of all these variables are stationary at the level. However, the data series of all variables are not found to be significant as per the different panel unit root tests used. Therefore, panel unit root tests have been conducted at the second difference.

Table 3. Panel unit root at first difference.

LLC	ATM	DCPFS	DCPSB	DEPO	ER	INFL	BB	GDP	IU	POP	ATM/USER
Without C and T	−2.81804 (0.0024)	−4.51705 (0.0000)	−5.01004 (0.0000)	2.36869 (0.9911)	−4.99789 (0.0000)	−8.31360 (0.0000)	−2.26432 (0.0118)	−3.79540 (0.0001)	−4.28441 (0.0000)	0.20579 (0.5815)	7.31995 (0.0000)
With C	40.9274 (1.0000)	12.5357 (1.0000)	14.0137 (1.0000)	26.9693 (1.0000)	10.7713 (1.0000)	−5.44396 (0.0000)	13.7639 (1.0000)	6.30723 (1.0000)	8.92979 (1.0000)	2374.23 (1.0000)	668.597 (1.0000)
With C and T	35.9735 (1.0000)	13.8813 (1.0000)	13.2249 (1.0000)	62.1063 (1.0000)	13.7106 (1.0000)	−6.50543 (0.0000)	15.3341 (1.0000)	7.87503 (1.0000)	18.4844 (1.0000)	141.823 (1.0000)	752.513 (1.0000)
Im, Pesaran and Shin											
Without C and T											
With C	0.45777 (0.3236)	−3.20043 (0.0007)	−2.05747 (0.0198)	0.60310 (0.7268)	−1.75797 (0.0394)	−3.96392 (0.0000)	−1.75712 (0.0394)	−2.63346 (0.0042)	−2.50496 (0.0061)	−3.69523 (0.0001)	−0.93911 (0.1738)
With C and T	−0.78840 (0.2152)	−2.41456 (0.0079)	−2.27408 (0.0115)	1.05672 (0.8547)	−0.32369 (0.3731)	−3.13261 (0.0009)	−1.42073 (0.0777)	−2.24169 (0.0125)	−0.94960 (0.1712)	0.45522 (0.6755)	−0.82105 (0.2058)
ADF											
Without C and T	15.7901 (0.1058)	29.1294 (0.0012)	35.6639 (0.0001)	17.0303 (0.0737)	33.1368 (0.0003)	60.0266 (0.0000)	28.8920 (0.0013)	33.4518 (0.0002)	26.7645 (0.0028)	12.1179 (0.2772)	26.4407 (0.0032)
With C	10.0062 (0.4399)	28.7135 (0.0014)	23.5864 (0.0088)	10.8685 (0.3679)	17.7364 (0.0596)	33.8269 (0.0002)	18.4819 (0.0474)	24.4633 (0.0065)	23.3056 (0.0097)	32.1912 (0.0004)	12.3081 (0.2650)
With C and T	13.3659 (0.2039)	22.9226 (0.0110)	23.9728 (0.0077)	4.86572 (0.9000)	10.9790 (0.3592)	28.4215 (0.0015)	20.5404 (0.0245)	22.9551 (0.0109)	17.2800 (0.0684)	9.86486 (0.2746)	13.0062 (0.2233)
PP											
Without C and T	64.0861 (0.0000)	68.7969 (0.0000)	89.5589 (0.0000)	53.4400 (0.0000)	75.4641 (0.0000)	71.8665 (0.0000)	67.7947 (0.0000)	65.6003 (0.0000)	88.7803 (0.0000)	73.4560 (0.0000)	42.2895 (0.0000)
With C	63.6961 (0.0000)	78.2208 (0.0000)	79.5951 (0.0000)	58.6660 (0.0000)	71.9093 (0.0000)	51.2138 (0.0000)	53.0021 (0.0000)	66.3438 (0.0000)	99.5154 (0.0000)	56.7943 (0.0000)	33.9392 (0.0002)
With C and T	62.9860 (0.0000)	82.0445 (0.0000)	77.5300 (0.0000)	57.7273 (0.0000)	68.4164 (0.0000)	54.0432 (0.0000)	47.5186 (0.0000)	77.9936 (0.0000)	93.3361 (0.0000)	55.2620 (0.0000)	33.7663 (0.0002)

Source: Authors' calculations with Eviews11.

As pointed out in Table 4, and according to ADF, PP and Im, Pesaran and Shin [97] tests, the data series of all variables highlight stationarity at second difference (p-value < 0.05). The overall outcome of the panel unit root indicates that the variables' data series are stationary at second difference. After that, we estimated the model using fixed and cross-sectional random effects, as sometimes the data are not stationary at first difference, and, thus, it may be necessary to differentiate the data a second time to obtain a stationary series. Differencing help stabilize the mean of a time series by removing changes in the level of a time series and, therefore, reducing trend and seasonality so that it is not dependent on past values [102]. The stationarity of the data series reflects that data series of different variables do not follow the particular trend of different variables used in the study. Since all the variables have been made stationary at the second difference, the data series of all the variables are not going to follow a particular trend and independent variables used in the study are true predictors of dependent variables used in the study. Most forecasting techniques suppose that a distribution has stationarity, and if the data series of variables is not stationary, then it is made stationary before estimating the model. The economic significance of stationarity is that we can avoid the problem of autocovariance and autocorrelations, and only explanatory variables contribute to the variance of the model. An absence of stationarity can cause unexpected or bizarre behaviors, such as t-ratios not following a t-distribution or high r-squared values assigned to variables that are not correlated at all [103].

Table 4. Panel unit root at the second difference.

LLC	ATM	DCPFS	DCPSB	DEPO	ER	INFL	BB	GDP	IU	POP	ATM/ User
Without C and T	−8.18609 (0.0000)	−10.3275 (0.0000)	−8.89980 (0.0000)	−4.03747 (0.0000)	−7.00968 (0.0000)	−11.0836 (0.0000)	−8.71464 (0.0000)	−11.3691 (0.0000)	−8.92335 (0.0000)	−22.9309 (0.0000)	−11.9405 (0.0000)
With C	21.2301 (1.0000)	5.24140 (1.0000)	7.94936 (1.0000)	52.3502 (1.0000)	7.06820 (1.0000)	−8.82909 (0.0000)	10.5664 (1.0000)	−2.01695 (0.0219)	6.72571 (1.0000)	2580.09 (1.0000)	557.602 (1.0000)
With C and T	20.9549 (1.0000)	5.65905 (1.0000)	9.90707 (1.0000)	55.4134 (1.0000)	7.52763 (1.0000)	−7.24729 (0.0000)	13.5671 (1.0000)	−2.00431 (0.0225)	9.46400 (1.0000)	77.5186 (1.0000)	615.695 (1.0000)
Im, Pesaran and Shin											
Without C and T											
With C	−4.45103 (0.0000)	−5.97929 (0.0000)	−4.56204 (0.0000)	−1.21276 (0.1126)	−2.90779 (0.0018)	−5.43773 (0.0000)	−4.41986 (0.0000)	−5.86351 (0.0000)	−4.89460 (0.0000)	−3.88355 (0.0001)	−3.79194 (0.0001)
With C and T	−2.55972 (0.0052)	−3.75924 (0.0001)	−2.19156 (0.0142)	−0.04195 (0.4833)	−1.08611 (0.1387)	−2.92360 (0.0017)	−2.54519 (0.0055)	−2.88170 (0.0020)	−2.90666 (0.0018)	−5.14313 (0.0000)	−1.62446 (0.0521)
ADF											
Without C and T	59.8919 (0.0000)	78.0699 (0.0000)	63.3855 (0.0000)	32.1116 (0.0004)	49.6085 (0.0000)	74.5576 (0.0000)	63.2309 (0.0000)	65.5357 (0.0000)	69.4423 (0.0000)	65.6961 (0.0000)	57.4444 (0.0000)
With C	38.9131 (0.0000)	48.4024 (0.0000)	38.6851 (0.0000)	15.8001 (0.1055)	26.7450 (0.0029)	44.9350 (0.0000)	37.7208 (0.0000)	46.1430 (0.0000)	43.5374 (0.0000)	36.8605 (0.0001)	33.2521 (0.0002)
With C and T	30.4908 (0.0007)	35.6813 (0.0001)	24.0469 (0.0075)	10.3584 (0.4096)	17.0121 (0.0741)	29.9309 (0.0009)	26.8375 (0.0028)	28.6121 (0.0014)	29.9999 (0.0009)	32.1255 (0.0001)	20.2019 (0.0274)
PP											
Without C and T	89.8553 (0.0000)	96.0283 (0.0000)	86.5876 (0.0000)	61.6247 (0.0000)	87.1887 (0.0000)	92.5230 (0.0000)	77.4615 (0.0000)	95.2717 (0.0000)	95.2111 (0.0000)	60.1991 (0.0000)	70.1315 (0.0000)
With C	76.1645 (0.0000)	108.656 (0.0000)	96.8579 (0.0000)	65.2886 (0.0000)	77.3801 (0.0000)	90.7456 (0.0000)	72.5153 (0.0000)	102.562 (0.0000)	94.6752 (0.0000)	56.2480 (0.0000)	65.7413 (0.0000)
With C and T	74.8204 (0.0000)	91.5914 (0.0000)	90.6683 (0.0000)	60.5010 (0.0000)	69.9152 (0.0000)	70.0087 (0.0000)	69.4405 (0.0000)	81.2396 (0.0000)	88.8257 (0.0000)	56.2327 (0.0000)	49.3571 (0.0000)

Source: Authors' calculations with Eviews11.

Table 5 represents panel data estimation using the no. of depositors as a dependent variable. The estimation has been conducted without fixed and cross section RE, with FE and with cross-section RE. Model 5.1 represents the results of cross-section RE. No. of internet users (p-value < 0.01) and population (p-value < 0.05) are significant. GDP is significant at a 10% confidence level. The result of cross-section RE indicates that heterogeneity across countries does not influence the result of panel data estimation. In the case of cross-section random effect, the associated R-Square is 0.4034. It means around 40.34% of the variance of FI (no. of depositors) is explained by indicated predictors. The model is a good fit (F: 4.90: p < 0.01).

Model 5.2 of panel data estimation deals with FE. Internet users are found to be significant (p-value < 0.01), and the population is significant at 10% (p-value < 0.10). GDP shows the negative significant impact on the no. of depositors at a 10% confidence level (p-value < 0.10). In the case of FE, the explained variance is quite high (R^2: 0.83), and predictors elucidate 83% variance of FI (no. of depositors). The difference between R^2 and adjusted is lesser. R^2 authenticates the described variance of the FE model.

Model 5.3 has been developed without fixed and cross-section random effect. In this model, there are six significant variables. The internet users, population, domestic credit to financial sector, and bank branches highlight influence on the no. of depositors in a representative economy. It means all these variables encourage the no. of depositors in the particular country. The no. of internet users, population, and domestic credit to financial sector are found to be significant at 1% level; bank branches at 5%. DCPS is significant (p-value < 0.01) and GDP is also significant (p-value < 0.05). GDP and DCPS show the negative influence indicating that GDP and DCPS discourage the no. of depositors in BRICS economies. The explanatory power is high (R^2: 0.7824), i.e., 78% variance explained by predictors. The model is a good fit, and the difference between the R-square and the adjusted R-square is less than 0.05.

Table 5. Panel Least Squares with Cross section Random and Fixed Effect (Depositors).

	5.1 Cross-Section Random Effect		5.2 Fixed Effect		5.3 Without Fixed and Random Effect	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Domestic Credit to Financial Sector	3.291181	1.102465 (0.2748)	1.357233	0.381075 (0.7046)	7.197453	2.9597 * (0.0045)
Domestic Credit to Private Sector	−8.281807	−1.599206 (0.1152)	−3.325062	−0.465988 (0.6431)	−14.01716	−5.25137 * (0.0000)
Exchange Rate	−2.709269	−0.919437 (0.3617)	−4.217192	−1.253087 (0.2156)	−1.437202	−0.548958 (0.5851)
Inflation Rate	_270.0783	−0.284451 (0.7771)	−432.5921	−0.431500 (0.6678)	−537.1401	−0.522219 (0.6035)
No. of Bank Branches	8.141914	0.779224 (0.4390)	4.392642	0.398039 (0.6922)	23.46507	2.27552 ** (0.0266)
Gross Domestic Product	−217.9722	−1.7158 *** (0.0915)	−273.7548	−1.719 *** (0.0913)	−384.5451	−4.75780 * (0.0000)
Internet Users	204.4143	3.563590 * (0.0007)	225.1530	3.5733 * (0.0008)	212.9717	3.5327 * (0.0008)
Population	157.9973	2.211612 ** (0.0309)	161.9981	1.954453 *** (0.0558)	228.9801	4.8381 * (0.0000)
C	−3078.858	−2.737549 * (0.0082)	− 2816.191	−2.150041 ** (0.0360)	−2347.067	−3.1174 * (0.0028)
Cross-section random S.D./Rho		257.5897 (0.6751)				
Idiosyncratic random S.D./Rho		178.6883 (0.3249)				
R-squared		0.403409		0.838095		0.782438
Adjusted R-squared		0.321121		0.802116		0.752429
S.E. of regression		181.0207		182.4858		204.1143
F-statistic		4.902385 (0.000118)		23.29407 (0.000000)		26.07382 (0.000000)
Akaike info criterion				13.42357		13.59964
Schwarz criterion				13.85135		13.89580

Source: Authors' calculations with Eviews11, * *p* value < 0.01 ** *p* value < 0.05 *** *p* value < 0.10.

Table 6 depicts the results of panel least squares with cross-section RE and FE using ATM/user (a proxy for FI) as a dependent variable.

Table 6. Panel Least Squares with Cross section Random and Fixed Effect (ATM/User).

	6.1 Cross-Section Random Effect		6.2 Fixed Effect		6.3 Without Fixed and Random Effect	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Domestic Credit to Financial Sector	−0.014457	−1.754396 *** (0.0845)	−0.014520	−1.500900 (0.1390)	−0.022003	−3.189650 * (0.0023)
Domestic Credit to Private Sector	0.033828	2.658788 ** (0.0100)	0.036698	2.237329 ** (0.0293)	0.037831	4.986724 * (0.0000)
Exchange Rate	0.029540	3.730900 * (0.0004)	0.027592	3.193083 * (0.0023)	0.036897	4.957580 * (0.0000)
Inflation Rate	−2.516099	−0.917280 (0.3627)	−2.927792	−0.998179 (0.3225)	−1.205760	−0.413739 (0.6805)
No. of Bank Branches	0.025306	0.881366 (0.3816)	0.028357	0.919545 (0.3618)	0.012471	0.444567 (0.6582)
Gross Domestic Product	1.317503	3.802321 * (0.0003)	1.148383	2.664574 ** (0.0101)	1.821702	8.131877 * (0.0000)
Internet Users	−0.247697	−1.498354 (0.1393)	−0.203865	−1.119164 (0.2678)	−0.351417	−2.134441 ** (0.0369)
Population	−0.953691	−4.847351 * (0.0000)	−0.904078	−3.744875 * (0.0004)	−1.182962	−8.823982 ** (0.0000)
C	3.634187	1.175361 (0.2445)	4.141161	1.133064 (0.2620)	3.041411	1.425740 (0.1591)
Cross-section random S.D./Rho		0.613498 (0.5793)				
Idiosyncratic random S.D./Rho		0.522860 (0.4207)				
R-squared		0.701333		0.874595		0.846138
Adjusted R-squared		0.661511		0.847723		0.825623
S.E. of regression		0.533436		0.542655		0.580700
F-statistic		17.61161 (0.000000)		32.54622 (0.000000)		41.24492 (0.000000)
Akaike info criterion				1.783371		1.871941
Schwarz criterion				2.204290		2.163347

Source: Authors' calculations with Eviews11, * p value < 0.01 ** p value < 0.05 *** p value < 0.10.

For cross-section random effect (Model 6.1), GDP and exchange rate show positive and significant impacts on the dependent with p-value < 0.01. It means higher GDP and exchange rate across different BRICS countries encourage the no. of ATM/user or encourage FI. DCPS also shows a positive and significant influence on ATM/user (p-value < 0.05). This reflects that DCPS encourages FI in BRICS economies. Population exhibits a negative and significant influence on ATM/user (p-value < 0.01). Thus, the population across different BRICS nations discourages FI.

The panel least square results in FE (Model 6.2) are similar to cross-section RE. The exchange rate and GDP are significant in BRICS countries. The exchange rate shows the positive significant impact on ATM/user with (p-value < 0.01). GDP and DCPS are found to be significant at 5%. Population exhibits a significant negative association with ATM/user (p < 0.01).

In the case of cross-section RE (Model 6.1), the associated R^2 is 0.701, and in FE (Model 6.2) R^2 is 0.874. Thus, FE has a higher explanatory power.

Results of the simple panel least square (without fixed effect and cross-section random effect), as depicted by model 6.3, are not much different from 6.1 and 6.2, except in the case of one variable, i.e., internet users ($p < 0.05$). It indicates a negative association with ATM/user. It means that the no. of internet users in BRICS economies discourages ATM/user. Higher F statistics of all three models indicate that they are significant (p-value < 0.01). These statistics reflect that all three models are good fit models to predict ATM/user. The overall results of the status of the hypotheses for all models have been highlighted in Table 7.

Table 7. Result of Hypotheses Support.

Hypotheses	Model		
	1	2	3
H1a	Supported	Supported	Supported
H1b	Supported	Supported	Supported
H2a	Not-Supported	Not-Supported	Not-Supported
H2b	Supported	Supported	Supported
H3a	Not-Supported	Not-Supported	Not-Supported
H3b	Supported	Supported	Supported
H4a	Supported	Supported	Supported
H4b	Not-Supported	Not-Supported	Not-Supported
H5a	Not-Supported	Not-Supported	Not-Supported
H5b	Supported	Supported	Supported
H6a	Supported	Supported	Supported
H6b	Not-Supported	Not-Supported	Not-Supported
H7a	Not-Supported	Not-Supported	Not-Supported
H7b	Supported	Supported	Supported
H8a	Supported	Supported	Supported
H8b	Not-Supported	Not-Supported	Not-Supported

Source: Authors' compilation.

The Hausman test (highlighted in Table 8) is sometimes described as a test for model misspecification. In panel data analysis, this test helps the researchers to choose either a fixed effect model or a cross-section random model [104]. Acceptance of the null hypothesis or failure to reject the null hypothesis indicate that the random model is best suited for the given data series, while acceptance of the alternate hypothesis demonstrates that the fixed effect model is best fitted for the given data series [105].

Table 8. Hausman Test.

Variable	Chi.Square-Statistics	Degree of Freedom	Prob.
ATM per User	7.545030	8	0.4791
Depositor	6.030604	8	0.6438

Source: Authors' compilation through Eviews 12.

In the present study, the Hausman test is performed two times. Firstly, it is performed by using ATM per user as a dependent variable. In this case, the associated value of Chi-Square statistics (7.545030) is quite low, and a p-value > 0.05 means the failure to rejectthe null hypothesis and the rejection of the alternate hypothesis. This indicates that the cross-section random model is a good fit [106], using ATM per user as a dependent variable and all others as an independent variable (BB, INF, GDP, POP, DCPS, DCFS, INTUSER,

EXCH). Secondly, the Housman test uses the depositor (DEPOSITER) as a dependent variable. Again, in this case, the associated Chi-Square value of the model is (6.030604) quite low, and the *p*-value > 0.05. It means that, again, in the case of DEPO, the cross-section random effect model is the best-suited model as compared to the fixed effect model.

5. Conclusions and Discussion

The key to driving development is to increase FI, which has several advantages for eradicating poverty and fostering prosperity. Hence, in order to evaluate progress, it is crucial to investigate the determinants of FI across BRICS. Therefore, this research is intended to analyze the factors influencing FI of BRICS economies, using determinants such as (i) domestic credit provided by the financial sector; (ii) domestic credit provided by banks to the private sector; (iii) exchange rate; (iv) inflation rate; (v) gross domestic product; (vi) bank branches; (vii) internet users; and (viii) the population as explanatory variables. The no. of depositors and ATM/user were the two dependent variables signifying FI in BRICS nations. The outcome of panel data analysis indicates that internet users and population have a positive and significant influence on FI in cross-section RE. This has also been corroborated by Duncombe and Boateng [107], that technological innovations through internet connectivity enhanced the accessibility of financial products.

In the case of FE, the internet users and population also emerge with an affirmative association with the no. of depositors (FI) in BRICS countries. An increase in internet users and a higher population encourages a higher no. of depositors in the BRICS economies. GDP has a negative and insignificant association with FI.

In the case of simple panel least square, domestic credit to the financial sector; population; no. of bank branches; and no. of internet users illustrate a positive and significant association with the no. of depositors, i.e., FI. It means that all these variables create a positive environment for FI in BRICS countries. These outcomes are in consensus with the results from earlier researchers [108–110].

Further, the simple panel least square results indicate that when heterogeneity across BRICS countries is not considered the maximum no. of variables, as explained above, are found to be significant, whereas when heterogeneity is considered across different BRICS economies, in that case, only three variables (internet users' population and GDP) show significant association with the no. of depositors in these countries.

In the case of ATM per user (proxy of FI) as a dependent variable, the cross-section random effect results indicate that DCPS, GDP and exchange rate show a positive and significant impact on FI [111]. It means these variables encourage FI in the BRICS nations. As per Nasir, Balsalobre-Lorente, and Huynh [112], increased financial services accessibility through FI benefits macroeconomic factors, which help financial system stability and economic development.

Outcomes of FE [113] highlight that domestic credit to the private sector (DCPS), exchange rate and GDP positively impact FI. Population and internet users have a negative influence on FI. However, the variable domestic credit to the financial sector is not found to be significant in the case of FE. The results of FE indicate that when heterogeneity across BRICS countries is considered, the variables mentioned follow the described relationship.

Results of the simple panel least square (without fixed and cross-section random effect) indicate that internet users' population and domestic credit financials have a negative association with FI. However, exchange rate, GDP and DCPS are positively related to FI. This conclusion is aligned with Lee et al. [32]'s results, which show that FI boosts business sales growth, which is then reflected in economic growth.

Summing up, it can be inferred that the results support that the existence of ICT in the banking industry provided numerous advantages, such as easy access to banking products and services. The unique outcomes from the current study highlight that more emphasis has to be given to access per user (ATM/user) rather than just focusing on the increase in the no. of depositors [114]. In these cases, the macroeconomic variables such as GDP, inflation and exchange rate appear to have a stronger impact. King and Levine [115] support that

access to credit boosts economic growth. In contrast, Dabla-Norris et al. [116] found that FI promotes GDP growth via access to credit, credit depth, and the effectiveness of credit mediation among enterprises. Hence, increased financial access will have additional effects on GDP growth. Our data also emphasize how crucial it is to consider national income when formulating measures to increase financial inclusion. Conclusively, every nation needs to work towards enhancing the sharing of knowledge and experiences across nations through international financial institutions such as the Alliance for Financial Inclusion (AFI) and the Global Partnership for Financial Inclusion (GPFI). These types of organizations need to collaborate to increase the degree of FI in emerging nations with a low level of inclusion.

6. Practical Implications

The findings from this study have several policy implications. Unquestionably, many country-level features and economic aspects must undergo substantial enhancements to increase financial inclusion. Our analysis conclusively demonstrates the determinants of FI. Countries may focus on these indicators of FI, and governments should encourage opening domestic financial markets to enhance financial inclusiveness across the globe. Emerging economies such as India must promote FI to ensure more people have access to banking facilities. The variables as investigated by the study will benefit the policymakers when considering these factors for expanding banking facilities. The current study highlights that no. of internet users is strongly associated with the number of depositors in BRICS economies, and may be taken as a strong indicator to promote FI. Policymakers must initiate the requisite actions to start technology revolution campaigns in their respective countries to enhance no. of internet users. Another important step that the governments must take is to maintain adequate banking facilities as per the population in the respective country. We argue that pursuing these steps concurrently might have significant advantages, including more effective credit resource allocation, increased reliance on the formal, regulated financial sector, and increased access to a broad range of financial goods and services. In addition, our study's results make it abundantly clear that technological advancement is critical to the process of FI. We suggest that authorities collaborate on the development of strategies for reducing the digital divide that exists in our modern societies.

7. Future Areas of Research

The current research has covered FI in BRICS nations. Future studies can be carried out for other emerging economies. There is further scope for research, and the study may be extended by using a higher no. of country specific variables. This study relies on only two proxies of FI; for deeper and comparative analysis, other proxies of FI may be used.

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