

Ridhima Garg

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Chapter I

INTRODUCTION

The introduction lays the foundation for the study by examining the theoretical and historical evolution of financial development indicators and their influence on economic growth in India. Section 1.1 discusses the key theories related to financial development and growth, followed by an overview of channels through which financial intermediaries operate. Further, it traces the major financial reforms and their impact on the financial system. Section 1.2 presents the conceptual framework, introducing the variables used and their role in promoting economic growth. Section 1.3 discusses the key problems, followed by Section 1.4, which outlines the research questions. Section 1.5 presents the objectives of the study, aligning with the research questions. Section 1.6 introduces the hypotheses to test the given indicators and their impact on economic growth. Furthermore, Section 1.7 describes the data used and the econometric methodology employed. It also highlights the research significance. Finally, Section 1.8 details how the study is structured into different chapters, each addressing a specific aspect of the research, including an overview of the financial development and economic growth relationship, an extensive literature review, methodology, research-specific chapters, and a conclusion with policy recommendations.

1.1 Background

In the post-World War era, economists began examining the relationship between financial development and economic growth. An efficient financial system, in both developed and developing countries, enables them to increase their gross domestic product (GDP). The debate on the finance-growth nexus started when (Schumpeter, 1911) highlighted the importance of financial sector development in boosting economic growth. Schumpeter argued that the financial sector's advancement plays a pivotal role in driving economic growth, especially through its support of technological innovations. He believed that financial development influences economic growth by identifying and funding productive investments, aligning with (Goldsmith, 1969), who emphasized the efficiency of investment for financial development. (McKinnon, 1973) and (Shaw, 1973) supported this view, highlighting the importance of financial liberalization in promoting savings and, consequently, investments. (Gurley & Shaw, 1955) challenged neoclassical views that downplayed the role of the financial sector,

emphasizing its crucial contribution to economic growth. Similarly, (Patrick, 1966) proposed two key hypotheses regarding the finance-growth relationship: the supply-leading hypothesis and the demand-leading hypothesis. Patrick argued that in the early stages of a country's economic development, the financial system drives economic growth, whereas, as the country advances towards becoming a developed nation, growth creates demand for a more developed financial sector. Over time, the importance of the financial system for economic prosperity gained recognition. During Britain's Industrial Revolution (1760-1840), the country's substantial financial resources, including surplus capital from colonies like India, fueled the shift from an agrarian to an industrial economy. This period marked a pivotal change, as noted by (Bagehot, 1873) and (Hicks, 1969). While India supplied capital for other countries, its indigenous banking system declined, and colonies directed capital flows towards British interests. (Bagehot, 1873) suggested that during crises, it becomes crucial for banks to lend freely through liquidity injections. Notably, during the 2008 crisis and COVID-19, central banks in London applied this principle to stabilize financial markets (Leloup & Trautwein, 2024).

The link between financial development and economic growth has been extensively studied in India since the financial reforms in 1992. India's financial sector is diverse, including commercial banks, insurance companies, non-banking financial institutions, cooperatives, mutual funds, pension funds, and other markets. Commercial banks hold 64% of the total resources in the financial system. As the main source of credit, the banking sector plays a vital role in providing funds to productive sectors. Improved access to bank credit has led to increased investment and industrial growth. As financial reforms deepened the economy, financial intermediation channels evolved, strengthening the finance-growth relationship.

1.1.1 The channels through which financial development promotes economic growth:

- Facilitates risk trading, diversification, and pooling
- Ensures efficient resource allocation
- Mobilizes savings for productive activities
- Supports monitoring, management, and corporate control
- Enables the smooth exchange of goods and services
- Improves access to external finance

A well-developed financial system promotes growth by fostering capital accumulation and raising total factor productivity (Greenwood & Jovanovic, 1990). Financial intermediaries are highly effective at sourcing information about investment projects, enabling high-quality investments via technological innovation. These investments often involve low risk and high returns, positively impacting economic growth. Banks primarily provide savings to investors by attracting household deposits and offering loans, leading to physical capital accumulation. The financial system allows participants to deposit savings as liquid assets for ready use, reducing liquidity risks and the need for constant monitoring to manage risks and uncertainties. Additionally, an efficient financial system supports a smooth payment mechanism, facilitating secure and simple business transactions.

1.1.2 Evolution of Financial Sector Reforms in India

In India, the relationship between financial development and economic growth has evolved, particularly following the reforms. Under the License, Raj, the financial system was heavily regulated and controlled, leading to deficits in the balance of payments and a growing non-performing assets (NPA) ratio of 16.3%. The average GDP growth rate was around 3.5%, often called the Hindu growth rate. To address the balance of payments issue and the Gulf oil crisis, Manmohan Singh acted swiftly to stabilize growth and macroeconomic conditions. Liberalization reforms were undertaken to empower the financial sector to fulfil its role effectively. The Indian banking system shifted to a more market-oriented system with the reduction of the cash reserve ratio and the statutory liquidity ratio. Interest rates were also deregulated following the recommendations of two committees: the Narasimham Committee (1991) and the Narasimham Committee (1998), to introduce greater flexibility and simplicity in banking operations. The pre-liberalization financial sector was characterized by financial repression, which imposed strict controls on banking activities and limited the allocation of credit. These reforms aimed to promote liberalization and facilitate the better allocation of credit and savings. The cash reserve ratio (CRR) and statutory liquidity ratio (SLR) were gradually reduced to 10% and 25%, respectively, to enhance lending capacity. At least 10% of fixed credit must be allocated to priority sectors. The government's ownership in public sector banks was reduced by allowing them to source capital from the equity market up to 49% of paid-up capital. The entry of new private and foreign banks, which were better capitalized and technologically advanced to increase competition in the market. Foreign investment in the banking sector was permitted up to 74%, with voting rights restricted to 10%. The Monopolies

and Restrictive Trade Practices (MRTP) Act became obsolete and was replaced by the Competition Commission of India (CCI) to promote sustainable competition in the market. Additionally, the liquidity adjustment facility was institutionalized in 2000-01, under the guidance of the Narasimha Committee, to manage short-term liquidity, using repo and the reserve repo rates. The monetary policy targeting was undertaken to stabilize inflation and promote economic growth.

Liberalization reforms brought significant changes in the equity market as well. The Bombay Stock Exchange (BSE), the oldest stock exchange in Asia, was initially confined to Bombay and dominated by the broker community, leading to restrictions and barriers on trade. Trading was primarily conducted through traditional open outcry and spot market trading. The period between 1992 and 1996 marked a remarkable phase for the Indian equity market with the establishment of the Securities and Exchange Board of India (SEBI) and the National Stock Exchange (NSE) in 1992. NSE was set up as a public sector institution while also functioning as a private entity. Within a year, it became the largest stock exchange in the country with a significant volume of shares traded. National Stock Depository Limited (NSDL) was introduced in 1996 as the depository holder for securities in electronic form, thereby reducing the transaction cost and risk. The adoption of an online trading platform enhanced the price discovery process by integrating domestic and global investors. Demat trading improved the liquidity, reduced the settlement cycles, and provided individual stock futures.

The merger of weaker public sector banks with stronger banks reduced non-performing assets (NPAs), which had been increasing quarterly, while also generating economies of scale. The NPA ratio decreased to 1.9% in 2006 from 7% in March 1997. After peaking at 14.58% in March 2018, it subsequently fell to 3.12% by 2024. Banking consolidation led to improved efficiency and lowered operational costs. Similarly, the number of public sector banks decreased from 27 in March 2017 to 12 by April 1, 2020. The RBI introduced Real-Time Gross Settlement (RTGS) in April 2004 for interbank electronic transactions, allowing real-time online transactions across the country. The National Electronic Funds Transfer (NEFT) also went live, facilitating low-value fund transfers across banks. The Pradhan Mantri Jan Dhan Yojana (PMJDY) was launched in 2014 to broaden access to financial services, including bank accounts, credit, insurance, and remittances. The Micro Units Development and Refinance Agency Banks (MUDRA) was established in 2015 to provide easy credit to Micro and Small Enterprises. RBI amended flexible inflation targeting in 2016, following recommendations by

the Urjit Patel Committee (2014). Under this framework, the RBI and government decided to maintain inflation with a target of 4% and a tolerance band of ± 2 ; i.e., implying an acceptable range between 2% and 6%. A significant transformation occurred in 2016 with the introduction of Unified Payments Interface (UPI) and, along with platforms like BHIM, Aadhaar-enabled payment systems (AEPS), and QR codes, which initiated a digital revolution in retail transactions. The Goods and Services Tax (GST) was implemented in 2017 to consolidate various indirect taxes and initially supported growth; however, after 2018, the economic growth declined due to the impact of COVID-19.

1.1.3 Impact of Various Reforms on the Financial Sector

- Between 2014 and 2024, India experienced sustained growth, with GDP growth averaging around 6.6%.
- A self-sufficient banking sector helped the economy overcome the Global Financial Crisis of 2008.
- The share of private banks increased by 8% between 2001 and 2006, reducing the public sector banks' deposits and advances from 82% and 80% to 74% and 72% respectively.
- The operating expenses of Indian banks amounted to around 2% of total assets, in line with international standards.
- The equity market has the lowest transaction cost based on screen-based and paperless transactions.
- The BSE daily turnover ratio increased substantially from ₹13 crores in 1980 to ₹2054 crores in 2004-05, further surging to ₹9054 crores by 2021-22. Market capitalization increased from 42.8% to 54.7% in 2004-05, reaching ₹18 lakh crores, while the NSE scaled up to ₹23 lakh crores by August 2005.
- Under the PMJDY, over 42 crore bank accounts were opened until 2021, helping the unbanked population by enabling direct funds transfers.
- MUDRA banks sanctioned nearly 29 crore loans, particularly empowering women and non-farm microenterprises.
- India is a global leader in digital payments, with 89.5 billion transactions in 2022, UPI accounting for 46% of transactions.

Overall, India's financial system has evolved through a combination of institutional changes, policy reforms, technological advancement, and a market-driven mechanism. India's financial

development trajectory not only improved economic growth but also the accessibility and efficiency of the financial sector itself. Given this scenario, investigating the finance-growth nexus becomes imperative. The present study tries to identify the gaps and unresolved issues, as understanding the dynamics of financial institutions over time provides valuable insights for policymakers and stakeholders.

1.2 Conceptual Framework

The primary view in the literature is that investment is the function of savings; accordingly, the financial system allocates savings into productive investments. The classical dichotomy assumes that monetary variables do not influence real variables but affect only nominal variables, like a price change. Keynesians, however, argue that credit formation is the primary function of the financial system, which leads to an increase in investments and thus savings. Neoclassical economists highlight that financial influence grows directly or indirectly through finding or technological advancement. The financial system comprises financial institutions and financial markets. Both the banks and the financial markets provide financial services. In economies with a dominant bank-based system, banks are the source of long-term credit. It holds the view that banks have the power to determine the profitable assets and risks in advance (Levine, 2002), and banks improve efficiency with the prior information from investors and firms. While in a finance market-based system, investors source long-term funds from equity and bonds. Stiglitz (1985) highlights the effectiveness of financial markets in providing information quickly.



Figure 1.1 Key Role of Financial Institutions

The conceptual framework has been drawn from the various theories of the finance-growth nexus. Figure 1.2 displays the three main indicators of financial development: Bank credit—this variable reflects the amount of funds available and transfers within a period (Ductor & Grechyna, 2015). The broad money supply, M3, is an indicator of financial depth; high liquidity implies depth in the banking system. Interest rates are an important instrument in monetary policy. McKinnon-Shaw financial liberalization theory suggests that interest rates are determined by market forces, thereby improving savings and their allocation. Moreover,

neoclassical economists posit that interest rates reflect the cost of capital, influencing investment decisions. So, banking credit and monetary policy operate through the interest rate mechanisms. Another important indicator of financial development is stock market capitalization, which reflects improved firms' valuation and investors' confidence, promoting investor markets and growth. The combined market capitalization of the Bombay Stock Exchange and the National Stock Exchange has been utilized in the study. These indicators represent the depth of a financial system and its efficiency in allocating resources. The framework assumes that increased financial depth improves credit distribution and liquidity, which further enhances capital formation and thereby economic growth.

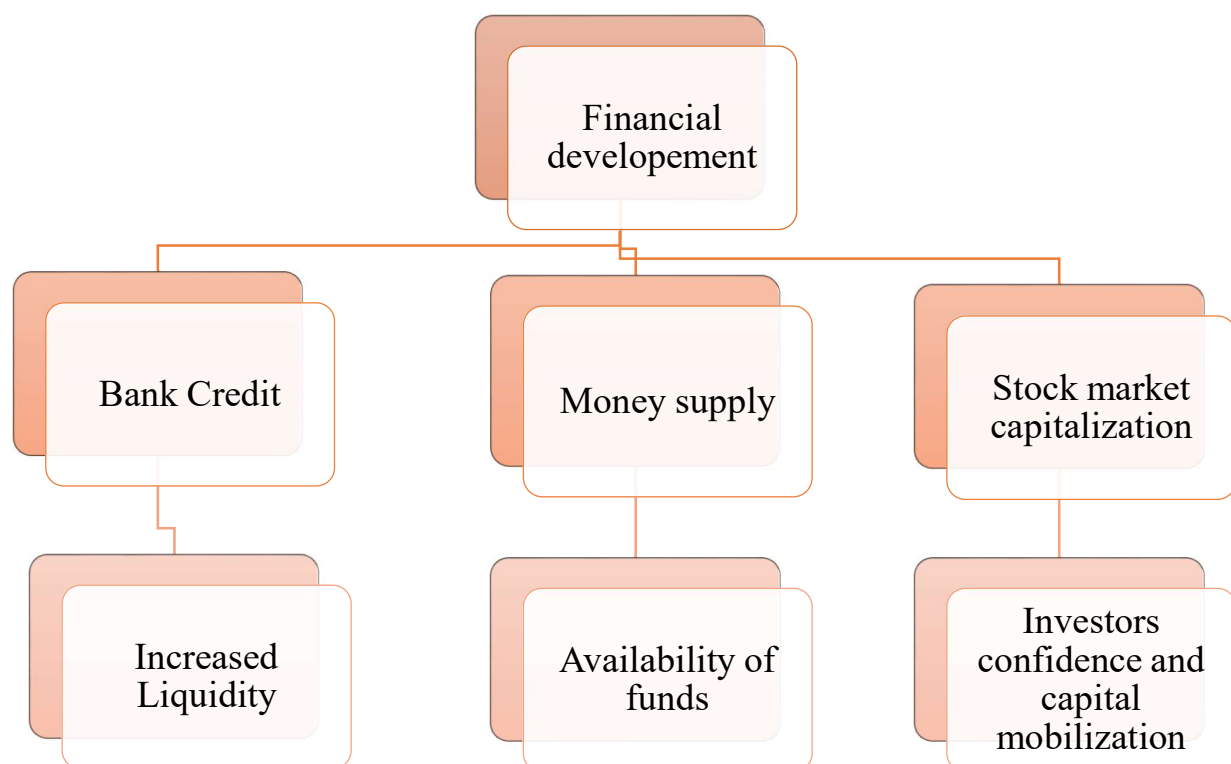


Figure 1.2 Structure of Financial Development

The second part of the framework is the cyclical interaction between the indicators of financial development and real economic activity. By analyzing business cycles, financial cycles, and monetary cycles, this study examines how these variables behave during times of expansion and contraction. It also aims to understand how financial booms contribute to fluctuations in economic growth. Furthermore, it also captures the long-run relationship between financial and business cycles, whether financial cycles lead or lag business cycles.

Together, this framework offers a comprehensive perspective on the depth of financial development and financial stability.

1.3 Statement of the Problem

Since the mid-20th century, achieving sustainable economic growth has been the primary macroeconomic goal of any nation, particularly in the context of Europe's post-war recovery and the developmental challenges faced by newly independent Asian and African countries. Many theories of growth and development have been proposed by prominent economists, including the Harrod-Domar model, Joan Robinson's Golden Age model of economic growth, Solow's model of growth, Romer's endogenous growth model, and others. While these theories emphasize capital, labor, and innovation, the efficiency of financial institutions has gained prominence in recent decades. The positive link between financial development indicators and economic growth is evident in more developed countries, and it holds that these countries have also developed robust financial markets. Indeed, many consider the important role of financial development in achieving high economic growth. In contrast, the famous classical dichotomy of (Patinkin, 1965) suggests that monetary and financial variables are independent of real economic variables, such as income, output, and economic growth. This theory posits that money and financial structures play neutral roles in contemporary economic development, suggesting that they do not directly determine economic growth and development. John (Robinson, 1952) emphasized "that where enterprise leads, finance follows," implying that causality flows from economic growth to financial development. Likewise, development economists, including Nobel laureates, paid limited attention to the role of finance in the process of economic development. (Lucas, 1988) further argued that economists tend to overemphasize the role of financial factors in economic growth; instead, economic development creates demand for specific types of financial instruments and arrangements, to which financial systems naturally adapt.

Empirical studies have contributed to the positive relationship between finance and growth; however, there are still some gaps that need to be filled. While several studies examine the positive relationship between bank credit and economic growth, they overlook whether the same relationship holds at the state level. Given the regional disparities in terms of infrastructure, banking credit, and industrial base, the relationship between them might differ, motivating the need to do a disaggregated analysis. This insight motivates a more nuanced inquiry into whether the credit-growth nexus is uniform. Moreover, there's still a long-standing

debate about whether financial development leads to economic growth or it's the other way around. This study will examine the direction of the relationship between financial development and economic growth.

This study contributes by examining all the financial development indicators together. Money supply and banking credit have been widely studied. However, the combined market capitalization of BSE and NSE is still unexplored as a driver of growth in the context of liquidity and capital formation. At the same time, financial intermediation has led to a virtuous circle of savings, promoting investment, and in turn economic growth (Joshi, 2016). Rising NPAs and liquidity mismatch further question the efficiency of the banking system in supporting real growth. This study, therefore, provides updated evidence on the relationship between financial development and economic growth.

While it's well established that bank credit and broad money supply have a positive influence on India's economic growth, there's limited research on how these variables interact with each other during periods of crises and structural shocks. India has experienced instability over the last four decades, such as the balance of payment crisis of 1991, the global financial crisis of 2008 and the COVID-19 pandemic. These crises have also impacted the stock market, the most volatile segment of the financial system. Therefore, this study focuses on examining the impact of these shocks on the finance-growth nexus by incorporating the crisis-period dummy variables, thereby offering a richer and better understanding of the dynamic relationship involved.

While several studies examine the linear effect of financial development on economic growth, others suggest the presence of a non-linear relationship. As (Cecchetti & Kharroubi, 2012) illustrate, a U-shaped relationship between financial development and economic growth; beyond a certain point, it starts negatively affecting GDP. For example, (Louis, Berkes, & Panizza, 2015) emphasize that once domestic credit to the private sector reaches 100% of the GDP, it negatively affects growth. These findings motivate a more nuanced inquiry into whether a finance-growth threshold exists. While threshold effects have been studied in the context of the banking sector, there is limited evidence related to the stock market. To address this gap, this study incorporated threshold regression to investigate whether the stock market exhibits a regime-specific effects on economic activity.

While economists generally reached a consensus on the essential role of financial development in economic growth theoretically, the Indian financial sector has experienced a large and negative credit-output gap since 2012 (MacDonald & Xu, 2022). In this context, this study aims to fill the existing gap in the literature by empirically examining the cyclical role of the financial system in influencing India's economic growth. The global literature has increasingly focused on financial cycles; however, it remains limited in the context of India, despite the country's exposure to multiple crises and shocks. Firstly, existing studies rely on the long-run or co-integrating relationship and do not explain how financial variables behave during expansion or contraction. Secondly, few studies examine the lead-lag relationship between financial markets and real economic activity. Thirdly, studies rarely incorporate SVAR to distinguish between the contemporaneous and long-term interactions among financial and business cycles. This study addresses the gap by incorporating SVAR on cyclical values and the lead-lag relationship to examine how financial shocks transmit to real economic activity, providing a macro-financial assessment.

1.4 Research questions

Understanding the complex relationship between financial development and economic growth, particularly in developing countries like India, remains a significant area. The study aims to address questions to explore the combined impact of various financial development indicators on economic growth. The research questions outlined below guide the objectives of the study:

- Do banking sector development and its indicators exhibit a correlation with India's real GDP growth rate?
This question investigates whether banking credit can be a catalyst for India's economic growth.
- What is the effect of monetary aggregates on the real GDP growth rate?
This question investigates whether the NM3 positively influence consumption and investment behavior.
- What role does the combined market capitalization of NSE and BSE play in predicting India's economic growth trends over time?
This question examines whether the increased market capitalization leads to long-term financial development and investment-led growth.
- Does a financial cycle exist in India, and if so, does it lead or lag the business cycle?

This question answers whether fluctuations in credit and money supply cycles influence GDP cycles.

1.5 Objectives

The main purpose of this study is to examine the relationship between financial development and economic growth in India. Unlike the developed nations of Europe and America, India continues to follow a bank-based financial system, where credit and monetary aggregates play a central role in financing economic activity. Following (Levine R. , 1997) and (Beck, Levine, & Loayza, 2000), this study employs total credit issued by scheduled commercial banks and non-food gross bank credit, along with the other two indicators, broad money supply and the combined market capitalization. These measures provide a comprehensive view of both the banking and market-based segments of the financial system.

Specifically, the following are the objectives of the study:

- 1- To examine the relationship between the banking system credit and the real gross domestic product of India.
- 2- To examine the effect of NM2 and NM3 (broad money) on the economic growth of India.
- 3- To examine the relationship between the combined market capitalization of NSE and BSE and India's economic growth.
- 4- To determine the financial cycle in India.

1.6 Hypotheses

The following hypotheses are to be tested in the study. These hypotheses are listed below, objective-wise:

O_{1A}: To examine the impact of banking credit on economic growth.

H_{1a}: There is no significant long-run relationship between non-food gross bank credit (NFGBC) and GDP.

H_{2a}: Agricultural credit has no significant impact on the GDP.

H_{3a}: There is no significant relationship between lending rates and GDP.

O_{1B}: To identify if the long-run relationship exists between bank credit and GDP among Indian states.

H_{1b}: There is no co-movement between bank credit growth and GDP growth at the state level.

H_{2b}: There is no significant long-run relationship between bank credit and GDP across Indian states.

H_{3b}: Bank credit does not cause GDP in Indian states.

O₂: To determine the influence of broad money (M3) on economic growth.

H_{2a}: There is no long-run relationship between M3 and GDP.

H_{2b}: The impact of M3 on GDP growth is not linear during the period of economic shocks and crises.

H_{2c}: Inflation (CPI) has no significant effects on GDP.

H_{2d}: Inflation (CPI) has no significant effects on GDP during structural instability.

H_{2e}: Interest rates do not have a more direct impact on GDP across the sample.

H_{2f}: The financial crisis of 2008 has no short-run significant effects on GDP.

H_{2g}: The COVID-19 pandemic has no short-run impact on GDP.

O₃: To examine the relationship between the market capitalization of BSE and NSE and economic growth proxied by IIP.

H_{3a}: There is no significant long-run relationship between combined stock market capitalization and economic growth.

H_{3b}: Crude oil has no significant impact on India's economic growth.

H_{3c}: COVID-19 has no significant short-run and long-run impact on economic growth.

H_{3d}: There is no nonlinear relationship between market capitalization and economic growth.

O₄: To determine the financial cycles in India.

H_{4a}: Financial cycles measured through non-food gross bank credit (NFGBC), credit-to-GDP ratio, and construction GDP (house prices proxy) do not exhibit cyclical components.

H_{4b}: The financial cycles do not differ significantly in duration or amplitude from business cycles.

H_{4c}: Credit cycles are not synchronized with business cycles.

H_{4d}: Credit cycles do not lead business cycles.

H_{4e}: There is no structural relationship among credit, investment and business cycles.

1.7 Methodology

To achieve the first objectives of the study, this research, grounded in extensive literature on the finance-growth nexus, employs various combinations of econometric tools. The first objective uses both national and state-level data; this dual approach enables the examination of whether bank credit acts as a driver of growth at both levels. At the national level, the study uses data from 1980 to 2021, including indicators like non-food gross bank credit (NFGBC), agriculture credit, spliced GDP (2011-12), and the lending rate. At the state level, annual data on bank credit by commercial banks is used, limited to 32 states from 2001 to 2021 due to data availability. State-level GDP is based on GDP at factor cost/GVA, with data standardized to the 2011-12 base year for consistency. All variables are transformed into natural logarithms, except the lending rate, which serves as a control variable. Data are sourced from the Reserve Bank of India (RBI), 'Handbooks of Indian States.' The study applies the autoregressive distributed lag (ARDL) model and the panel ARDL model for the estimation.

Moving on to the second objective, the study examines the impact of monetary aggregates on economic growth. Broad money supply (M3) is directly linked to India's growth and serves as an important indicator (Kutumbale & Phatak, 2018); (R, 2018). The time frame set for the study is 1980 to 2021. As far as prices are concerned, the consumer price index (CPI) has been utilized to represent the movements in prices and call money rates (interest rates) as an important channel of monetary policy transmission. The data is sourced from the India Monetary Policy Report (RBI), the Ministry of Statistics and Programme Implementation (MoSPI), and the International Monetary Fund (IMF). The real GDP and M3 are transformed into logs, while CPI and IR growth rates are used. The ARDL model, bound tests, and error correction mechanism (ECM) are employed to analyze the short-run and long-run dynamics between them. Additionally, dummy variables are incorporated to capture the effects of the financial crisis and COVID-19 on the relationship between M3 and GDP.

To capture the impact of the combined market capitalization on economic growth, the BSE, NSE, and the global indicator, Brent crude oil, are employed. The study covers a monthly frequency from April 1996 to December 2021. Monthly real GDP is spliced at a common base

of 2011-12. The data are sourced from the Handbook of the Indian Economy (RBI), FRED, and MoSPI. Market capitalization serves as a measure of the depth of financial markets; it reflects the share of all listed equities as a percentage of GDP (Levine & Zervos, 1996); (Demirgüç-Kunt & Levine, 1996), capturing volatility in the equity market. A combined market capitalization is computed by summing the BSE and NSE market capitalization. To account for the impact of economic shocks such as the dot-com bubble burst, the financial crisis and COVID-19, dummy variables are introduced. The ARDL approach is applied to examine the short-run and long-run relationship between these variables. Moreover, the non-linear regression analysis is computed using the Threshold regression for the identification of critical points beyond which the stock market's influence on output may shift.

The final objective is to determine the characteristics of financial cycles in India from 1980 to 2021, utilizing annual data. Using the HP filter, cyclical components in credit, the credit-to-GDP ratio, house prices, and economic growth are captured. NFGBC is included to capture the credit flow in the economy. Other variables like M3 and gross fixed capital formation (GFCF) are incorporated to represent the monetary and investment trends. The peaks and troughs are determined through visual inspection of the HP-filtered series. The study evaluates the lead-lag behavior of credit, money, and investment cycles, thereby offering insights into whether financial indicators serve as an early warning indicator for volatility in real economic output. Furthermore, Structural Vector Autoregression (SVAR) analysis is undertaken to examine the structural relationship between credit, investment and business cycles, if shocks in one variable cause systemic, predictable changes in another variable.

1.8 Rationale of the Study

India is an emerging economy, making it essential to identify the drivers of economic growth and support strategic economic planning. The finance-growth relationship in India has evolved over the years, especially after the post-liberalization reforms. This research significantly contributes to the existing understanding of the relationship between financial development and economic growth. While existing literature has extensively explored this relationship, some major indicators of financial development have been overlooked. Although some research focuses on the banking industry and others concentrate on the stock market, few have combined these areas to assess their collective impact on long-term growth. This study examines multiple components of the financial system—bank credit, money supply, and stock market—across a

long period (1980-2021), encompassing financial reforms, crises, and structural shifts experienced by India.

Furthermore, this study further extends the literature by conducting a panel analysis across 32 Indian states. Using bank credit growth and GDP growth rates, it examines whether the variations in the bank credit actually contribute to the GDP growth across the states, capturing regional disparities and the efficiency of the financial system in influencing economic growth.

In addition, this study adopts a multidimensional approach by capturing both cyclical and structural dynamics and contributes to the evolving literature on financial cycles in India, which has gained importance after the 2008 global financial crisis. These uncertainties indicate that liquidity surges, credit booms, and market fluctuations can influence growth. While prior studies captured the cyclical co-movements between financial cycles and macroeconomic indicators, they did not examine the lead-lag relationship or the direction of causality among them. This study addresses the gap by using the Hodrick-Prescott filter to extract cyclical components and then employing lead-lag analysis to uncover dynamic interactions. Another important contribution of this study is the structural relationship between financial market shocks and business cycles using Structural Vector Autoregression (SVAR). While the VAR models are atheoretical, the SVAR allows the imposition of short-run and long-run restrictions. Applied to the cyclical components, this enables a better understanding of the transmission of financial shocks to real economic activity.

In summary, this study particularly emphasizes going beyond the linear relationship between the indicators of financial development and economic growth by incorporating dummy variables for periods of structural shocks. This approach facilitates understanding the influence of financial development on economic growth during periods of shocks and uncertainty. In addition, the study makes a significant methodological contribution by incorporating Threshold regression, which helps identify the different levels at which the stock market impacts economic growth. The findings enable policymakers to design forward-looking strategies and macroprudential policies aimed at maintaining a stable financial system and promoting sustainable economic growth. This approach can also help investors, regulators and financial institutions to see which parts of the financial system are more vulnerable to shocks and how intervention can promote stability and long-term growth.

1.9 Organization of thesis

This thesis is composed of the following components: First of all, it covers three core components of financial development in India: banking credit, monetary aggregates, and stock market performance and their influence on overall economic growth. Second is the interaction between the variables during the period of economic crisis and structural shocks. The study employs a multidimensional approach and examines the channels through which financial development transmits in the real economy, like interest rates, capital formation, and inflation, using multiple time approaches, depending on the variability and nature of the variables.

The thesis comprises **nine** chapters: introduction, overview of financial development and economic growth, literature review, methodology, four empirical analyses, and conclusion.

The first chapter presents the research context and background, which reflects the pioneering role of Schumpeter in the finance-growth nexus, followed by the financial reforms comprising banking, capital, and other reforms and their impact on the development of the financial system. Additionally, it includes the statement of the problem, research questions, the objectives and hypotheses to be investigated, followed by the data and methodology, research significance, and overall research design.

The second chapter provides an overview of financial development and economic growth. This chapter presents the structure of the Indian financial sector, followed by the theoretical literature on the finance-growth nexus. Moreover, it highlights important indicators of financial development, the overall background of financial development, and economic growth. Additionally, it outlines the evolution of financial development and macroeconomic indicators using recent trends and charts. Lastly, it addresses the challenges faced by the Indian financial system.

The third chapter offers a theoretical and empirical review of the relationship between financial development and economic growth. This includes key indicators such as bank credit, broad money supply, and the stock market, along with cyclical dynamics. The chapter discusses how these financial development indicators influence economic growth across different countries, highlighting various findings and insights.

The fourth chapter details the methodology and variables used in the study. The chosen time frame is 1980 to 2021 to capture both pre- and post-liberalization economic growth. It also

specifies the sources of the variables. Advanced econometric tools such as ARDL, SVAR, Threshold regression, the HP filter, and lead-lag cross-correlation are employed to analyze both the structural and cyclical relationships among the variables.

Chapters five through eight present the empirical analysis. These chapters examine 1) the relationship between banking credit and economic growth, 2) the relationship between broad money supply and economic growth, 3) stock-market growth analysis, and 4) the characteristics of financial cycles and their interaction with business cycles.

Finally, the ninth Chapter presents the findings of the study, providing a detailed conclusion. It discusses the policy implications for the government and policymakers, and also acknowledges the limitations of the study. This also extends a few recommendations for future research.

Chapter II

AN OVERVIEW OF FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN INDIA

This chapter provides a comprehensive overview of financial development and its interaction with economic growth in India. It begins by examining the structure of financial systems and the indicators that have influenced the economy's development over time. Also engages with the major theoretical perspectives, such as Schumpeter's hypothesis, McKinnon-Shaw's framework and endogenous growth theory, asserting the positive influence of financial development on economic growth. The predominant view suggests that investment depends on savings and that financial intermediaries allocate these savings into productive investments. The chapter aims to establish a foundation for understanding the institutional and conceptual basis of India's financial development. To support this, different macroeconomic and financial development indicators were visually analyzed.

To achieve this, the chapter is structured as follows: the subsequent sections present the structure of the Indian financial sector, highlighting the role of Scheduled Commercial Banks (SCBs), Non-Banking Financial Companies (NBFCs), and Development Financial Institutions (DFIs) and the segmentation between money and capital markets. This is followed by a theoretical framework, highlighting monetary theories and finance-growth models. Section 4 introduces a classification of financial development indicators, categorized into three subsections: access, depth, and stability. Section 5 reviews the background of the financial development and economic growth nexus. Section 6 highlights the evolution of financial development and economic growth. Finally, the last section discusses the challenges the Indian economy has faced in terms of both economic growth and financial development.

2.1 Structure of the Indian Financial Sector

Financial development is characterized by the growth of financial services provided by banks, financial institutions, and other intermediaries. An effective and robust financial system, comprising financial institutions such as commercial banks, non-bank financial institutions, and financial markets—including money markets, stock markets, bond markets, and foreign exchange markets—plays a crucial role in driving and expanding economic growth. These

institutions act as intermediaries between suppliers and borrowers. They generate information and direct resources to their most productive uses, facilitating optimal resource allocation. They enhance economic growth by boosting aggregate savings and facilitating effective investment, thereby accumulating physical capital. Furthermore, financial development supports competition and stimulates innovation, thus promoting dynamic efficiency. Consequently, sound and efficient financial systems channel savings into more profitable investments. Financial institutions are classified into depository and non-depository institutions based on the services they offer. Commercial banks and credit unions are depository institutions that raise funds from individual and business deposits. These banks mobilize savings through time and demand deposits, known as demand deposits, creating liquidity and facilitating money creation in the economy. In contrast, insurance companies, mutual funds, and provident funds are non-depository institutions. They cannot source funds from the savings or deposits of individuals. Instead, they acquire funds by selling their securities, with premiums serving as the primary source of funding. Unlike depository institutions, these institutions are not regulated by the government. The IRDA Act of 1999 serves as a regulator for these insurance companies.

DFIs played an important role in the overall development of India's financial system. These institutions were established to provide medium- to long-term credit to sectors like infrastructure, industry, agriculture, and small- and medium-scale enterprises. The first successful DFIs were set up in 1948: the Industrial Finance Corporation of India, the Industrial Development Bank of India (1964), and the Industrial Credit and Investment Corporation of India (1955). Other important DFIs include the National Bank for Agriculture and Rural Development (established in 1981) and the Small Industries Development Bank of India (established in 1990). The RBI and the government funded DFI's occasional loans through National Industrial Credit. In addition to this, NBFCs play an important role in financial development, registered under the Companies Act 1956, depending on their business activities. They do not hold a banking license but perform banking activities. These are the last resort for the unbanked and underbanked sectors, including those in rural areas. These NBFCs source themselves by borrowing advances from the commercial banks and the government and by issuing securities.

The following chart, Figure 2.1, represents the vicious cycle of financial development, wherein the funds are supplied and demanded through institutions and financial markets, mobilizing savings into productive areas and creating capital.

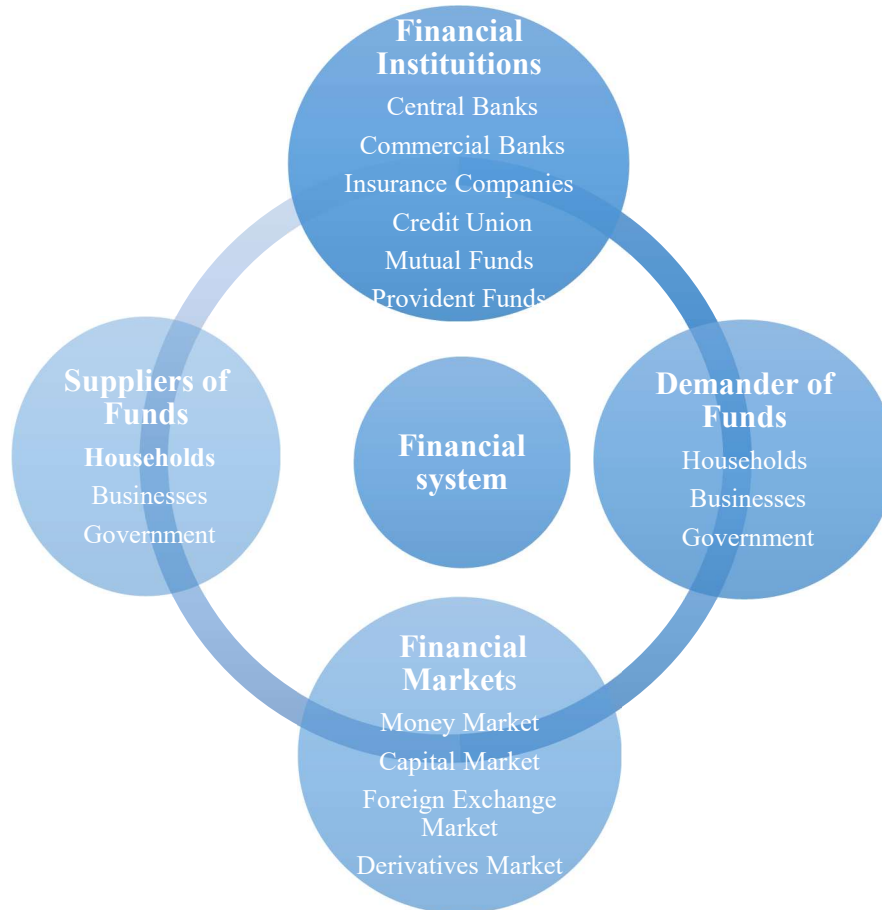


Figure 2.1 Cyclical interactions within the financial system

Money markets provide short-term funds that serve as close substitutes for money, such as securities, primarily focused on their demand and supply. Borrowing and repayments occur over a period ranging from a day to a year. In India, the money market is further divided into organized and unorganized sectors. The organized sector includes the Reserve Bank of India, the State Bank of India, Commercial Banks, Cooperative Banks, and Non-Bank Financial Institutions, all of which are regulated by the RBI. The unorganized sector comprises private moneylenders and unregulated financial institutions, traditionally managed by families and individual committees. The RBI oversees liquidity conditions in India through the money market. A well-regulated money market indicates an effective monetary policy. Various instruments are utilized in the money market, including call money, representing overnight lending for up to 14 days; treasury bills and cash management bills, issued at a discount and

sell by the RBI on behalf of the central government; ways and means advances, which are temporary loans or overdraft facilities provided to both central and state governments; certificates of deposit, which are securities issued by scheduled commercial banks; commercial paper, representing an unsecured short-term loan issued by corporations; and trade bills, negotiable instruments issued by buyers and sellers, each designed to meet the needs of participants. The money market plays a crucial role in ensuring financial stability and the proper functioning of financial institutions.

While the money market caters to short-term needs, the capital market serves long-term financial requirements by selling stocks and bonds. Indian capital markets consist of the primary market, secondary market, mutual funds, and foreign institutional investors. The primary market is where new shares, debentures, and bonds are issued, such as Initial Public Offerings (IPOs) and Follow-on Public Offerings (FPOs), while in the secondary market, existing shares are traded, such as the Bombay Stock Exchange, the oldest stock exchange, established in 1875, and the National Stock Exchange, founded in 1992. Additionally, mutual funds serve as a platform that pools money from investors for investment in stocks, bonds, and short-term money markets. Foreign Institutional Investors (FIIs) bring foreign capital into the domestic country and are registered under SEBI, contributing to liquidity. Capital markets are further classified into debt and equity markets. Debt markets provide a platform for trading debt instruments like bonds and debentures, essentially a type of loan primarily issued by corporations and governments. This involves lower returns and is often less risky. The equity market represents ownership shares in a company and typically involves high returns; however, it carries more risk.

The role of financial institutions in economic growth has been under discussion since (Schumpeter, 1911). Well-developed financial institutions foster economic growth, and for a better understanding of the nexus between financial development and economic growth, it's important to understand the theories behind them.

2.2 Theoretical framework

2.2.1 The theory of economic development

(Schumpeter, 1911) emphasized that banks have the power to create purchasing power out of nothing, enabling them to use this for innovation to improve the quality of financial activities and stimulate economic growth. The entrepreneur can break the monotonous cycles and bring

about new changes or innovations, and this is known as creative destruction. A new combination of factors of production, products, and methods is called innovation. The services provided by financial intermediaries involve allocating savings into productive channels that foster technological and economic development. Since these intermediaries act as a bridge between savers and borrowers, they have the discretion to choose which firms to source savings from, ensuring efficient allocation. They not only channelize savings but also create credit. The post-liberalization era focused on market-oriented policies, increased private participation, technological development, and globalization. The development of OLA, Uber, Zomato, and Amazon illustrates Schumpeter's innovation in the modern economy. A positive relationship between financial innovation and growth is supported by researchers (Nazir , Tan, & Nazir , 2020) (Qamruzzaman & Jianguo, 2018). Another important aspect is credit availability, like the Pradhan Mantri Mudra Yojana, which was launched in 2014. It has played an important role in funding non-corporate, small, and micro enterprises by providing loans of up to ₹20 lakhs in 2024. More recently, financial technology (fintech) has made it easier and more accessible to fund small and medium enterprises. Fintech is a technology-driven financial innovation that utilizes information and communication technology to deliver efficient financial services. India's fintech sector is ranked 4th worldwide, receiving significant investments and securing 21% of the total funding sourced by Indian startups across all sectors.

2.2.2 Supply-Leading and Demand-Following Hypotheses

These hypotheses were formulated by (Patrick, 1966), who suggested that a causal relationship explains the direction between financial development and economic growth. The supply-leading hypothesis supports the view that financial development acts as a catalyst for economic growth. As the financial institutions and markets expand their financial services, there's growth in the real sector. There are several channels through which financial development influences growth: by helping to allocate tangible wealth and resources from savers to investors, increasing the rate of physical capital, and providing savings. (Schumpeter, 1912), (Goldsmith R. , 1969), and (McKinnon, 1973) support the supply-leading hypothesis. Additionally, GDP growth in the post-1991 period resulted from financial liberalization and reforms. The GDP growth rate increased to 6-7%, which was earlier 3-4% before 1991. The banking services expanded with the entry of private banks and foreign banks. The demand-following hypothesis posits that as the real sector develops, the demand for financial services also grows, which means financial developments respond to economic growth (Robinson, 1952). Recently,

(Karimo & Ogbonna, 2017) argued that there exists a neutral or feedback hypothesis between financial development and economic growth, suggesting a mutual or bidirectional relationship. The findings align with those of (Chow, Vieito, & Wong, 2019), who also reported a bidirectional relationship between financial development and economic growth in India.

The direction of the relationship between financial development and economic growth depends on the phases of growth. In early phases, the supply-leading hypothesis exists; both the savers and investors benefit from developed financial systems. Later, the demand for financial services increases because of economic growth. It can be concluded that in the initial phase of growth, a supply-leading hypothesis exists, and the demand-following hypothesis prevails later.

2.2.3 McKinnon and Shaw Hypothesis

They coined the term "financial repression" in 1973, which refers to the strict regulation and intervention of the government that affects the volume of investment. High interest rates, restrictions on international capital movements, reserve requirements imposed on commercial banks, new banking entrants, and unconventional monetary policy. They introduced two channels through which financial development influences economic growth, i.e., savings and investments. Before 1991, international capital flows were restricted by various tariffs and quantitative restrictions. These restrictions discouraged savings, investments, and economic growth. They argued that financial liberalization is the most effective way to boost economic growth, particularly in developing countries. Gradually, after 1991, India's government lifted these restrictions through financial reforms. The cash reserve ratios and statutory liquidity ratios declined to 10% over four years and 25% within three years, respectively. Administrative constraints were eliminated, and new private banks were encouraged. The Securities and Exchange Board of India (SEBI) was set up to regulate the capital market. Financial deepening increased to 45% in 1990 and to approximately 80% by 2010 (Pal, 2014).

They refuted the traditional practice of keeping below-the-level-of-interest rates, as low interest rates decrease the overall efficiency of investment, and put forward a hypothesis reflecting a complementary relationship between money and physical capital.

$$\frac{M}{P} = F(Y/P, I/Y, d-i)$$

Where $\frac{M}{P}$ is the broad money supply.

Y/P is the real GNP.

I/Y is a gross investment.

$d-i$ is the real deposit rate of interest.

This implies that if $d-I$ is greater, indicating high real returns, it encourages financial deepening and the effective mobilization of resources, thereby inducing economic growth. The post-1991 reforms encouraged savings and investments, leading to greater monetization of the economy.

2.2.4 Endogenous Growth Theory

(Lucas, 1988) identified three key elements crucial for economic growth. Lucas believed that economic growth is not only dependent on external factors but also on internal factors like research and development, human capital, and technological progress. This study further emphasized the role of financial intermediaries; economies with active intermediaries tend to have high growth rates (Romer, 1990). The higher level of investment and productivity leads to economic growth, as production with greater knowledge leads to better returns. Investments in education lead to human capital formation. (Levine, 1996) suggested that technological advancements reduce transaction costs. Financial development is a predictor of technological advancement and growth, particularly in developing economies. (Greenwood & Jovanovic, 1990) identified the channel through which financial intermediaries allocate funds. The financial system provides liquidity, minimizes risk, and transforms savings into efficient investments. (Bencivenga & Smith, 1991) developed an endogenous model that stresses the important role of financial intermediaries in generating liquidity, suggesting that savers should invest in productive assets. (Michalopoulos, Laeven, & Levine, 2009) emphasized financial innovation as a key driver of growth. They built a model that involves financial entrepreneurs who can earn monopolistic profits by investing in better goods.

2.2.5 Financial Intermediation Theory

Financial intermediation is a financial entity that bridges the gap between different economic units: borrowers and lenders. It mobilizes funds into productive channels, including depositary institutions, investment banks, mutual funds, and insurance companies. Key players in the Indian financial intermediation sector include banks, NBFCs, and mutual funds. This concept

originated with (Gurley & Shaw, 1960), who emphasized that financial intermediaries mitigate information asymmetry between borrowers and lenders. Financial markets possess better information than others about the creditworthiness of borrowers with the help of proper monitoring and screening, which helps avert problems of adverse selection. Another important aspect is the reduction of transactional costs due to the available marketplace (Benston & Smith, 1976). It also relies on the various technologies used by the participants; by lowering the costs, they can reap the economies of scale. This trend was observed in India due to increased participation by private banks and foreign banks, leading to an improvement in overall efficiency and a decline in operating expenses from 2.77% in 1996 to 2.11% in 2006. Finally, an important aspect of financial intermediation is the creation of money. The end product provided by intermediaries consists of loans and advances given to customers, while the input is the deposits from participants. They also facilitate a smooth payment system by enabling electronic transfers and card payments.

The contribution of NBFCs to lending increased from 6% in 2008 to 15% in 2017. They began providing loans to small and medium enterprises because bank loans were primarily utilized by large corporations. MSMEs constitute 37% of industrial output, and even then, only 5.7% have access to formal institutional credit. COVID-19 significantly impacted these institutions, but NBFCs played an important role in maintaining liquidity (Ray, 2022).

2.3 Indicators of Financial Development

Financial development is understood by two pillars: financial institutions and financial markets, often measured by indicators that reflect the accessibility, depth, efficiency, and stability of financial services and the structure of the financial system. The perfect measure of financial development does not exist, so prior literature has employed proxies for financial intermediaries and stock markets. Private sector credit as a percentage of GDP is considered an important indicator, which is strongly correlated with long-run growth and reflects the depth of financial institutions (Beck, Levine, & Loayza, 2000). However, it is not the only indicator; the degree of competition among the banks reflects the efficiency of the banks (Claessens & Laeven, 2005).

A) The depth of financial systems illustrates the accessibility of financial markets, which can be measured by

1. The ratio of liquid liabilities to GDP represents the broad size of intermediation in the economy. This includes the broad money supply (M3), demand deposits, time deposits held with the banking sector, and certain liabilities of non-banking financial intermediaries.
2. The ratio of banking credit to GDP represents the private credit extended by financial institutions as a share of total GDP.
3. The ratio of stock market capitalization to GDP reflects the value of listed companies. It captures the size of the stock market as a percentage of GDP, including the BSE and NSE market capitalization.

B) The structure of the financial system illustrates who holds a more empowering or dominant role in the economy: banking or the capital markets, broad money or the narrow money, which can be measured by

1. The ratio of banking credit to stock market capitalization determines whether the economy is bank-based or market-based; India is a bank-based economy, with more credit flowing through banks.
2. The ratio of broad money to narrow money, where narrow money is the most liquid form of money and broad money comprises currency along with demand and time deposits. Savings deposits increase more as the financial market expands than the transaction balances.

Another important indicator reflecting the size of the financial services sector is the total assets of the financial sector, which encompass the assets of commercial banks, central banks, and other non-banking financial institutions. Additionally, the value traded in the stock market as a percentage of GDP, called the Value Traded Ratio (TVT), is another indicator that reflects the efficiency of stock markets (Levine & Zervos, 1996). Along with the domestic turnover ratio, financial efficiency is also reflected by the return on assets (ROA) or the return on equity (ROE). ROA illustrates how profitable the banking system is working and utilizing its assets and operational health. ROE represents the net profit divided by its average total capital for the last year and the current year. Another key indicator is net interest margin (NIM). The World Bank defines it as the accounting value of a bank's net revenue as a share of its average interest-bearing assets. Additionally, the deposit-to-loan ratio indicates the proportion of deposits that are converted into loans (Wang, Chen, Hu, & Xu, 2014).

Lastly, stability is another aspect that highlights the resilience of the market to economic shocks. Non-performing assets (NPAs) are defaulted loans or advances; the borrower has failed to repay, and if it continues, the NPA stops generating income for the bank. The z-score, which compares the capital and returns with risk a higher z-score indicates greater financial stability and less chance of insolvency. Similarly, stock price volatility and price-earnings ratio illustrate the stability in the stock market. Stock price volatility reflects the degree of fluctuations in the returns of the stock market over time. While the P/E ratio evaluates a stock's worth by dividing the stock price by earnings per share, a high P/E ratio suggests instability and overvaluation.

Table 2.1 Classification of financial development indicators

Dimensions	Financial Institutions	Financial markets
Depth	Non-food gross bank credit, Private credit, M3, life and non-life insurance premiums.	Stock market capitalization, international debt securities to GDP, and total debt securities to GDP.
Accessibility	Bank branches and ATMs per 100,000 adults, insurance density, and depositors with banks per 1,000 adults.	Nonfinancial corporate bonds to total debt securities, value trading excluding top 10 companies.
Efficiency	Return on assets, deposit-to-loan ratio, return on equity.	Stock market turnover ratio, trading volume.
Stability	Non-performing assets to total assets and banks' Z-score.	Stock price volatility and price-earnings ratio.

The overall health of a financial system is also reflected in interest rates; it's a financial cost borne by borrowers and the returns to lenders. And financial intermediaries can induce investments by reducing this cost (Levine, 1996). A developed financial system should have a stable rate of interest that aligns with people's expectations, encouraging them to make productive investments. Table 2.1 displays the classification of financial development indicators based on the depth, accessibility, efficiency, and stability of financial institutions and financial markets.

2.4 Financial Development and Economic Growth Background

While numerous studies have explored the financial growth dynamics, the section outlines the key work that gained recognition and frames the present analysis. (Goldsmith, 1969) gained particular recognition for documentation about financial systems and financial intermediaries. He emphasized that the bank grows larger relative to the nation's output as the economy expands. His famous work revealed a positive relationship between financial development and economic growth in 35 countries, using data from before 1964.

(King & Levine, 1993) made a major contribution to the finance-growth nexus. They used four main indicators: liquid liabilities, deposits of money to the bank, domestic assets as a percentage of deposits to the bank, domestic assets plus central bank domestic assets, domestic asset distribution, and the non-financial private sector's contribution to GDP. They conducted a panel analysis on 77 countries spanning over 30 years, from 1960 to 1989. The findings established a statistically significant and positive relationship between the financial development indicators and growth in real per capita GDP, real per capita capital stock, and total productivity. The results are consistent with the view that the financial system facilitates capital accumulation and thereby promotes economic growth. Similarly, (Leitao, 2010), employed a panel data approach to examine the relationship between financial development and economic growth for European Union countries and BRICS during the period from 1980 to 2006. The study employed a fixed effects and system GMM approach, and its findings coincide with the literature view that financial development promotes economic growth by stimulating productivity and international trade.

Furthermore, (Beck & Levine, 2004) examined whether the stock market and banking sector both influenced the economic growth from 1976 to 1998. With the help of GMM, they concluded that the efficient financial system helps with investment information and reduces transaction costs, which leads to the efficient allocation of resources. They also suggested that both banks and stock markets independently influence economic growth. In contrast, (Saci, Giorgioni, & Holden, 2009) employed the GMM techniques on 10-year annual data from 1988 to 2001 for 30 countries, utilizing variables such as domestic credit to the private sector, liquid liability or M3 as a % share of GDP, the ratio of commercial banks' assets to all bank assets for the banking sector, and the turnover ratio and ratio of value shares traded in the stock market. The findings revealed a positive relationship between the stock market and economic growth, while a negative influence of banking indicators on growth was found.

(Adusei, 2013) investigated the impact of financial liberalization on Ghana's economic growth. The study employed fixed effect ordinary least squares (FMOLS) and the ECM approach on annual data from 1970 to 2010, which found an insignificant relationship between the variables. However, this was confirmed by GMM, which also revealed that financial development indicators undermine Ghana's economic growth, which might be due to the presence of financial instability.

Numerous studies have been done, particularly in the context of India. (Lenka, 2015) employed principal component analysis (PCA) and combined 11 measures (a combination of financial institutions and financial markets) into one single index. The study concluded that financial development is a sole indicator of India's economy from 1980 to 2011. Similarly, (Lenka & Sharma, 2020) used a similar approach, PCA, to construct a financial index, and with the help of ARDL and ECM mechanisms, found a short-run and long-run relationship between the financial development index and economic growth during the period 1980 to 2017. Also confirmed a bi-directional relationship between them. However, (Chakraborty, 2010) investigated the impact of financial sector development on India's economic growth during the quarterly period from 1993 to 2005, based on the Solow growth model. The cointegration and vector error correction model (VECM) was employed, and the findings revealed a positive relationship between capital output ratio and human capital on economic growth. VECM confirmed that market capitalization of the stock market adjusts to short-run dynamics only, and no evidence of long-run impact was observed. However, interest rates had a positive impact on economic growth. (Yadav & Rani, 2024) found an insignificant relationship between Sensex, CPI and crude oil, this highlights the existence of a regime-dependent relationship between financial and real sectors.

Another important contribution (Sehrawat & Giri, 2015), who used both the financial development indicators, bank-based and stock market, to examine the influence of financial development on economic growth during the period 1982 to 2012. The cointegration and autoregressive distributed lag model (ARDL) confirmed the presence of short-run and long-run impacts of both of these indicators on India's economic growth. (Kumar, 2015) employed co-integration and Granger causality tests on quarterly data from 1991Q1 to 2015Q4 to examine the impact of M3 on GDP, and the co-integration revealed a long-run relationship between them. Interestingly, the Granger test revealed a unidirectional relationship from financial development to growth; however, no relationship was found from economic growth

to financial development. Recently, (Sahoo, 2024) found a positive relationship between Indian states' GDP and financial development during the period 2001-2018 using a pooled mean group. While foreign direct investment (FDI) negatively influenced GDP.

2.5 Evolution of Financial Development and Economic Growth in India

The efficient financial system allows for a transfer of risk to the bearers during times of crisis and fluctuations. Financial liberalization aimed to make the existing banking sector more efficient by reducing state intervention and allowing free market forces to determine the price. With high unemployment and a lack of knowledge, the only financial investment options were investments in gold, safety offered by banks, company deposits, and government-sponsored small savings schemes, which were highly state-regulated. The economic growth has experienced a dynamic transformation in the post-reform period in response to domestic policy shifts and global developments. The following section gives a brief overview of the GDP performance over the decade, highlighting the key phases of economic transformation.

2.5.1 Macroeconomic Growth Trajectory in India

Under the license Raj, characterized by central planning, heavy regulation, and an average GDP growth rate of around 3.5%, referred to as the Hindu rate, is reported in Table 2.2. After 1991, financial reforms were undertaken in many sectors to enhance the productivity and efficiency of the financial sector. These reforms reflected the positive impact on average GDP growth, which increased to 6.1% in 1992, sometimes also called the "New Hindu growth rate."

Table 2.2 Macroeconomic Indicators (1990-2023), as a % of GDP

Indicators	1990	2000	2010	2020	2023
GDP growth (annual)	5.5	3.8	8.5	-5.8	8.2
Agriculture, value added	27.6	21.6	17%	18.7%	16
Services, value added	37	42.7	45	47.9	50
Gross domestic savings	21.6	24.3	34.3	27.3	29.3
Gross fixed capital formation	26	26	33	27	31

The economy recovered from negative growth rates, the impact of the oil crisis and the tensions in the Middle East. India, once a predominantly agricultural economy, has transformed into a service-driven economy, with the service sector contributing 50% of the growth of the GDP, which has emerged as a global hub for industries. India's GDP growth trend has undergone several shifts over the decades. The average GDP growth rate in 2000 was approximately 7%, up from an average of 4% over the past four decades. The GDP growth rate peaked at 8.5% in 2010. India outsources services to the global economy due to growth in financial services, information and technology communication technology (ICT), and technological advancements (Born, 2025).

Figure 2.2 depicts the fluctuations in the growth, highlighting the expansions and contractions, aligning with the reflection of the impact of structural reforms, economic crises, and evolving macroeconomic conditions. Post 1947, India experienced a sharp decline in agricultural GDP in the years 1964 and 1979, by -16.6% and -15.5%, respectively. This was caused by the poor monsoon and drought, which further caused food shortages; these factors caused GDP to decline by -3.66%.

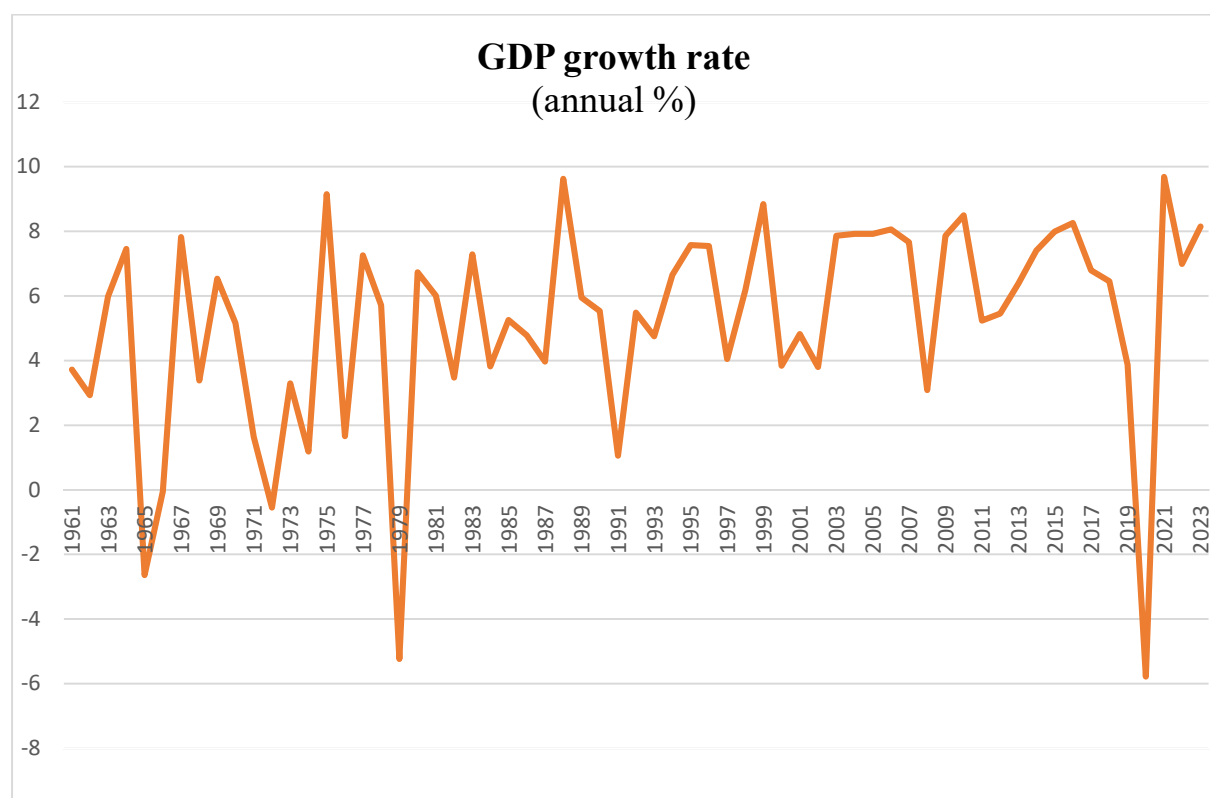


Figure 2.2 Annual GDP growth rate (1961-2023)

The global dot-com bubble in 2000-01 had a notable impact on the Indian economy and influenced many sectors, including stock market trade, the IT sector and the internet services sector. During the global financial crisis, the GDP growth rate declined from 7.6% in 2007 to 3.08%; however, recovery started immediately after due to extensive monetary and fiscal measures taken by the RBI and the central government. India imposed a nationwide lockdown in March 2020, affecting all economic sectors. According to surveys, 35% of MSMEs were on the verge of shutting down, and 13 million people lost their jobs (Ramakumar & Kanitkar, 2021). The interest rates reached an all-time high in 1992. The decline in growth was primarily due to a decline of 2.4% in the manufacturing sector.

2.5.2 Interest rate dynamics in India

While GDP growth rates reflect overall economic performance, lending interest rates play a crucial role in shaping borrowing, investments, and credit flow. According to the World Bank, the interest rate meets both short-term and long-term financing needs of the private sector. The classical theory of interest suggests that the rate of interest is determined by the interaction of demand and supply. James Tobin's theory highlights the role of interest rates in stimulating savings and investment, thereby promoting economic growth. The demand for money is influenced by the interest rate, and it is the fee charged by a lender for using the borrowed money (Teriba, 1974).

The movements in lending interest rates have shown a gradual decline in India. From 1980 to 1989, India experienced a stable lending interest rate of 16.5%. In 1992, the interest rates were the highest, standing at 18%, reflecting a tight monetary policy amid a crisis. Due to the financial reforms, it declined to 12.5% by the end of the decade. Interestingly, in 2010, it reached its lowest at 8.3% due to the post-global crisis impact. A period of moderate tightening followed between 2011 and 2015, and the rate stabilized at 10%.

Following the introduction of the marginal cost of funds-based lending rate (MCLR) in 2016, the RBI brought transparency to loan pricing. The State Bank of India, the Bank of India, and the Bank of Baroda reduced their lending rates due to the ongoing COVID-19 pandemic. The repo and reverse repo rates were also cut by 75 bps and 90 bps, respectively (ETBFSI, 2020). In 2022, the lending interest rate stood at 8.6%, which is lower than the long-term average of 13.15%. Post-pandemic, increased repo rates lead to higher lending interest rates, which can

also be seen in the graph, causing borrowers' costs to rise, thereby affecting the MSME sector (Lakayil & Shree, 2024).

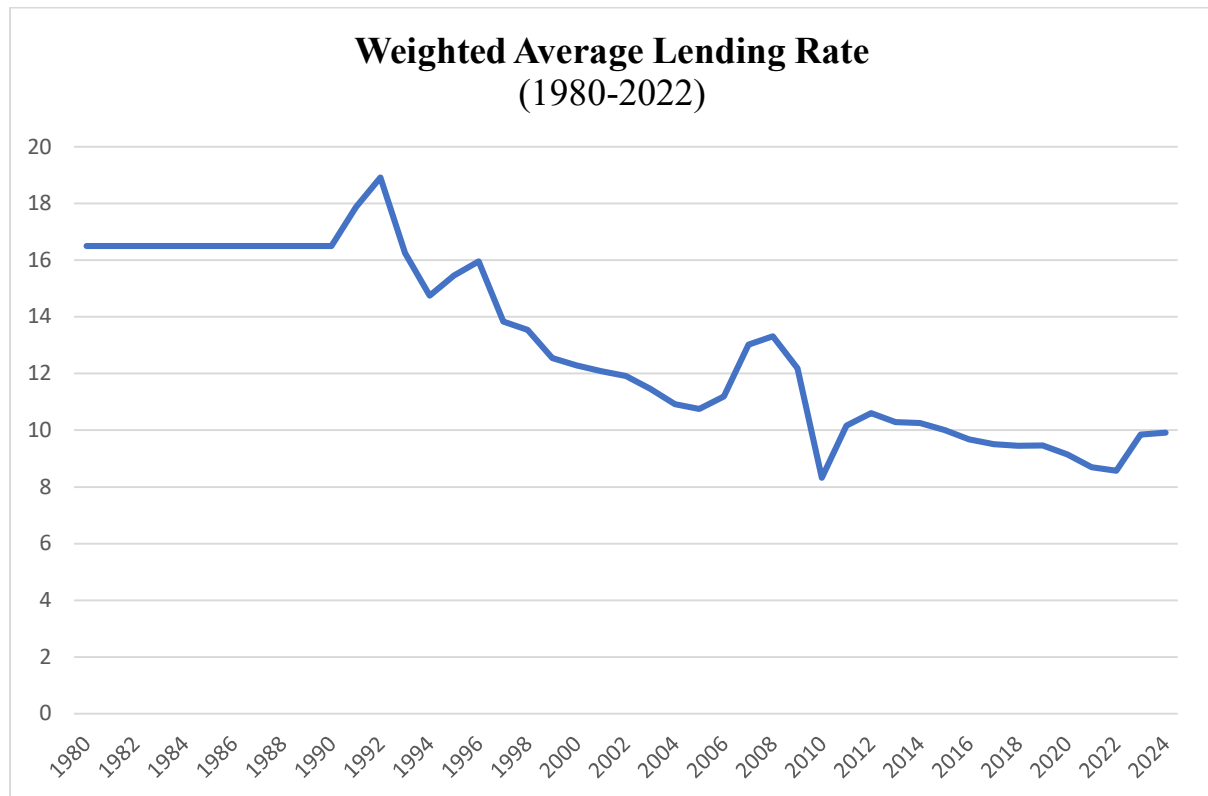


Figure 2.3 Trends in Weighted Average Lending Rates (WALR)

2.5.3 Financial Inclusion and Access in India

Financial reforms enabled the financial sector to fulfil its primary role, allocating resources to productive channels. Financial inclusion is determined by two indicators: depth and accessibility. Table 2.3 provides an overview of the expansion of commercial banks in India from 1969 to 2022. The commercial banks experienced significant growth post-reforms in 2005, reaching their highest number of institutions, 288. However, after 2020, there was a decline in this trend due to consolidation; public sector banks were burdened with a high level of NPAs. The government and the RBI decided to merge these banks to create technologically advanced institutions with stronger balance sheets. While the number of branches increased, the banks retained and expanded their network. In 2015, the Indian finance minister introduced Indradhanush to improve the functioning of public banks through capital reallocation. The asset quality review was conducted by the RBI in 2015 to assess the true state of assets. These measures helped in improving transparency and recapitalization of banks with high NPAs.

Table 2.3 Scheduled Commercial Banks in India (1969-2022)

Year	No. of commercial banks	No. of bank branches	Population per office ('000)
1969	73	8,262	64
1980	154	35,594	16
1999	272	60,570	13
2005	288	68,339	16
2010	163	95,000	11
2015	148	120,000	10.6
2017	140	125,000	10.2
2022	135	140,000	10

The health of public sector banks improved with capital reallocation and mergers, and their balance sheets strengthened with the entry of private banks and foreign banks, allowing for more competition; there was a fundamental improvement in the banking sector, with credit creation as the dominant force.

Table 2.4 displays the total assets of financial institutions as a percentage of GDP, highlighting the depth and composition of these financial institutions. Over the period, scheduled commercial banks have maintained and even increased their dominant share of financial assets. The total share of SCBs and non-SCBs increased from 58.8% in 1997 to 118.2% in 2022. Following the reforms, private sector banks increased nearly 9.74 times, while public sector banks experienced a significant decline. Public sector banks contributed 80% of credit in the early 1990s, and this has dropped to 50%, with private banks and NBFCs filling the gap (Agarwal, 2023).

The role of NBFCs has expanded exponentially, now standing at 16 times their previous influence. These banks are often referred to as shadow banks, providing credit facilities to participants, but are not regulated by the RBI. They not only complement banking services but

also serve as substitutes (Prudhvi & Bhattacharya, 2020). They sourced credit from the wholesale market, holding a share of 58% in 2018, while commercial banks contributed 12.6% of capital funding in 2018. Their contribution increased from 8.4% in 2006 to 12.9% in 2015, reaching ₹54 lakh crore in 2021, accompanied by a 25% increase in the asset size of the banking sector. Until 2018, any shortfalls in the banking sector's credit, such as when the RBI conducted asset quality checks in 2015, caused a collapse of public sector banks, which were addressed by NBFCs filling these credit gaps. The banking sector subsequently increased its lending to NBFCs and the consumer sector after 2015, with these sectors growing at a rate of 17%. Furthermore, the interest rates declined from 2014 to 2017; the return on 10-year government securities decreased to 6.25%, and the simultaneous reduction in interest rates and liquidity funding contributed to a decrease in the funding cost of NBFCs (Sengupta, Song, & Vardhan, 2021).

Table 2.4 Total assets of financial institutions (as % of GDP)

Category	Institution type	Total assets % of a GDP	
		1997	2022
Scheduled commercial banks	Public Banks	40.4	54.1
	Private banks	3.2	31.4
	Foreign banks	1.2	5.8
Non-scheduled banks	Cooperative Banks	1.7	4.4
	Small finance and other non-scheduled banks	0.9	0.2
Non-bank financial institutions	Non-bank financial companies	2.6	16.3
	Development financial institutions	9.5	5.2

DFIs have played an important role in post-independence India. While developed economies require 7-8% infrastructure growth, India's infrastructure investment has remained around 5.55% of GDP. Earlier, they sourced capital from the RBI and the government, but later, due

to a lack of funds, many transformed into commercial banks. Recently, a new DFI was established through the National Bank for Financing Infrastructure and Development Bill (NABFID) in 2020. It was announced in the Union Budget 2021-22 that IIFCL would be recapitalized with 20,000 crore (Chaturvedi & Vohra). The new DFIs are fully owned by the government entity. As of 2024, NABFID had sanctioned loans amounting to ₹1.3 trillion. Despite government initiatives, their positions remained moderate, at 5.2% in 2022 (Agarwal, 2023).

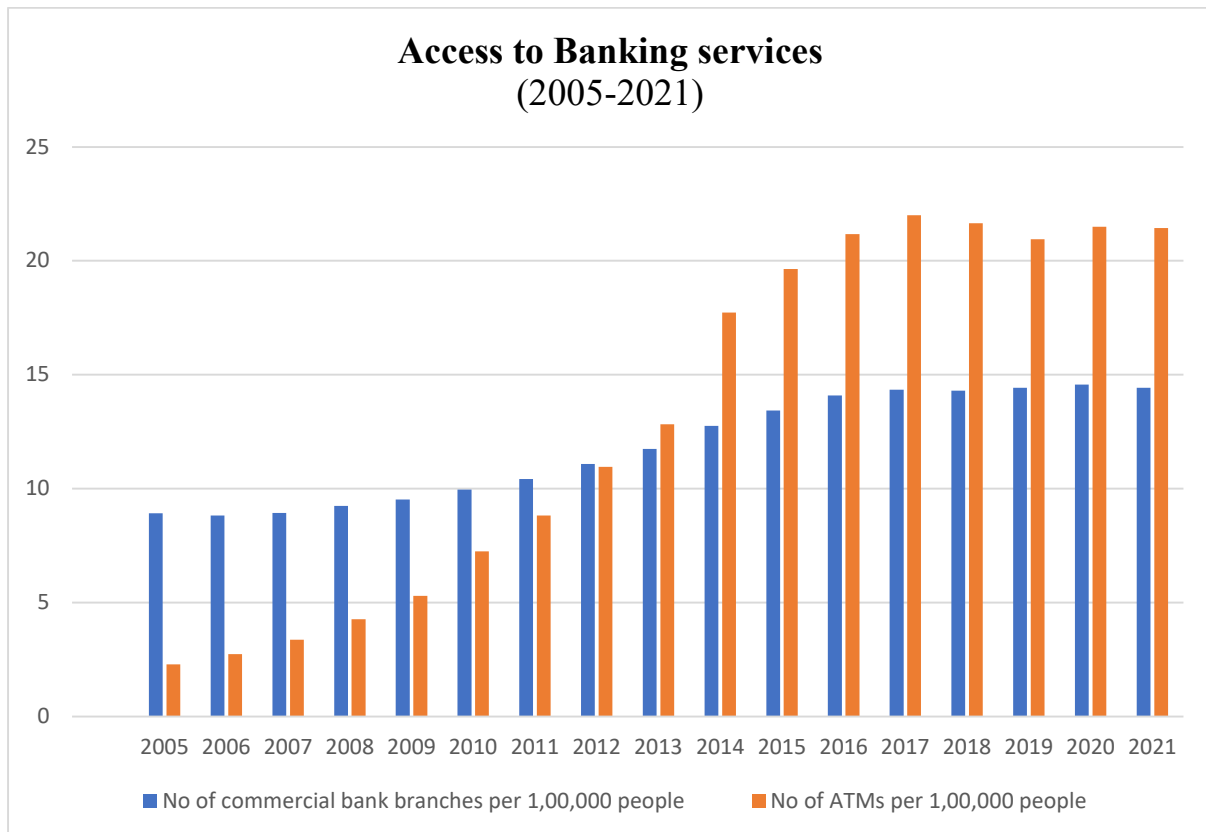


Figure 2.4 Trends in commercial bank branches and ATM access

The growth in the number of commercial banks and ATMs has played an important role in promoting financial inclusion, as illustrated in Figure 2.4. Earlier, the commercial banks' growth reflected traditional banking activities. The first automated teller machine (ATM) in India was set up by HSBC Bank in 1987 in Bombay. And as per the RBI guidelines, a minimum of two ATMs are mandatory in 3 to 6 tiers, functioning 24/7 to provide funds and accept deposits during emergency hours. The Pradhan Mantri Jan Dhan Yojna (PMJDY), the biggest financial inclusion measure taken by Narendra Modi in 2014, aimed to provide one account for every household and to reduce the gap between rich and poor and the gender-based gap. This

led to a boost in the growth of the number of ATMs. In 2010, there were 41,268 on-site and 34,377 off-site ATMs, respectively, which grew to 109,809 and 98,545, indicating a substantial increase. (G, 2018) revealed that post-demonetization, the number of ATM transactions has increased from 39.95 crores in 2011 to 71.07 crores in 2017, and over 6 billion were recorded in 2023. And now the ATM density is reflected as a key indicator of access to financial services.

2.5.4 Digital Financial Inclusion in India

Digital financial inclusion refers to payments made through mobile phones and internet banking. The evolution of digital financial services began in 2014, with a steady growth of 2% in digital transactions per month until 2017. According to a World Bank report, only 35% of fifteen-year-olds had bank accounts in India in 2011. Under the PMJDY scheme, 330 million bank accounts were opened. Narendra Modi announced Digital India due to the rapid expansion of mobile and internet penetration across all sectors of the economy. Demonetization, motivated solely by the goal of creating a cashless economy, temporarily increased digital payments and marked a period of remarkable growth. The key building blocks include Aadhaar digital identification and UPI. UPI, introduced by the National Payments Corporation of India (NPCI), represents a major development in India, providing low-cost, large-scale payments virtually through mobile phones.

In 2018, UPI transactions increased by 450%, surpassing credit and debit cards in terms of transactions. Due to the widespread mobile penetration in rural and urban areas, people have started preferring to make payments through UPI. This increased participation of individuals in formal banking and payment services has boosted economic growth by reducing poverty, empowering small entrepreneurs, reducing exchange costs, and providing fast and secure exchange. It has also motivated informal sector participants by improving access to digital finance (Agarwal A. , 2024).

The significant growth of UPI is evident in Figure 2.5. This graph depicts the number of transactions, both traditional measures, like RTGS, NEFT, and card payments (credit and debit cards), as well as modern measures. These indicators represent a broader picture of the impact of digitisation on financial institutions, covering monthly data from 2021 to 2023, sourced from “Payment System Indicators” published by the RBI. The graph shows that digital payments increased by almost 40% on average year over year. This rapid expansion highlights a structural shift in India’s payment system, highlighting the dominance of UPI.

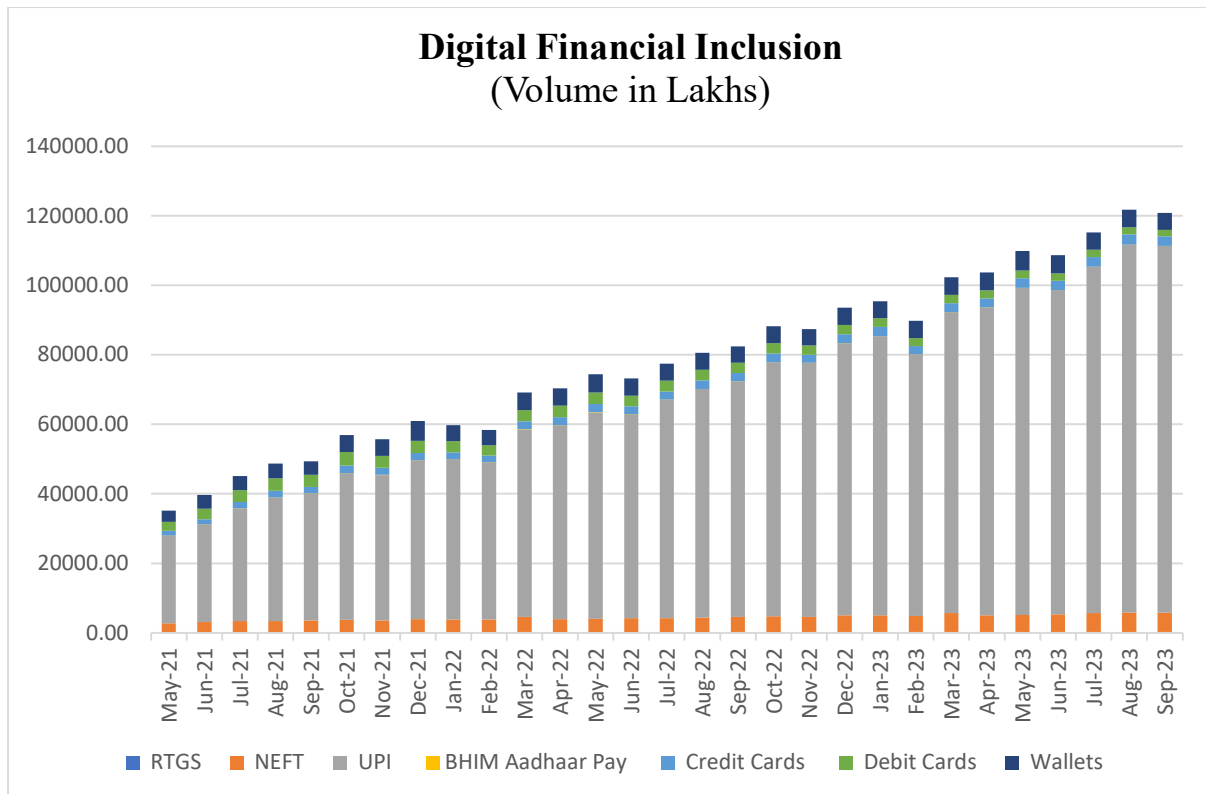


Figure 2.5 Trends in Digital Payments in India: UPI and the Rise of E-Payments

Mobile transactions grew from 19.75 million in 2015 to 106.18 million in 2017. Similarly, mobile wallet transactions increased to 387.6 million, worth ₹15,408 crore, from 11.96 million transactions in 2015 (Draboo, 2020). In July 2021, UPI had recorded over 3.2 billion transactions worth 70 billion, with a remarkable jump in 2023 to 117.64 billion in transactions. Over 72 billion in monthly transactions were made through BHIM in June 2023.

The National Electronic Fund Transfer (NEFT) and Real Time Gross Settlement (RTGS) are used to settle the retail and wholesale payments managed by the RBI. RBI in 2019 announced 24*7*365 operations, enabling round-the-clock funds transfer. These upgrades led to significant growth in these payment methods. The total volume of transactions processed through NEFT increased to 803.7 million in 2022, up from 113.8 million in 2013. While the RTGS transactions reached 38 million from 13.9 million in October 2013. The private banks contributed more to the development of these payment settlements, with HDFC Bank having the highest number of NEFT and RTGS transactions, leading in terms of online banking (Chandravathi, 2022). So, demonetization and digitalization have surged the use of digital platforms in India.

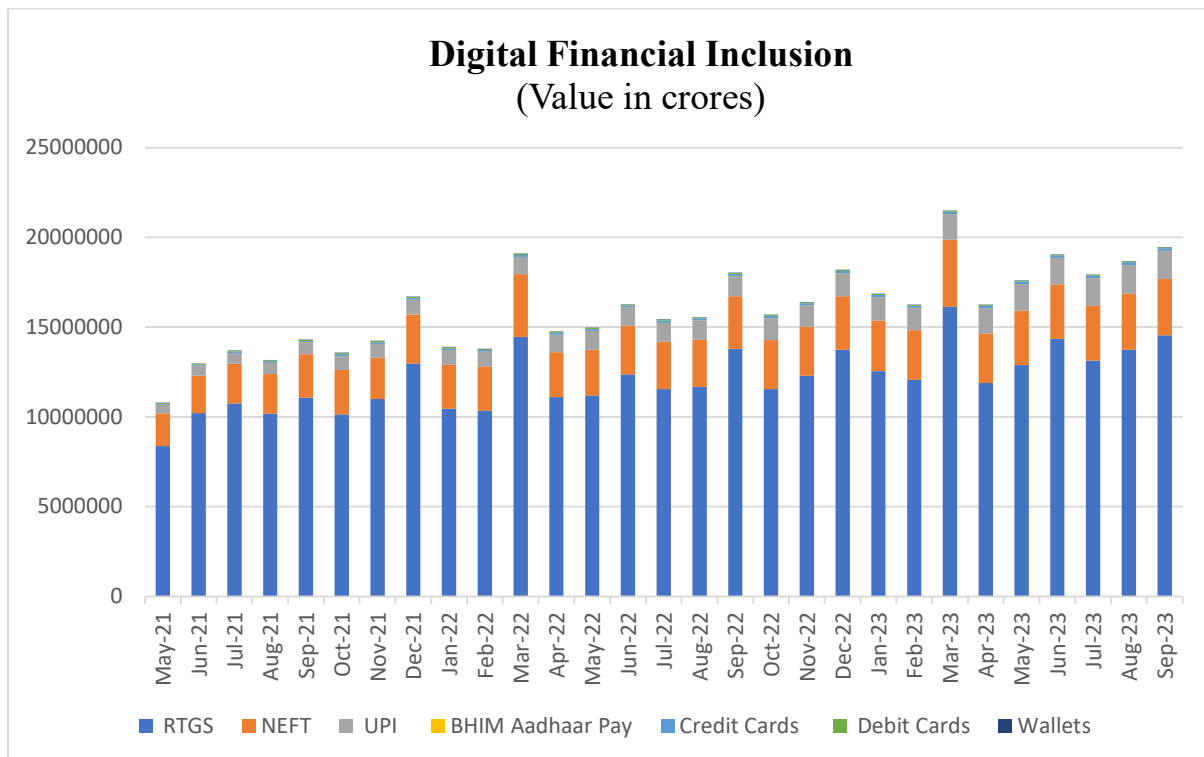


Figure 2.6 Transaction Value Trends across Digital Payment Platforms

2.5.5 Indicators of Financial Depth in India

Financial depth measures the size of the financial system relative to the economic growth (GDP) of a country. Domestic credit to the private sector and liquid liabilities as a percentage of GDP showed the upward trend, particularly after 2000, as displayed in Figure 2.7. The growth rate of non-food gross domestic credit exhibited fluctuations over the years, reflecting expansions and contractions in bank lending, as shown in Chapter 5 (Figure 5.1). Domestic credit to the private sector faced a marginal decline due to the dot-com bubble burst in 2002 and the global financial crisis in 2008, which adversely affected the international markets. In 2010, private credit was 50% of GDP, representing a significant role of private funding in boosting India's GDP. Further, it was recorded at 50.14% in 2021, after a decline from 54% owing to the spread of COVID-19. However, the credit growth rate has become stagnant since 2010, despite continued economic growth.

The average money supply growth rate was 8-10%, which grew by 12-15% as a result of Nationalization. M3 as a percentage of GDP has been experiencing a significant rise over the

years. India experienced an average M3 growth rate of 14.3% between 2000 and 2016 (Soltani, 2024). M3 was reported at 87% of the GDP in 2021, and grew at the rate of 10.5% between 2016 and 2023. Considering the higher demand for economic expansion in India, there is a rising demand for the money supply. Notably, in the aftermath of COVID-19, there was a steep rise in the M3-to-GDP ratio. In 2020, the RBI infused liquidity worth ₹12.8 trillion (RBI, 2022). Also, the Liquidity Adjustment Facility (LAF) stood at ₹3.43 lakh crore in 2020 and rose to ₹5.47 lakh crore in 2021, reflecting the surplus liquidity from forex purchases. The rising M3-to-GDP ratio highlights the important role of monetary expansion in maintaining liquidity and economic recovery during the crisis period.

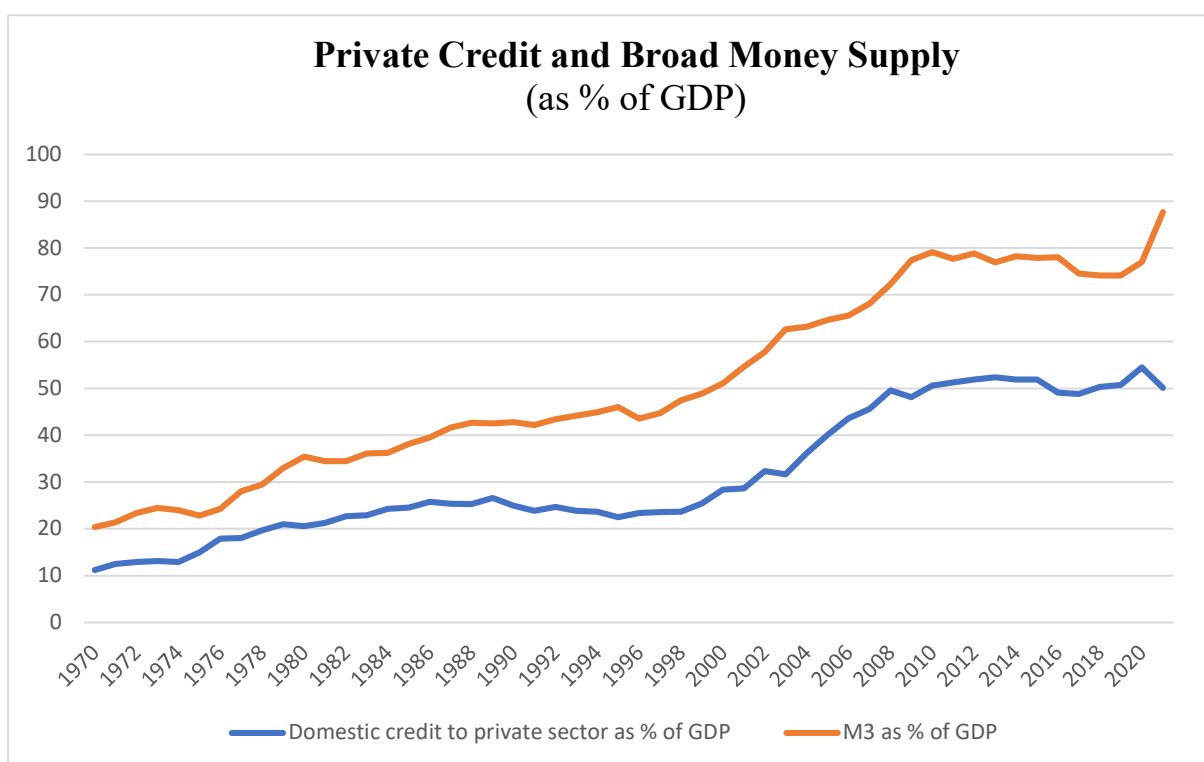


Figure 2.7 Evolution of private credit and broad money (1970-2020)

Market capitalization, often known as market value, is the share price times the number of outstanding shares. The market capitalization of all the listed domestic companies has grown over the last 15 years, as displayed in Figure 5. In 2007, the market capitalization nearly doubled, accounting for 160% of the GDP. The investor's wealth surged by \$970 billion. This was followed by a sudden crash of 50% due to the global crisis. The pre-COVID market capitalization of each major index was \$2.16 trillion. While in the early months of 2020, BSE and NSE traded at their highest levels, 12,362 and 42,273, respectively. And the market crashed

in April 2020 (Kumar & Kumara, 2020). Recently, it stood at 113% of the GDP in 2021, a significant rise from 68% in 2011.



Figure 2.8 Market Capitalization of Listed Domestic Companies (2000-2022)

2.5.6 Financial system stability

The government takes preventive measures to ensure the stability, transparency, and growth of the banking system in the economy. Growing NPA significantly impacts the efficiency of the banking system. In 1996, the NPA peaked at 15.7%, and commercial banks and public sector units (PSUs) were badly affected, with the NPA at 17.8%. Private and foreign banks also experienced a steep rise during this period. To address this issue, the RBI initiated the Asset Quality Review in 2015 to analyze the quality of assets.

Figures 2.9 and 2.10 present the trends in gross and net NPA across different categories of SCBs. The gross and net NPAs recorded a significant decline from 2018-19. The total gross NPA in 2012 stood at 1.42 lakh crore, while it was 10.39 lakh crore in 2017-18. Further, it declined to 5.71 lakh crore. The percentage of NPA in total assets was recorded at 1.7% in 2011-12, increased to 6.8% in 2017-18, and then further declined to 2.4% in 2022-23 (Sarkar, 2025). The figure clearly explains the current phase of the NPAs, with both the PSUs and

commercial banks peaking at 14.6% and 11.2%, respectively. According to the RBI, the gross NPAs as a percentage of the banking sector stand at 7.5%.

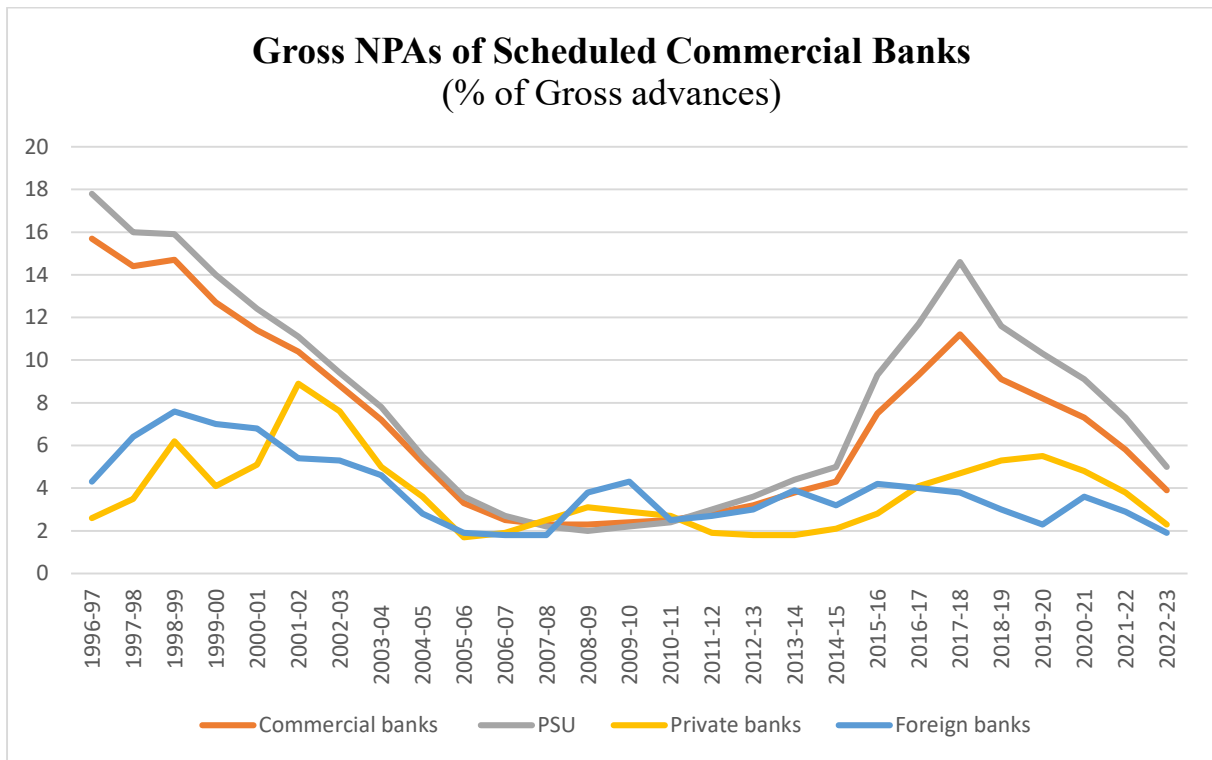


Figure 2.9 Bank group-wise gross NPAs in India (1996-2022)

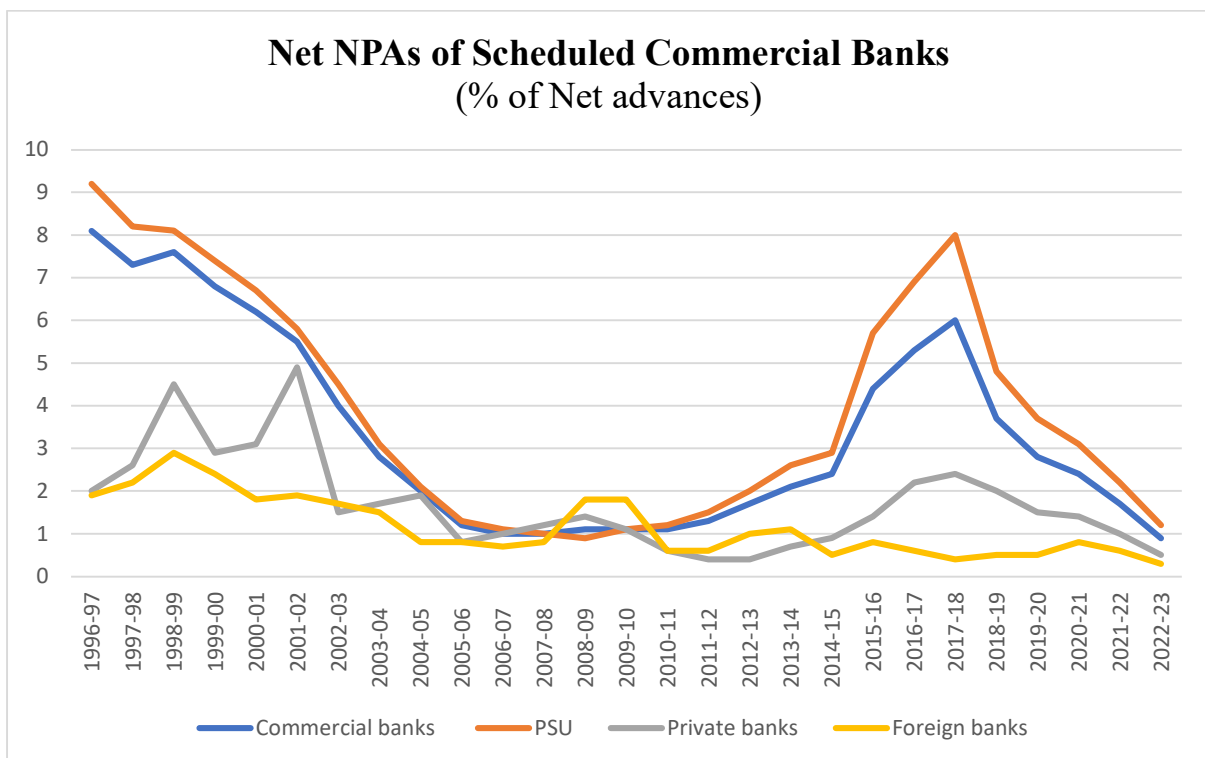


Figure 2.10 Bank group-wise net NPAs in India (1996-2022)

The PSUs contribute more than three-fourths of the total NPAs in India. PSUs provide 20% of the credit to the infrastructure and industrial sectors, a heavy lending sector. These sectors are contributing to the default of loans and advances, and private banks limit their credit lending to medium- and large-sized industries (Das, 2021).

As financial access and depth indicate, the important role of the financial system is in fueling investment, productivity, and expansion across sectors. The indicators of financial development—bank credit, broad money supply, market capitalization of domestic listed companies, growing market, and easy access to credit with digital transformations—have experienced significant growth over the years and their contribution to GDP growth. However, despite financial progress, to achieve long-term stability, India has to address the following challenges to build a more robust financial system.

2.6 Challenges

1. The global financial crisis of 2008 represents the ongoing engagement of banks in credit creation during times of crisis. In 2014, public sector banks sourced up to 70% of the total credit to the real economy. While lending from private banks also increased during this period, the major challenge faced by the RBI was the rising number of non-performing assets (NPAs) in the banking sector. The RBI prioritized these issues, and throughout the process of identifying the asset quality review that led to the decline in credit, public bank lending collapsed. Many major PSUs like Bank of Baroda (Rs 3,230), PNB (Rs 5,376), and IDBI (Rs 1,376) recorded losses in the year 2016, which led to increased NPAs in 2017-18 by almost 80%.
2. Self-employed women's associations (SEWA banks) were established in 1974 and have been providing microfinance to people living in rural areas since then (Saleh & Ahmad, 2023). They charge a higher interest rate, ranging from 12% to 30% on the principal amount, unlike other banks, which charge between 8% and 12%. Moreover, 70% of late payments were recorded, which limits working capital and profits. Furthermore, these banks depend on commercial banks for financing services, making them highly dependent on other banks.
3. The Infrastructure Leasing and Financial Services Ltd. (IL&FS) is a large NBFC, expanding its credit facilities to network businesses, mainly infrastructure projects, and has financed projects worth 1.8 lakh crore. But IL&FS accumulated outstanding debt worth Rs 91,000 crore by 2018, of which Rs 57,000 crore was owed to public banks. Due to a lack

of funds, IL&FS couldn't meet its obligations and even failed to repay banks. This short-term funding shortage in 2018 caused a liquidity crisis in NBFCs. Similarly, Dewah Housing Finance Corporation (DHFL) reported a loss of Rs 2,223 crore in 2019 and owed Rs 1 lakh crore to banks and investors. It was claimed that company investors were involved in a Rs 3,000 crore scam. These scams caused a credit crunch in the economy, and the net value of mutual funds was also impacted, resulting in a total outflow of Rs 1.7 trillion (Agarwal, 2023), raising doubts about the viability of NBFCs.

4. NBFCs are struggling to recover from the 2018 and 2019 credit crunch caused by the IL&FS and DHFL defaults, as well as COVID-19. This has led to the shutdown of most NBFCs and an increase in NPAs. The adverse impact on GDP has been significant, falling from 6.1% in 2018-19 to 4.2% in 2019-20. No passenger cars were sold during the COVID-19 period, causing no growth in the car industry (Sengupta, Son, & Vardhan, 2022). MSMEs, which were funded by NBFCs. The Atmanirbhar Bharat, or Self-Reliant India, fiscal package was announced by the finance minister in 2020, including a liquidity scheme worth Rs 750 billion.
 - Rs 300 billion liquidity scheme to invest in graded debt papers.
 - Rs 450 billion partial credit guarantee scheme.
5. With the rise of digital payment systems, there is a need for data related to consumer protection and cybersecurity. Many complaints were lodged against digital platforms during the COVID period, totalling 2,500, which highlights the necessity to regulate excessive financial inclusion and credit under insufficient supervision. Moreover, rural mobile internet penetration also remained low, with only 38% in 2022.
6. The gross expenditure on research and development (R&D) stood at Rs 104,864 crore in 2016-17 and Rs 127,381 crore in 2021, nearly doubling from 2011. However, it remained a very small fraction of GDP, accounting for only 0.7%, compared to China's 2.3% and the USA's 2.8% (Das G. , 2019), which contributed to low productivity in the manufacturing sector. This highlights the need for private sector investment in productive channels.
7. According to the IMF reports, there is a downward trend in private investment from 21% in 2022-23 to 13% in 2023-24. Although private investments have increased in value terms, but declined as a percentage of GDP. This fall is mainly associated with the fall in machinery and equipment, which can be due to the slowdown in consumption growth; businessmen are reluctant to expand. Also, private corporate and household investment declined to 10% in 2020-21 from 12% in 2015-16. Furthermore, FDI-to-GDP also fell from

6.55% in 2020 to 2% in 2023, reflecting the impact of India's protectionist policies that tend to discourage foreign investments.

8. According to the Federal Reserve Bank, central banks and governments need to know when the economy is overheating or slowing down, for this critical assessment is required. However, it's difficult to get real-time data, particularly on complex indicators like potential output and output gap. Recent shifts in economic trends have caused investors not to always move to other investments, creating a disconnect between business and financial cycles. Because of this, the central bank finds it harder to decide if inflation is demand-driven or supply-driven.
9. Despite the fastest-growing economy, the rate of reduction in national poverty is not proportionate to GDP growth. In 2018, only 50% of the population participated in the labor force, out of which 81% were employed in the unregulated sector, causing high wealth inequality. While 10% of the Indians own 80% of the wealth, this causes poverty, crime, dissatisfaction, and low economic development.

2.7 Conclusion

This chapter highlights the progress and gaps within India's financial system. The financial indicators, such as bank credit, money supply, and market capitalization as a percentage of GDP, have progressed over the years, indicating financial deepening, and the macroeconomic indicators—GDP, services, and gross fixed capital formation—have shown a significant increase. While the rising NPAs, inequality in the distribution of income, decline in private investment, and other gaps remain key concerns. Despite these challenges, financial development has played a crucial role in channelling savings into effective investments. And this foundational understanding supports the positive influence of financial development in promoting India's economic growth.

Chapter III

REVIEW OF LITERATURE

Financial development and economic growth are two firmly integrated concepts essential for an economy's growth and development. The development of the financial sector includes the banking sector and the capital market. (Schumpeter, 1911) emphasized the importance of financial services on innovation and growth. In 1991, financial liberalization reforms were introduced to promote financial stability and growth, efficient allocation of resources, and ensure financial stability (Gopinath, 2007). These reforms aimed at improving the efficiency, profitability, and productivity of financial services. (King & Levine, 1993), revealed a positive and significant relationship between the different indicators of financial development and economic growth in 80 countries during the period 1960-89. Financial development also supports investments and growth by reducing the cost of external finance, as revealed by (Rajan & Zingales, 1996). They investigated the impact of the financial sector on the growth of different US industries, especially those that heavily rely on external finance, for the period 1980-1990. The findings suggest that finance is necessary for sector expansion, particularly in innovation and capital-intensive industries. Also, the economic growth of a country refers to the sustained increase in gross domestic product (GDP), which is a key indicator of a country's economic health. Various economic indicators, such as capital formation, access to credit, technological advancement, human capital development, and efficient resource allocation, influence GDP. (Levine, 2004) emphasized the importance of well-functioning financial systems in promoting economic activity and growth. It is strongly advocated that a developed financial sector, characterized by efficient intermediation, strong legal frameworks, and effective regulatory systems, ensures better credit access for individuals and firms. They encourage growth by easing information and transaction costs and thereby ensuring minimum risk and efficient allocation of resources.

This chapter deals with the extensive literature review on different financial development indicators and economic growth. The previous literature lists the prominent contributions in the context of this study, which helped us to identify the research gaps and frame the objectives of our research, thereby providing novelty to this research. Accordingly, a section-wise literature review is presented below, structured around each objective of this study.

3.1 Review of Banking Credit and Economic Growth

The debate on the finance-growth relationship has been ongoing, with (Schumpeter, 1911) a view on finance's role in facilitating new entries into the circular flow through start-ups. Before independence, private sector investments in India's primary sector were unprofitable due to seasonal fluctuations, colonial policies, and low profitability, necessitating the establishment of financial institutions that could cater to the needs of the agricultural sector. In 1948, the Industrial Finance Corporation of India (IFCI) was established as the country's first Development Finance Institution (DFI), followed by the Industrial Credit and Investment Corporation of India (ICICI) in 1955 and the Industrial Development Bank of India (IDBI) in 1964. The primary aim of these banks was to provide financial assistance to the Indian agrarian sector and industries for their short-term and long-term requirements, with a special focus on infrastructure and key manufacturing projects. After World War II, economic growth became the primary objective, and the Solow growth model analyzed the need for capital, output, and labor. After the 1991 reforms, these institutions transformed into commercial banks to promote competition, global integration, and financial stability. Several studies of literature, like (Schumpeter J. , 1934) & (Rousseau, 2000) believed in finance's role in economic growth, emphasizing the importance of financial integration, capital optimization, and credit mobilization.

India is a transitional economy where credit availability plays an integral role in economic growth. Credit simply refers to the borrowing and lending of funds between individuals, businesses, and financial institutions. Banks offer credit to various sectors, such as industrial, agricultural, and household, which helps fund their consumption needs and has a significant impact on the economy. (Stiglitz, 1993) emphasized the importance of credit availability, particularly for developing countries. Domestic credit by private banks facilitates economic growth by providing individuals and businesses with the necessary funds for investment and consumption, as suggested by (Beck T., 2000). Entrepreneurs need access to finance to start or expand their businesses, invest in new technologies, and hire more workers. Domestic credit was estimated to be 50% of GDP in 2021, compared to 54.7% in 2020. Not only does access to finance matter, but the cost of credit influences consumer spending patterns and investment decisions. When credit is easily accessible and affordable, consumers and businesses tend to spend and invest more, driving up aggregate demand and fueling economic growth. Conversely, during periods of credit tightening or high interest rates, borrowing becomes more

expensive, leading to reduced spending and investment, which can dampen economic activity. (McKinnon, 1973) highlighted the role of financial repression and the impact of interest rate controls on economic growth. He argued that when interest rates were artificially suppressed, savers received low returns on their deposits, leading to the misallocation of resources. According to him, financial repression, which includes policies such as interest rate ceilings and directed credit programs, inhibits financial intermediation and hampers the efficient allocation of capital. He was a strong supporter of liberalizing interest rates and reducing financial repression to promote economic development.

Some studies showed a nonlinear relationship between financial development and economic variables. (Robinson, 1956) believed that “where enterprise leads, finance follows,” while (Patinkin, 1965) argued that real economic variables were independent of monetary and financial variables. (Lucas, 1998) and (Stern, 1989) believed that financial development was an “overstressed” indicator of growth, diverting from other major policies. (Van Wijnbergen, 1983) and (Buffie, 1984) suggested that higher risks lead to more economic growth. Efficient allocation of resources could reduce the risks and lower economic growth. However, when credit expands, the return on the projects lowers, leading to a reduction in productivity growth (Stephen G. Cecchetti, 2019). Additionally, several works of literature indicated that bank credit served as an indicator of financial instability.

(Duican & Pop, 2015) analyzed the role of bank credit on Romania’s economic growth during the period 2005-2014. The findings revealed that a one-unit increase in credit caused a 1.47-unit rise in GDP. (Akpansung & Babalola, 2012) investigated the relationship between banking credit and Nigeria's economic growth during the period 1970-2008 by employing the Granger test and Two-stage Least Squares (TSLS). The Granger test revealed a unidirectional relationship from GDP to private credit. While interest rates negatively impacted GDP. In addition, TSLS revealed a positive and significant bank credit coefficient, suggesting a positive influence of credit on growth. (Joseph, 2020) confirmed the long-run relationship between bank credit and Tanzania's economic growth during the period 1993-2017 with the help of the Vector Error Correction Model (VECM); however, the Granger test revealed no relationship between credit and growth.

Various studies conducted in the Indian context highlight the significant relationship between bank credit and economic growth. (Chakraborty, 2008) analyzed the impact of financial sector development on economic growth in India from 1993 to 2005, employing the interpolation

method. This paper's findings suggested a positive significance of the investment-output ratio on the real rate of growth, indicating that the transmission of credit and reform policies influenced investment and economic growth positively. Moreover, they argued that long-run economic growth fosters the financial sector by increasing the demand for real economic activities, thereby promoting economic growth. Furthermore, (MacDonald & Xu, 2022), a recent study, examined the importance of credit growth, capitalization of private banks with lower non-performing loans, and improvement in balance sheets during periods of low economic growth. They argued that higher credit growth promotes capital formation and facilitates easy fund lending at low interest rates, leading to higher economic growth over the medium term. (Balasubramanian, 2022) revealed a short-run and long-run relationship between long-term credit and economic growth in India with the help of the ARDL mechanism. Also, there existed a long-run impact of long-term credit on industrial output. Furthermore, the Granger test revealed that credit Granger causes economic growth. In contrast, (Krishnankutty, 2011), using a panel data analysis, focused on the relationship between bank credit and economic growth in the context of Northeast India from 1999 to 2007 and found that bank credit didn't influence economic growth in different segments of Northeast India owing to default in payment and the absence of awareness by authorities.

Additionally, (Jotwani, 2015) investigated a unidirectional causal relationship between bank credit and economic growth in India from 1972 to 2012. Bank credit led to economic growth; however, economic growth had no such effect on bank credit. (Singh, Pemmaraju, & Das, 2016) investigated the effects of bank credit on different sectors of the economy during the years 1973-2014, and an aggregate analysis was also conducted for the period 1951 to 2014. The annual data of sectoral banking credit, industrial, agricultural, and services were utilized. Industrial credit was further divided into mining, quarrying, manufacturing, and others. Johansen's co-integration test revealed that there was a long-term relationship between variables till 1992. However, there existed a long-term relationship between the variables in the manufacturing sector. Additionally, GDP Granger caused credit in the short-run at both the sectoral and aggregate levels. Furthermore, (Mohanty, Kumar, & Patra, 2016) investigated the credit growth nexus at the state level for the period 2001-2014, covering 21 states. They studied the causal relationship between them using the Kao residual co-integration test, which established a long-run relationship between bank credit and economic growth. Also, a bidirectional relationship was confirmed by the Dumitrescu-Hurlin panel test. Their research concluded that bank credit, capital outlay, and development expenditures had a favorable

impact on growth rates. Table 3.1 presents the panel and cross-sectional studies on the credit-growth nexus.

Table 3.1 Panel and cross-sectional studies on bank credit and economic growth

Authors	Country /Region	Methodology	Periods	Key findings
(Khaled, Samer , & E, 2006)	11 Arab countries	Hausman's test	1980-2001	No significant relationship between indicators of financial development and growth rate of GDP per capita
(Bist, 2018)	16 low-income countries	Pedroni panel co-integration and OLS	1995-2014	Positive impact of financial development on economic growth
(Guru & Yadav, 2019)	BRICS	System GMM	1993-2014	The banking sector and stock market development complement each other in stimulating growth.
(Abbas, Afshan, & Mustifa, 2022)	44 and 42 middle-income countries	Panel ARDL and Granger causality	1995-2018	The financial development contributes to economic growth.
(SIRISANKAN AN & KANANURAK , 2022)	140 sample countries	Income decomposition, two-step estimation, and multiple linear regression	2000-2018	Financial development contributes to economic growth.

More research was carried out across different country panels. (Gregorio & Guidotti, 1995) found a long-run positive relationship between financial development and economic growth in a large cross-country panel, while it was negative in panel data for Latin America. (Bloch, 2003) examined the cross-country positive relationship between financial development and economic growth in East Asian countries. They utilized the bank credit to the private sector and GDP from the period 1960-1990. The findings emphasized the bidirectional relationship between financial development and economic growth, and also structural factors that affect

economic growth. (Abbas, Afshan, & Mustifa, 2022) investigated 44 and 42 lower-middle- and upper-middle-income countries from 1995 to 2018, revealing a long-run relationship between the variables, particularly a more pronounced impact on middle-income countries. The Granger causality test revealed a bidirectional relationship between them.

However, financial booms are not always beneficial (Cecchetti & Kharroubi, 2012), revealing that financial development pulls productivity growth. (Wen, Mahmood, Khalid, & Zakaria, 2022) identified a negative relationship between financial development and economic growth across 120 countries by employing the System GMM technique from 1997 to 2017. Financial development boosted economic growth up to a certain limit, which they called the threshold limit, after which an increase in financial development could lead to inflation in the economy. (Arcand, Berkes, & Panizza, 2015) explored 100 upper- and middle-income countries from 1960 to 2010 and found a vanishing effect of financial development on economic growth when credit to the private sector reached 100% of GDP. (Shen & Lee, 2006) demonstrated an inverse U-shaped relationship between the variables in Ghana. (Law & Singh, 2014) investigated that financial development was not necessarily good for economic growth. (Samargandi, Fidrmuc, & Ghosh, 2015) and (Matei, 2020) found an inverted U-shaped relationship, suggesting policymakers should prioritize quality financial development over quantity to avoid its adverse effects. (Lay, 2020) examined the non-linear credit-to-GDP ratio impact on the economic growth of 20 advanced countries during the period 1870-2013. Using a dynamic threshold panel model, they found a threshold around 135% of credit-to-GDP. These findings suggest that credit above this threshold negatively affects GDP, suggesting a statistically significant U-shaped relationship between them.

Similarly, (Ho & Saadaoui, 2022) determined if a threshold effect exists in the credit-growth nexus in the ASEAN countries for the period 1993 to 2019. This study identified a threshold at 96.5%; if the ratio is $\leq 96.5\%$, bank credit positively and significantly influenced economic growth; however, if it is $> 96.5\%$, credit showed a positive but insignificant effect on growth. They emphasized that it depends on the structural characteristics of a country. When credit is allocated toward more productive firms, it boosts growth, while if it goes to households, the growth weakens.

The above-mentioned literature suggests that there are numerous studies published on the relationship between banking credit and economic growth. The literature revealed a mixed relationship, some suggesting a positive long-run, while others suggesting a limited or no

relationship. However, limited attention has been given to the interaction of non-food credit, GDP, and lending rates at the state level. Based on the above discussion, the current objective seeks to examine the relationship between bank credit and economic growth among 32 Indian states, employing panel ARDL estimation, and extending the analysis to the national level as well. This also aims to analyze the credit growth rate trends across states and their implications on growth.

Thus, the literature reviewed forms the formulation of the first objective: *to determine the relationship between bank credit and economic growth in India.*

Further, to study the financial development and growth nexus, it is important to study other important indicators of financial development and their impact on economic growth.

3.2 Review of Broad Money Supply and Economic Growth

The classical dichotomy suggests that the money supply only affects monetary variables like money wages, nominal GDP, and prices (Patinkin, 1995). However, real variables like real output, real wages, and employment are independent of the monetary variables. However, Monetarists and Keynesians rejected the classical dichotomy. Keynesians argue that the money supply can affect GDP via changes in interest rates, and they believe that monetary policy is not sufficient; fiscal policy is also required for spending on the public and private sectors for stability and growth. They also believe that inflation is caused by market imbalances. Monetarists believe that the supply of money is an important driver of growth. If there is money available in the market, the aggregate demand for goods and services goes up, generating employment and growth.

Several studies across different countries have established a positive relationship between money supply and economic growth. (Robert Nizhegorodtsev, 2015) found a long-term positive relationship between money supply and economic growth in BRICS and growing Asian countries, identifying a threshold beyond which an excessive money supply causes inflation, an issue already faced by PIIGS countries. Using the pooled mean group (Chaitip, Chokethaworn, Chaiboonsri, & Khounkhalax, 2015) conducted a study on the influence of money supply (M1 and demand deposit) on the economic growth of the AEC open region for the period 1995. A positive long-run relationship between money supply and economic growth was concluded, while demand deposits showed a negative impact. (Mahara, 2021) employed the ARDL mechanism and found that there was a long-run relationship among money supply,

capital expenditure, and Nepal's economic growth and a unidirectional relationship from money supply and capital expenditure to real economic growth.

In the context of India, the empirical literature explores the dynamics between money supply, inflation, exchange rate, and GDP with distinct conclusions and policy implications. (Mishra, Mishra, & Mishra, 2010) examined the dynamics among money supply, output, and price for the period 1950-51 to 2008-09. VECM results confirmed the presence of a long-run relationship between the variables. Additionally, the Granger test confirmed the bidirectional relationship between money and output and unidirectional causality from price to money supply and output. (Sharma, Kumar, & Hatekar, 2010) confirmed a short-run unidirectional causality: money supply caused IIP. (Behera, 2016) found a long-run relationship between money supply, exchange rates, and India's GDP between the period 1975-2012 using VECM. The impulse response showed that GDP positively responded to growth in the money supply. Inflation negatively affected India's GDP during the period 1972-73 to 2007-08, as indicated by (Salian & Gopakumar, 2009). The interesting finding was that the sensitivity of inflation to a change in growth is higher than the sensitivity of growth to inflation.

However, (Sabade, 2014) argued that in developing and underdeveloped countries, which have not achieved the level of full employment, it is not necessary that monetary tightening does not necessarily helps control inflation. In the case of India, monetary tightening measures caused GDP to fall by 5% and increased unemployment during the period 2011Q1 to 2012Q3. "Monetary tightening can push the economy into inflation, but liberal monetary policy cannot get the economy out of it."

While (Agarwal & Shah, 2019) focused on the fact that inflation targeting in developing countries has reduced inflation, raised growth rates, and reduced debts, they also argued that low inflation may cause slower growth. While the IT sector did not succeed in reducing inflation within the targeted range. India adopted an inflation target of 4% with a band of (+/- 2), and subsequently the annual inflation decreased from 5.8% in 2014-15 to 3.6% in 2017-18, while the output declined later on post 2016.

(Rajeshwari, 2018) employed an Engle-Granger two-step modelling to investigate the relationship among money supply, GDP, and the price level CPI. The period for the study was 1971 to 2015. The cointegration test revealed a long-run relationship between money supply, CPI, and GDP. The ECM test confirmed no short-run relationship among the variables.

(Hossain & Maitra, 2019) examined a positive and significant short-run and long-run relationship between money supply and real income, as well as a negative long-run impact of interest rates. (Maitra, 2020) further revealed that money supply and exchange rate had a positive impact on GDP, while interest rate had a negative relationship with GDP. (Kaur & Sunanda, 2020) established that monetary policy influenced growth in both the short and long-run, and GDP was dependent on all these variables: repo rate, reverse repo rate, unemployment, and FDI.

(SAHOO & SAHU, 2023) employed a multivariate VAR model and observed that money supply negatively affected industrial production in the long-run. The Granger test confirmed a unidirectional relationship from money supply to industrial production, implying the existence of a short-run relationship. (Kumar P., 2023) investigated the influence of money supply on aggregate demand using the SVAR model during 1998-2019. The findings suggested that monetary policy influenced output primarily through the asset price channel; however, the credit and exchange rate channels appeared to be neutral. (Zaerpour, 2023) emphasized the important role of money supply in promoting financial stability and sustainable economic growth in India. Additionally, highlighted the importance of continuous monitoring and adaptation to ensure money supply growth.

While broad money has been found to exert a positive influence on economic growth, several studies have suggested a weak or insignificant relationship. (Simasiku, 2022) examined the relationship between bank credit and Namibia's economic growth by employing the ARDL approach on quarterly data for the period 2008Q1 to 2020Q4. The findings revealed no long-run relationship between the variables. However, the Granger causality test found a unidirectional relationship from real economic growth to broad money supply. Furthermore, (Gachugu & Luseno, 2023) investigated the relationship between financial deepening and Kenya's economic growth during the period 1985-2020. The money supply served as a proxy for financial deepening with the help of a bivariate autoregressive (BVAR) model. The results revealed a negative impact of money supply on economic growth in the long-run. With a one-unit rise in money supply, there's a decline of 0.3215 units of economic growth.

Table 3.2 displays a selection of empirical literature where the findings indicated either a limited short-term influence or no long-term relationship. Some studies also found a negative long-term relationship between the money supply and GDP.

Table 3.2 Studies reporting mixed relationships between money supply and economic growth

Authors	Country /Region	Methodology	Periods	Key findings
(Alfawwaz, 2012)	Jordan	ECM and Granger Causality Test	1976-2009	There was no short-run and long-run relationship between money supply and economic growth.
(Omodero, 2019)	Nigeria	OLS and regression	2009-2018	Negative and insignificant relationship between money supply and GDP.
(Ewinetu, 2021)	Ethiopia	Vector Autoregressive model	2002-2017	No long-run relationship existed between money supply and GDP, but only a short-run one.
(SAEED, 2022)	Ghana	VECM	1980-2020	There was no long-run relationship between money supply and economic growth; however, a short-run relationship was observed.
(Madurapperuma, 2023)	Sri Lanka	Multivariate Autoregressive	1990-2021	The findings concluded a negative long-run effect of money supply and inflation on economic growth; however, a short-run effect existed.

Recent studies employed various innovative methodologies to better understand the interrelationships between different variables. (Buthelezi, 2023) explored the relationship between money supply and economic growth in South Africa during the period 1990 to 2021 using the TVP-VAR model. They observed that a trade-off between the variables only when monetary policy was used to stabilize inflation and growth. Using the MS-BVAR model, (Rich, 2022) demonstrated the importance of monetary intervention in the US for recovering from the financial crisis, highlighting that incorporating regime switches in monetary policy provided a realistic model for evaluating the effects of monetary policy. (Berger, Karlsson, & Osterholm, 2023) used BVAR models to investigate the relationship between money supply and inflation

in the euro area and the USA from 1962 to 2022. The results confirmed a weak relationship after 1980 but indicated a strong one after 2020. (Polat, 2025) revealed that policy rates were not the primary tool for monetary policy in Turkey during the period 2005 to 2018. With the help of the FAVAR model, he concluded that liquidity management, macroprudential policies, or credit-based treatment worked better in the case of the Turkish economy.

This extensive literature highlights that the relationship between GDP, M3, and CPI varies across different periods and countries due to different economic, behavioral, and political elements. Some of the literature suggested that inflation below 8% slightly positively impacted growth. However, above 8%, it dampened growth, according to (Sarel, 1996), using data from 90 countries for the period 1970-90. (Fischer, 1993) suggested that money supply and inflation were closely connected, and the money supply directly influenced economic growth (Bhunia, 2016). Similarly, (Dornbusch, Fischer, & Startz, 1996) their book showed a positive relationship between growth and inflation, as increased aggregate demand is a major driver of high inflation. Whereas, (Younus) found a non-linear relationship between inflation and Bangladesh growth during the period 1976-2012. The inflation threshold in Bangladesh lies within the range of 7-8% and he found a similar range of 7.31 threshold with the help of OLS. (Mohaddes & Raissi, 2014) found that Indian states with inflation above 5.5% had significant inflation-growth threshold effects, and found a negative relationship between CPI and GDP growth among 14 states. (Das & Loxley, 2015) found a positive relationship between inflation and GDP up to 23%, suggesting a very high critical value for Asia, Latin America, and the Caribbean. (Nizhegorodtsev & Goridko, 2015) identified a non-linear relationship between money supply and economic growth among BRICS and growing Asian countries. They suggested a beyond-threshold level of monetary growth ratio, which caused inflationary pressure in the economy, already experienced by PIIGS countries. (Dholakia, 2020) suggested that promoting economic growth requires maintaining inflation within a threshold. Also, he further advised that the threshold inflation rate depends on policy parameters like FD/GDP and CAD/GDP, and accordingly provided a whole range of threshold estimations. Expansionary monetary policy often aims to reduce loan costs, encouraging investment and spending (Mahara, 2021). (Dinh, 2025) found that a continuous increase in the money supply caused long-term inflation, with no short-run impact in Vietnam and China during the period 2012-2016. The government should take necessary action to control inflation and stimulate economic growth.

There are several studies carried out to identify threshold inflation, where inflation above a critical point negatively affects economic growth. (Kannan & Joshi, 1998), (Singh, 2010) explored the growth-inflation trade-off in India and found that above 6% inflation affected GDP and suggested maintaining an inflation rate under 6% to ensure healthy output and growth levels. Since 2016, the RBI has adopted flexible inflation targeting. MPC members (Dholakia, Chander, Padhi, & Pratap, 2021) suggested that India's threshold inflation level is approximately 6%. If the inflation target is under the critical value, then it becomes difficult to achieve the potential output, leaving the economy in disequilibrium (Nayak, 2021). The RBI kept the repo rates unchanged at 6.50%, while the CRR was reduced by 50 bps to 4%. The MPC emphasized promoting growth without lowering inflation. They highlighted the importance of maintaining price stability and forecasted inflation at around 4.5%, which later increased to 4.8% due to rising retail prices.

Therefore, the study attempts to investigate the relationship between GDP and Broad Money Supply (M3) while controlling for variables such as Consumer Price Index (CPI) and Call Money Rates (IR). The key novelty of the study lies in combining the structural break analysis with the inclusion of dummy variables with the ARDL framework, providing an understanding of how money supply interacts with growth during periods of economic shocks.

Thus, the extensive literature led to the formulation of the second objective: *to determine the relationship between broad money supply and economic growth in India.*

Additionally, another important aspect of financial development is the capital market, and the following section highlights the capital market and its impact on economic growth.

3.3. Review of the Stock Market and Economic Growth

Since the financial sector is broad and comprises financial institutions and financial markets, its growth is not measured by a single indicator. Many economists have focused on the stock market development and its impact on the real economy. Several studies have suggested a positive and significant impact of the stock market on the real sector of the economy. Empirical studies by (Atje & Jovanovic, 1993), (Levine & Zervos, 1998) suggested a positive and robust impact of the stock market on economic growth, capital accumulation, and productivity. (Greenwood & Smith, 1997) suggested that large stock markets reduced the transaction costs, reducing the cost of mobilization of savings and facilitating productive investments. (North,

1991) argued that the development of the stock market reduced the cost of transferring the ownership rights, thereby enhancing institutional efficiency and thus growth.

Several disagreements on the positive impact of the stock market on the real economy also exist. (Mayer, 1988) argued that stock markets, even if large, do not significantly contribute to corporate finance, particularly when compared to banks and internal funds. (Stiglitz, 1985) emphasized that capital control and greater liquidity may reduce investors' ability to monitor firms and weaken corporate governance, thereby hampering firm performance and growth. (Shleifer & Summers, 1988) contended that the stock market mechanism may not always lead to economic growth; with weak legal protection, it may lead to short-term gains but long-term breaches of trust, productivity, and ultimately economic inefficiency. (Shleifer & Vishny, 1986) argued that a stock market facilitates corporate takeovers, causing short-term gains and volatility, ultimately leading to overall slow economic growth. (Levine R. , 1991) argued that the stock market creates credit and makes investments less risky by allowing investors to buy and sell anytime and providing long-term capital to companies. It accelerates growth in two ways: first, by allowing the transfer of ownership of firms without affecting their operations, and second, by allowing the diversification of risk effectively. However, it may not always be beneficial for long-term economic growth. (Devereux & Smith, 1994) suggested that international risk sharing through the stock market leads to reduced savings and slow growth because it diversifies income risk. (Demirgüç-Kunt & Levine, 1996) proposed a broad indicator of the stock market and financial intermediaries. First, a high rate of return on stock encourages investments; however, it may reduce savings and advance future consumption by decreasing present consumption, reducing the overall money supply in the economy, and consequently hindering capital accumulation. Second, high liquidity induces investors to invest but simultaneously discourages savings, causing a significant impact on savings and investment in the economy. Third, it focuses on short-term gains; more liquidity allows investors to trade their equity, bearing fewer transaction costs, but low accountability leads to economic inefficiency.

Particular emphasizes was placed on the country-specific studies, such as (Kirankabes & Basarir, 2012), investigating the positive and significant impact of the stock market index ISE 100 on Turkey's economic growth during the period 1998:1–2010:12 using VECM. The Granger causality test revealed one-way causality from the ISE index to GDP. (Qamruzzaman & Wei, 2018) utilizing ARDL, confirmed the presence of a long-run relationship between the

various indicators of financial development, including the stock market and Bangladesh's economic growth in 1980-2016. (Hoque, Yakob, & Kruse, 2017) re-examined the relationship between stock market development and Malaysia's economic growth from 1981 to 2016. The study employed ARDL bounds tests, the Granger causality test, and multivariate regression. The ARDL test revealed the positive short-run and long-run relationship between stock market development and economic growth. The Granger test confirmed the presence of a unidirectional relationship from stock market development to economic growth, further confirmed by the bounds test. Similarly, (Chikwira and Mohammed 2023) reported a weak but positive and statistically significant influence of the stock market on Zimbabwe's economic growth, based on quarterly VAR analysis from 2013 to 2022.

In developed countries, the stock market has increasingly played a pivotal role in the mobilization of savings and effective investments. (Pan & Mishra, 2018) investigated the impact of the stock market on the economic growth of China during the period of crisis, 2007-2012. The ARDL analysis revealed a smaller magnitude but a negative effect of the share market on economic growth, suggesting signs of external turbulence. Toda Yamamoto's causality test indicated that economic growth caused development in China's stock market. (Demir 2025), with the help of OLS and panel VECM, found a positive short-run bidirectional relationship between the stock market and economic growth only in high-income countries. A unidirectional relationship was observed between the variables in both low- and middle-income countries. However, much of the literature focused on the linear relationships. Given the dynamic nature of these variables, it is essential to investigate the non-linear dynamics among them.

Apart from country-specific studies, regional efforts like the proposed African Monetary Union (AMU) provided a broader picture of monetary integration and its macroeconomic impact. (Tachiwou, 2010) examined the stock market development relationship with economic growth in AMU during 1995-2006. The study used two indicators of stock market development: size and liquidity. The ECM results confirmed the positive influence of stock market development on economic growth in both the short-run and long-run.

The stock market and monetary aggregate are often viewed as important drivers of fluctuations in economic growth, particularly in emerging countries like India. (Paramati and Gupta 2011) examined the relationship between the monthly indicators like the index of industrial production (IIP), BSE, and NSE and quarterly GDP from April 1996 to March 1999. Findings

revealed a bidirectional causality between IIP, BSE, and NSE. While GDP exhibited a unidirectional relationship with only NSE, no relationship was observed between GDP and BSE. The ECM bound test and Engle-Granger residual test confirmed a long-run relationship between stock market development and economic growth. (Palamalai and Prakasam 2014) revealed a long-run relationship and bidirectional causality between the stock market and GDP between June 1991 and June 2013 with the help of ARDL bound testing and the Granger test, consistent with the findings of (Vinayaranjan P, Rao and M Sravani 2022). (Pandey and Shettigar 2017) found a long-run relationship between monetary supply and IIP during the post-liberalization period. Similarly, (Misra 2018) also confirmed a long-run causality between IIP, BSE Sensex, and money supply, based on VECM results. (Ghosh and Chhaochhoria 2020) investigated various stock market indicators and their impact on GDP at constant prices. With the help of ARDL-bound testing, they found that lagged market capitalization had a positive influence on GDP, suggesting that the stock market had no contemporaneous impact on economic activity. However, in the later period, it led to an increase in new listings, businesses, firms, and investments. (Sultana, Sharma, & Akheel, 2021) reported a positive influence of stock market indicators on GDP during the period 2003 and 2017, using VAR, aligning with the findings of (K, 2024). (Keswani, Puri, & Jha, 2024) conducted a cointegration analysis and found a significant long-run relationship between Indian stock prices and GDP. While the above literature has explored the long-term effects of the stock market and economic growth, it often treats financial variables as a trend. However, the stock market exhibits inherent cyclical behavior, particularly when stock market fluctuations lead or lag business cycles.

Previous literature suggested a dynamic interaction between financial markets and business cycles. (Hamilton & Lin, 1996) used a bivariate model with an unobserved component and revealed that economic recessions caused volatility in the stock market, which further helped in identifying turning points in real economic activity. (Chauvet 2001) reported a significant role of financial cycles in driving fluctuations in economic output, especially during periods of economic fluctuations. (Raunig & Scharler, 2010) argued that stock market volatility influenced the real economy not only by capital accumulation but also via investor confidence. The uncertainty in the stock market caused a slowdown in aggregate demand. (Ma & Zhang, 2016), also confirmed that fluctuations in financial markets contributed to fluctuations in economic output; booms in equity prices often led to economic expansion. In contrast, (Jawadi, et al. 2022), found an important role of business cycles, particularly in the USA during the period of boom, in forecasting financial cycles, which is in line with empirical observation

(Yan and Huang 2020) (Qu 2024). While, (Vatsa P. B., 2024) reported that stock markets are procyclical in the USA and lag industrial production by approximately 1-3 months.

Table 3.3 presents the cross-country and panel research on stock market fluctuations and their impact on real economic activity.

Table 3.3 Cross-country/panel literature on stock market and economic growth

Authors	Country/Region	Period.	Methodology	Key findings
(Avouyi-Dovi & Matheron, 2003)	France, Italy, USA, Germany, UK	1970-1990	Turning point, cyclical components	There was no strong relationship between stock prices and real activity in the short-run, except in the USA. However, in the long-run they appeared to influence each other.
(Sharma C., 2008)	Argentina, Bangladesh, Brazil, China, Egypt, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, South Africa, Sri Lanka and Russian Federation	1990-2006	Pedroni Cointegration Tests and DOLS	No relationship was found between the stock market's size and liquidity and economic growth.
(Choudhry, Papadimitriou, & Shabi, 2016)	USA, Canada, Japan, and the UK	1990:01-2011:12	Non-linear bivariate	Bidirectional relationship between stock market volatility and business cycles.
(Adam & Merkel, 2019)	USA	1955Q1-2014Q4	Dynamic stochastic model	Productivity shocks caused stock/real booms followed by busts.
(Prudente de Alcântara e Silva & Giorno, 2025)	Brazil	1996-2023	Wavelet Methodology	Stock market cycles anticipated business cycles during the financial crisis period, while business cycles lead during non-economic shocks like COVID-19.

This study initially carries out the linear analysis, focusing on key indicators BSE and NSE, crude oil, and the index of industrial production (IIP). Additionally, given the limited existing literature related to the non-linear dynamics between the stock market and economic growth in the Indian context using high-frequency monthly data, this study further explores the *relationship between the combined market capitalization of BSE and NSE and economic growth* using threshold regression.

Furthermore, another important aspect of the finance-growth nexus is determining the financial cycles and their interaction with business cycles.

3.4. Review of Financial Cycles and Business Cycles in India

(Schumpeter, 1911) focused on the importance of financial development in economic growth, especially in fostering the R&D department, and enabling new entries. Many studies, such as (McKinnon, 1973), (Goldsmith, 1969), (Gregorio, 1999) (Levine, 1997), (Arteta, Eichengreen, & Wyplosz, 2001), (Edison, Levine, Ricci, & Slok, 2002) have supported this view. Another aspect of the finance-growth nexus is the examination of cyclical fluctuations in macroeconomic variables. Financial cycles, especially credit cycles, have gained importance after the global crisis because of their significant influence on macroeconomic indicators. This literature review addresses the nature of financial cycles, their duration, and their importance for economic growth.

The financial cycles have different characteristics that set them apart from traditional business cycles in terms of their duration, amplitude, and severity. (Adrian & Shin, 2008) highlighted the positive relationship between monetary policy and financial stability. They argued that financial institutions buy more during booms and sell more during busts, amplifying financial cycles. While business cycles have been extensively discussed in the literature, financial cycles are still a work in progress and have recently gained attention. Business cycles are associated with financial cycles (Claessens, Kose, & Terrones, 2011A), and their theories helped us understand financial cycles. This study investigated the interaction between business and financial cycles in 44 countries for the period 1960:1 to 2007:04. The findings revealed that financial cycles tend to be longer and deeper than business cycles and more pronounced in developing countries than in developed economies. Moreover, financial downturns were associated with slower output growth, confirming the leading role of financial fluctuations in determining the business cycles. (Borio 2012) one of the most influential works emphasized

the role of credit and asset prices in economic fluctuations. He highlighted how financial booms, particularly those driven by credit, often lead to economic expansions.

The dynamic interactions between business cycles and financial cycles are important for the estimation of recessions and recoveries. (Sanvi & Matheron, 2005) explored the limited link between stock prices and real activity, except in the USA, highlighting the importance of the financial cycle and business cycle in strengthening the effectiveness of monetary policy. (Claessens, Kose, & Terrones, 2011 B) explored the interactions between financial cycles; credit, house, and equity prices; and found a strong relationship between them in 21 advanced OECD countries during the period 1960:1-2007:04. The findings revealed that equity and house price cycles were more pronounced than credit cycles. Moreover, the credit and equity cycles were more synchronized. Moreover, credit and housing cycle interactions had amplified financial cycles, and evidence suggested that global downturns in credit and equity markets tend to be deeper than other contractions. (Rünstler & Vlekke, 2016) explored the interaction between business and financial cycles in the USA, UK, Spain, Italy, France, and Germany using the multivariate structural time (MST) model for the period 1973Q1-2014Q4. The findings revealed longer cycles for credit and housing, with a length of 15 years, except in Germany, which experienced short-lived fluctuations. Moreover, the findings suggested a systemic relationship between financial cycles and business cycles, particularly at medium-term frequencies, not just short-run fluctuations. (Ma & Zhang, 2016) emphasized that financial cycles had a significant role in business cycles in the USA, UK, China, and Japan. Financial cycle shocks drive major fluctuations in macroeconomic variables, particularly during times of financial instability. Moreover, monetary policy manages the financial fluctuations and promotes financial stability.

(Dees, 2016) investigated the impact of fluctuation in financial variables on the real economic activity of 38 countries during the period 1987 to 2013. The study used Global VAR (GVAR) modelling, and the findings suggested that credit and house prices were important indicators of business cycles, largely explaining fluctuations; however, they had not increased since the global crisis. The international transmission of financial shocks had a significant and persistent impact on business cycles. (Beirne, 2019) explored the dynamic interaction between business cycles and financial cycles in 38 advanced and developing economies between the period 1970Q1 and 2018Q3, employing a Christiano-Fitzgerald band-pass filter methodology to extract the cyclical components. (Jawadi, Ameer, Bigou, & et, 2022) revealed that information

from business cycles was useful in forecasting financial cycles, particularly during expansion in the USA from 1987 to 2016. (Tsiakas & Zhang, 2023) investigated the direction of the relationship between business and financial cycles in G7 countries: the USA, the UK, Canada, France, Italy, and Germany. The VAR results supported a positive relationship between the business and financial cycles in G7 countries during the period 1962 to 2019. While the Granger test confirmed the bidirectional relationship between them, the USA, being the global leader, influences the business cycles of the other countries. Table 3.4 outlines the country-specific panel research related to business and financial cycles.

Table 3.4 Country-specific literature related to business and financial cycles

Authors	Country/Region	Methodology	Period	Findings
(KARAGOL & DOÄŽAN, 2021)	Turkey	Bry Boschan, HP Filter and Hacker and Hatemi J 2006	1998Q1-2014Q4	There was a significant co-movement between business and financial cycles, particularly during the period of downturn. The causality test confirmed that financial cycles caused business cycles in Turkey.
(Paramaiah, Long, & Motelle, 2021)	Lesotho	Concordance Index	1976-2019	The findings revealed no co-movements between business and financial cycles in Lesotho.
(Impavido, 2024)	Kazakhstan	HP Filter and CUSUM Test	1990s-2023Q4	Financial cycles had a persistent and increasing impact on business cycles; moreover, the impact was similar during both the expansion and contraction phases.
(Magubane, 2024)	South Africa	Dynamic conditional correlation approach	1975Q1-2023Q4	Strong synchronization and positive correlation among financial cycle indicators, while weak co-movement was observed between business and financial cycles.

Various methodologies have been employed to study the financial cycles, including the traditional method and turning point analysis. (Burns and Mitchell 1946), a phase-centric approach to identify the business cycles, focus on the peaks and troughs. It allows us a better understanding of fluctuations and complexity in economic activity. (Bry & Boschan, 1971) (Harding & Pagan, 2002), which identified longer and deeper financial cycles than business cycles. These were medium-term cycles, as explained in the literature. Financial variables have different frequencies and durations, necessitating the utilization of statistical filter methods such as the unobserved component model as employed earlier by (Aikaman, Nelson, & A.G.Haldane, 2010). (Galati, Hindrayanto, & Koopman, 2016) observed that financial cycles, overall, tend to be longer and have greater amplitudes than business cycles.

Moreover, advanced methodologies like bandpass filters, spectral analysis, and unobserved components have been used to capture the deviations from the trend. Two commonly used methods for estimating cyclical behavior are the Hodrick-Prescott filter and the bandpass filter. The HP filter, introduced by (Hodrick & Prescott, 1981), separates the series into trend and cycle components. Conversely, the BP filter, proposed by (Christiano & Fitzgerald, 2003), functions as a two-sided moving average filter, effectively smoothing out fluctuations and underlying cycles and trends. Recent studies analyzing the dynamics between stock markets and business cycles increasingly employed advanced techniques like STL decomposition, wavelet analysis, and time-frequency domain approaches. The findings concluded that equity cycles in developing economies tend to be more useful in predicting financial cycles than credit and house price cycles. While in advanced economies, financial and business cycles showed partial synchronization.

In India, studies about financial cycles, such as (Behera & Sharma, 2019) identified the existence of financial cycles by examining their main characteristics using three methods: turning point analysis, spectral analysis, and bandpass filters, along with the quarterly data ranging between 1960:Q1 and 2018:Q4 on credit, equity prices, house prices, and real exchange rates. The findings suggested the existence of financial cycles as an early indicator of financial instability and weakening of growth in India. Also, the duration and length of financial cycles were found to be more pronounced than business cycles. While the contribution of housing prices had increased in the 2000s as an indicator of financial cycles. (Aravalath, 2020) with the help of a wavelet-based and Toda-Yamamoto causality test, revealed that financial shocks led to business cycles and that financial cycles were larger than business cycles

during the period Q1:1991 to Q4:2019. The financial cycles in India lasted for 12 years, and expansion and contraction lasted 6 years. These findings coincide with those of (Kumar, Ansari, & Paramanik, 2020). This study explored the business and financial cycles during the period 1996Q1 to 2018Q3, employing the Christiano-Fitzgerald filter technique. The Granger causality confirmed that the financial cycle caused business cycles in both the medium and long-run. The cyclical interactions between money supply and output have also been given attention. (Banerjee, Basu and Ghate 2020) found a positive influence of monetary shocks on output, as confirmed by (Goyal and Kumar 2018). (Ghate, Pandey and Patnaik 2012) suggested that developed economies adopted counter-cyclical monetary policy, while developing countries, such as India, employed pro-cyclical policies, thereby amplifying business cycles.

Additionally, (Paramanik, Bhandari, & Kamaiah, 2021) based on the VAR model, indicated a strong interdependency between real and financial markets during the period 2003-2020, emphasizing the importance of economic uncertainty and the presence of a bidirectional relationship between financial cycles and real market cycles. Conversely, (Saini, Ahmad, & Bekiros, 2021) found that the business cycle led to the credit cycle in India at both aggregate and sectoral levels. Furthermore, the duration of the business cycle was approximately 4 years, whereas the credit cycle lasted about 3 years. Also, they appeared to be procyclical, particularly during the period of crisis. However, at the sectoral level, some sectors showed countercyclicality. Similarly, (Kumar, Kumar and Prakash 2022) confirmed a close and bidirectional linkage between credit, investment, and the output cycle.

The significance of global financial cycles has been investigated in various studies. (Cerutti, Claessens, & Andrew, 2017) explored the importance of global financial cycles in determining capital flows in 85 countries from Q1 1990 to Q4 2015. Through the utilization of panel regressions, national capital equations, and event studies, they found that global financial cycles were not crucial in explaining capital flows. However, their impact was evident in other variables like credit and house prices. Similarly, (Silvia & Hélène, 2021) revealed that changes in monetary policy led to developments in global financial variables, resulting in contractions in asset prices, declines in credit and a downturn in capital flow globally. Consequently, the results indicated that US monetary policy acted as the key driver of global financial cycles.

In contrast, the empirical studies emphasized the pro-cyclical nature of fluctuations in the capital market and economic activity, while some theories suggested a limited relationship between them. Like (Mankiw 1989), believed that the fluctuation in economic activity was the

result of technological change, not because of the monetary variables. Similarly, (Sanvi and Matheron 2005) revealed a weak link between stock prices and real activity, except in the USA. Their findings suggested a limited co-movement between the financial market and business market, particularly in the short-run. (Ahmad and Sehgal 2017) observed a limited interdependence between financial and business cycles in the SAARC region. (Adam & Merkel, 2019) suggested that the fluctuations in the stock prices were largely belief-driven in the USA, and did not always reflect economic change. However, such fluctuations could influence output, but the effects were not always sustainable.

Although prior studies focused on the credit and investment behavior, limited research examined the cyclical dynamics of the financial indicators and economic growth. The present study focuses on *determining the financial cycles in India*, incorporating credit, credit-to-GDP ratio, and construction GDP. Other macroeconomic indicators, like GDP, broad money supply, and gross fixed capital formation, are also included. With the help of the Hodrick-Prescott filter, the study aims to examine the turning points and movement between these cycles. Additionally, lead-lag and SVAR are also carried out to assess the dynamic interactions among the credit, investment and GDP cycles.

3.6 Concluding Remarks

This chapter reviews past research on the relationship between various indicators of financial development and economic growth. Although a comprehensive literature review is already included, studies often neglect the analysis of *credit-led growth at the state level* and how these variables interact during periods of *economic disruption*, especially in India. Most of the studies focus on the national level analysis rather than inter-state disparities. The present study is methodologically advanced, as it goes beyond the simple time series and linear analysis. This study employs *panel ARDL, threshold regression and SVAR* to examine the structural and dynamic interactions. Overall, these objectives aim to analyze the role of financial development in driving economic growth over time, across markets, and across different regions.

Chapter IV

RESEARCH METHODOLOGY

The study aims to investigate the relationship between financial development and economic growth in India. It specifically identifies the key determinants of financial development and their impact on economic growth. Therefore, an appropriate methodology and econometric tools were carefully designed to provide a clear framework and capture the dynamics among financial development indicators and economic growth. The study utilized time series data from 1980 to 2021 to analyse both short-term and long-term dynamics during the pre- and post-liberalisation periods. Data were sourced from reputable databases like RBI, IMF, and MOSPI to ensure credibility and consistency. This chapter outlines the sample size, variable definitions, sources, model specifications, and various methodologies with residual testing to form the foundation of the empirical analysis.

Section 4.1 discusses the data utilized in the study, including the time frame and key variables employed in the research. Each variable is defined along with its sources. The period of study was chosen to reflect long-term trends, structural shifts, and crises in the Indian financial system.

Section 4.2 describes the methodology employed, beginning with preliminary analysis. This included unit root tests and cointegration tests, forming the basis of the statistical tools used. Given the mixed order of integration $I(0)$ and $I(1)$, the autoregressive distributed lag (ARDL) model was applied, followed by residual diagnostic tests. The Granger causality test and the Dumitrescu-Hurlin panel causality test were employed to examine the direction of relationships among the variables.

Additionally, the Hodrick-Prescott filter was used to extract cyclical components from the data. Cross-correlation analysis was conducted to understand whether financial indicators could predict economic slowdowns. Finally, SVAR was employed to analyze the structural relationships between cyclical variables and to assess the financial-real economy transmission mechanism.

4.1 Data

This section outlines the data used in the study, along with its sources and definitions. The focus is on India, and the indicators used are selected based on empirical literature and their relevance to the financial development and economic growth relationship.

4.1.1 Period of the Study

In the late 1990s, India underwent economic reforms aimed at liberalizing and globalizing the economy. During this period, fiscal and monetary policies experienced significant changes. The present study used annual and monthly data to analyze the relationship between financial development indicators and economic growth in India. For chapters such as banking credit, money supply, and financial cycles, annual analysis from 1980 to 2021 was employed to capture long-term trends.

While a sub-national analysis of bank credit and economic growth was also conducted, using data from 2000 to 2021, due to limited data availability. Additionally, to examine the highly volatile stock market, monthly data from April 1996 to December 2021 were utilized to identify short-term fluctuations, co-movements, and volatility patterns. This time framework encompasses all the major economic events that occurred, including financial liberalisation, financial economic crises, and the COVID-19 pandemic.

4.1.2 Variables of the Study

The present study employed the broad data set of macroeconomic and financial variables to examine the multidimensional relationship between financial development and economic growth. GDP and IIP were the dependent variables across different objectives. Financial development was proxied by non-food gross bank credit, total bank credit by Scheduled commercial banks, broad money supply, and stock market capitalization (BSE and NSE). Capital formation (GFCF) is a fundamental element that significantly contributes to economic growth; hence, it was also incorporated as a proxy for investment activity.

Table 4.1 shows the financial development indicators and macroeconomic variables used in the study for all objectives, along with their sources and definitions. The variables are organised objective-wise for clarity.

Table 4.1 Description of variables

Symbols	Variables	Definition	Source
NFGBC	Non-Food Gross Bank Credit	Credit extended by financial institutions to individuals and businesses other than food procurement.	RBI Database
AGRICRED	Agricultural Credit	It includes farm credit (short-term and medium-term crop loans), agriculture infrastructure, and ancillary activities.	RBI Database
BANK C	Total Bank Credit by SCBs	Aggregate amount of funds available for individuals and business through loans and advances.	RBI Database
GDP	Gross Domestic Product at Constant Prices	Monetary value of final goods and services.	RBI Database/MoSPI
M3	Broad Money Supply	Currency held by the public + net time deposits of all commercial banks.	OECD
MCBSE	Market Capitalization of Bombay Stock Exchange	Value of a public company in the stock market, depending on the current share price and outstanding shares.	RBI Database
MCNSE	Market Capitalization of National Stock Exchange	Value of a public company in the stock market.	RBI Database
IIP	Index of Industrial Production	It measures the general level of industrial activity.	MoSPI
HOUSE PRICES	Construction GDP	It measures the total value of the related construction related activities.	RBI Database
GFCF	Gross Fixed Capital Formation	It represent the total investment in the fixed capital assets	World Bank

Additionally, control variables such as lending rate of interest, call money rate, consumer price index, and crude oil were included. Table 4.2 presents these control variables, along with their definition and sources. These variables captured the effects of monetary policy, inflation trends, and global shocks on India's economic growth. The data for these variables were obtained from various sources, such as RBI, OECD, MoSPI, and IMF. These variables have been selected on the basis of their empirical contribution to growth.

Table 4.2 Description of controlled variables

Symbols	Variables	Definition	Source
LR	Lending Rate	Rate at which commercial banks lend money to borrowers.	RBI Database
CPI	Consumer Price Index	An increase in the price level of goods and services over a period of time.	OECD
IR	Call Money Interest Rate	Interest at which short-term funds are borrowed and sold overnight.	RBI Database
Brent	Brent Crude Oil Price	International benchmark prices of Brent crude.	IMF

4.2 Methodology

This section outlines the empirical strategy used to examine the relationship between financial development and economic growth. A combination of different time-series econometric techniques was employed based on the nature of the data. The following methods have been selected to capture both short-term and long-term dynamics, as well as potential structural shifts, in India.

4.2.1 Data Transformation

- (a) **Spliced Index:** To ensure data continuity and comparability, the splicing technique was used. It combines two overlapping index series to get a longer index series. It's primarily done to increase the number of observations and the degree of freedom (Hill & Fox, 1997).

The data on gross domestic product (GDP) in India is available for different base years; these values were spliced to create a consistent series using 2011-12 as the base year.

- (b) **Log-Linear Transformation:** The key economic and financial variables were transformed into a log-linear form by applying natural logarithms to both sides.

$$\log Y_t = \log \alpha + t \cdot \log \beta + \log \mu_t$$

Where $\log Y_t$ represents the natural form of GDP log, $\log \alpha$ is the intercept, and $\log \beta$ is the slope coefficient.

4.2.2 Correlation

This method analyzes the relationship between the variables. It's a statistical measure used to determine whether a relationship exists between the variables; however, it does not establish the causal relationship.

- (a) **Positive correlation:** An increase or decrease in variables causes an increase or decrease in other variables.
- (b) **Negative correlation:** An increase in one variable causes a decrease in the other variable and vice versa.
- (c) **Zero correlation:** An increase or decrease in one variable has no impact on the other variables. The relationship varies from $r = +1$ to -1 ; the former indicates a strong positive relationship, the latter indicates a strong negative relationship, and 0 indicates no relationship.

4.2.3 Unit Root Test

It's one of the fundamental concepts in econometrics for measuring whether time series data remains constant over time. However, many variables exhibit linearity due to the trend, making them non-stationary; that's why it's imperative to check their stationarity properties. If a time series is stationary, the mean and variance are constant. There are several methods to conduct a unit root test.

(a) **Augmented Dickey-Fuller (ADF) test**

One of the widely accepted and used tools to measure the stationary properties of a variable. The ADF test examines whether the unit root of the series follows a random walk, implying

the changes from one period to another are unpredictable. It adds lagged differences of the dependent variable, and autocorrelation can be controlled by adding the lags.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + e_t$$

Where α is the constant term.

βt : It is a trend.

γ : Is the coefficient of the lagged value to be tested for the presence of a unit root.

e_t : Error term

Δy_t : It is the first difference of the series.

If the p-value is less than the critical value, the null hypothesis is rejected, indicating the series is stationary. However, if the p-value is greater than the critical value, we fail to reject the null hypothesis, implying that the series is non-stationary.

(b) Phillips-Perron (PP) test

The PP test employs non-parametric statistical methods to detect autocorrelation and heteroskedasticity in the error term. It's similar to ADF but doesn't include first differences or lagged terms. This method is particularly used for non-normal data and examines a unit root to rectify the problem of heteroskedasticity and autocorrelation in the variables.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + e_t$$

It assumes that the error term is stationary, even if it's correlated or heteroscedastic. This implies that errors can be correlated. The ADF test assumes that the error terms are free from autocorrelation and heteroskedasticity.

4.2.4 Cointegration

Cointegration analysis examines the long-run relationship between the variables. It helps determine if the stationary series are cointegrated to maintain a long-run equilibrium. There are several methods to run the cointegration test.

(a) **Engle-Granger Test:** It is the first method introduced to test cointegration and the quickest one. The only drawback with this test is that it's limited to bivariate analysis. Another test, which is an improvement of the Engle-Granger test, was the Phillips-Ouliaris test.

- (b) **Phillips-Ouliaris test:** It offers more robustness against autocorrelation and heteroskedasticity. It can identify whether one time series is influenced by others. Another widely recognized statistical tool to check the cointegration, and an improvement for both the Engle-Granger Test and Phillips-Ouliaris Test, is the Johansen Cointegration Test.
- (c) **Johansen Cointegration Test:** This test was developed by Johansen (1980, 1981). This test is used on time series data, allowing estimation of multivariate variables. The ranks of the coefficient matrix determined the number of cointegrating variables. There are two subsets under this: trace statistic and maximum eigenvalue. Trace statistics test the null hypothesis that the number of cointegrating vectors is less than or equal to 1. While the maximum eigenvalue tests the null hypothesis that the number of cointegrating vectors is r against the alternative $r+1$.
- (d) **Pedroni Cointegration Test:** This is the panel cointegration test (Pedroni, 2004), an extended version of the Engle-Granger Test, which allows for heterogeneity in the model and tests the null hypothesis of no cointegration. This test accounts for seven different statistics categorized under within-dimensions (panel statistics) and between-dimensions (group statistics). If the Pedroni majority test rejects the null hypothesis, this indicates that there is a long-run relationship between the variables.

4.2.5 Granger Causality Test

The Granger causality test was introduced by (Granger, 1969) and is used to analyze the causal relationship between the variables. It examines whether lagged values of one variable predict the future values of other variables and helps in identifying the direction of the relationship.

$$GDP_t = c_1 + \sum_{i=1}^p \alpha_i GDP_{t-i} + \sum_{j=1}^p \beta_j FD_{t-j} + e_t$$

Where

α_i = lagged GDP coefficients

β_j = lagged financial development coefficients

p = number of lags

A p-value below the significance level of 0.05 indicates the existence of a causal relationship, rejecting the null hypothesis. The test results in four possible outcomes depending on the direction:

- (a) **Unidirectional causality (from financial development to economic growth):** If the financial development Granger causes economic growth, implying the past value of financial development can predict future GDP growth, the supply-leading hypothesis.
- (b) **Unidirectional causality (from economic growth to financial development):** If economic growth causes financial development, implying expansion in growth influences financial development, the demand-following hypothesis.
- (c) **Bidirectional causality:** If there exists a bidirectional relationship between financial development and economic growth, this implies that there is a two-way relationship; both variables influence each other.
- (d) **No causality:** No causality indicates that both variables are independent and there's no predictive power.

4.2.6 Dumitrescu-Hurlin Panel Causality Test

The Dumitrescu-Hurlin panel causality test, introduced by (Dumitrescu & Hurlin, 2012) is used to examine the causality in panel data, allowing for both cross-sectional relationships and heterogeneity. The test has been widely used for panel data (Lopez & Weber, 2017).

$$GDP_{i,t} = \alpha_i + \sum_{k=1}^k \gamma_{ik} GDP_{i,t-i} + \sum_{k=1}^k \beta_{ik} FD_{i,t-j} + e_{i,t}$$

Where

γ_{ik} = lagged GDP coefficients

β_{ij} = lagged financial development coefficients

k = number of lags

This assumes there can be causality for some individuals, not for all. The null hypothesis is as follows:

$$H_0: \beta_{iK} = \dots = \beta_{iK} = 0$$

While the alternate hypothesis is:

$$H_1: \beta_{1i} = \dots = \beta_{iK} = 0$$

$$\beta_{1i} \neq 0 \text{ or } \dots \text{ or } \beta_{iK} \neq 0$$

This implies there is a causality for at least one individual, and the null hypothesis implies there is no simple Granger causality between the variables.

4.2.7 Autoregressive Distributed Lag Model

The study applied the ARDL (Autoregressive Distributed Lag Model) model, a well-known approach (Pesaran, Shin, Smith, & J, 2001), to estimate the relationship among these variables, considering both the long-term and short-term dynamics. The dependent variables' current value depends on their lagged values and other independent variables' current and past values (Kripfganz & Schneider, 2018).

The model is applicable when the variables have different orders of integration. The ARDL model has its advantages over the traditional approaches. It gives robust results even when the number of observations is small. It eliminates the endogeneity problems with the assumption that all the variables are endogenous (DURSUN, 2024).

The general form of the ARDL model for $t = 1, 2, \dots, T$ periods and $I = 1, 2, \dots, N$ groups,

$$Y_{it} = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta FD_{t-i} + \beta_3 GDP_{t-1} + \beta_4 FD_{t-1} + \lambda D_t + e_{it}$$

Where

Δ represents the first difference, how past variables' values define the current value of GDP. GDP_{t-1} , and FD_{t-1} , which are the lagged values of variables representing long-run relationships. e_{it} is the error term, and λD_t is the dummy variable used for the structural shocks. In this approach, a bound test is performed to estimate the long-run relationship. The null hypothesis implies that the coefficient of lagged variables $H_0 = (B_3 = B_4 = 0)$. Two bounds of critical values are computed. The upper bound is $I(0)$, and the lower bound is $I(1)$. If the F-statistic exceeds the upper critical value, then we reject H_0 , and, this implies that there exists a long-run relationship between the variables. If the F-statistics fall below the lower critical bound values, we accept H_0 , which implies there is no relationship between the variables (Chandio, Jiang, & Rehman, 2019).

The regression only estimates the short-run relationships, neglecting long-run behaviour. The ECM (Error Correction Model) helps in distinguishing short-run effects from long-run equilibrium (Nkoro & Uko, 2016). The term ECT defines how much time an economy takes after short-run shocks to reach equilibrium. ECT_t , is defined as

$$ECT_{t-1} = GDP_{t-1} - (\beta_4 FD_{t-1})$$

The statistical significance and negative sign of $\alpha_1 ECT_{t-1}$ confirm the presence of a long-run relationship between the variables, implying how much the economy's disequilibrium is being corrected. If ECT_{t-1} , they are zero or insignificant, this suggests there is no long-run relationship, and the economy does not restore equilibrium.

$$Y_{it} = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta FD_{t-i} + \beta_3 GDP_{t-1} + \beta_4 FD_{t-1} + \alpha_1 ECT_{t-1} + \lambda D_t + e_{it}$$

4.2.8 Jarque-Bera (JB) normality test

(a) **Skewness:** It represents the asymmetrical distribution in the sample. A normal distribution is free from skewness, as it's symmetrical on both sides. If the given distribution is shifted to the left with its tail on the right, it's often called positively or right-skewed. If the distribution is shifted to the right with a tail on the left, it's called negatively or left-skewed. Two popular methods to measure it are Pearson's mode skewness and Pearson's median skewness.

$$\text{Pearson Mode Skewness: } \frac{\bar{X} - M_0}{s}$$

Where $\bar{X}$ is the mean value,

M_0 is the mode, and

s is the standard deviation.

$$\text{Pearson Median Skewness: } \frac{3\bar{X} - M_d}{s}$$

Where M_d is the median value. In a positive skewness, the mean value is greater than the median, while in a negative skewness, the mean value is less than the median value.

(b) **Kurtosis:** defines whether the tails of the distribution consist of extreme values, basically quantifying the heaviness of the distribution tails. This helps identify the potential issues in the dataset. It explains the peakedness in the data, the degree to which the data is concentrated around the mean.

$$\text{Kurtosis} = \frac{\sum_{i=1}^N (Y_i - \bar{Y})^4 / N}{s^4}$$

Where s is the standard deviation, $\bar{Y}$ is the mean, and n is the number of observations.

The medium-tailed kurtosis is called mesokurtic, a thin-tailed one is called platykurtic, and a fat-tailed one, more peaked, is known as leptokurtic.

(c) Jarque-Bera (JB) test: It determines whether the data is normally distributed with the help of skewness and kurtosis. This test follows a chi-square distribution with two degrees of freedom.

$$JB = n \left(\frac{s^2}{6} + \frac{(k-3)^2}{24} \right) \text{ where } s \text{ represents skewness and } k \text{ is the kurtosis.}$$

If the JB statistic is different from that of chi-squared, we reject the null hypothesis, implying the data is not normally distributed.

4.2.9 Breusch-Godfrey Serial Correlation LM Test

Autocorrelation is a phenomenon where the error term of one variable in one time period is correlated with the error term of another variable in another period. If correlation exists, it can lead to biased t-statistics and p-values. To detect autocorrelation at higher lags, the Breusch-Godfrey LM test is conducted.

H_0 : There is no autocorrelation.

H_1 : There is autocorrelation.

If the p-value is greater than the 0.05 significance level, fail to reject the null hypothesis. This confirms that there is no autocorrelation in the model. If the p-value is smaller than the 0.05 significance level, reject the null hypothesis and conclude that there is an autocorrelation in the model.

4.2.10 Breusch-Godfrey Heteroskedasticity Test

This test is used to check whether the residuals are heteroscedastic, indicating that the residuals do not have equal variance. This violation of the linear regression model's assumption leads to biased results. The test examines whether the variance of the error from regression is dependent on the values of the independent variables.

H_0 : the variance is constant.

H_1 : The variance is not constant.

If the p-value is greater than the 0.05 significance level, reject the alternate hypothesis. This confirms the presence of homoscedasticity in the model. If the p-value is smaller than the 0.05 significance level, reject the null hypothesis and conclude that heteroscedasticity is present in the model.

4.2.11 Ramsey RESET test

The Ramsey reset test expands the set of explanatory variables by adding their powers, like cubes or squares, and checks if these additional terms improve the model specification. This test relies on the F-statistic.

$$F = \frac{(SSR_{restricted} - SSR_{unrestricted}) / q}{SSR_{unrestricted} / (n - k - q)}$$

Where q is the number of variables added

n = sample size

k = number of parameters in the original model

The hypothesis to be tested is as follows:

H₀: the original model is correctly specified

H₁: The original model is not correctly specified.

If the p-value is greater than the 0.05 significance level, fail to reject the null hypothesis. This confirms the model is correctly specified. If the p-value is smaller than the 0.05 significance level, reject the null hypothesis and conclude that the model is mis-specified.

4.2.12 CUSUM and CUSUM square

A CUSUM (cumulative sum) and CUSUM square (CUSUMQ) test are performed to ensure the structural stability of the regression model. It's employed to detect any structural breaks in the regression model, reflecting any economic or policy change.

While the CUSUM test examines the parameter's stability, CUSUMQ helps in detecting stability in the variance.

$$CUSUM_Y = \sum_{i=k}^t e_i, \text{ for } t = k + 1, \dots, T$$

Where k is the number of estimated parameters.

If the CUSUM line stays within the positive and negative deviations or near the zero line, then the model is correctly specified and stable. However, if it deviates from the bound values, it suggests unstable coefficients or a structural break.

4.2.13 Threshold regression

The threshold regression model is a non-linear model proposed by (Hansen, 1999), where the relationship between the dependent and independent variables depends on whether the threshold variable crosses the threshold or critical point. The threshold variable can be an external variable or the lagged values of the dependent variable. The data can switch multiple regimes defined by a threshold estimator.

The general form of the Threshold regression model can be written as:

$$Y_t = \alpha_1 + \beta_1 X_t + \varepsilon_t, \quad \text{if } Z_t \leq \gamma$$

$$Y_t = \alpha_2 + \beta_2 X_t + \varepsilon_t, \quad \text{if } Z_t > \gamma$$

Where,

Y_t = Dependent variable IIP

X_t = Market capitalization

Z_t = threshold variable Market capitalization

γ = threshold value

α_1, α_2 = intercept term for each regime

ε_t = error term

Z_t is the threshold value that divides the samples into different regimes or groups. γ is the unknown threshold value, but it will be estimated. Regime one is defined as the subset of observations in which the value of being Z_t is less than the threshold γ . Similarly, regime two is defined as the subset of observations that Z_t is greater than or equal to γ .

4.2.14 Hodrick-Prescott Filter

The HP filter, a method developed by Hodrick and Prescott in 1981, is a commonly and widely used econometric model to separate the trend component from a cyclical component in a series.

It is a linear filter that relies on the specification of a parameter called lambda, λ . Lambda helps in the determination of the smoothness of estimated trends and depends on the periodicity of the data.

$$Y_t = \tau_t + c_t + \varepsilon_t$$

$$\min_{\tau_t} \sum_t (Y_t - \tau_t)^2 + \lambda \sum_t (\tau_{t+1} - 2\tau_t + \tau_{t-1})^2$$

The series Y_t denotes the time series decomposed into trend (τ_t), (c_t) cyclical component, and (ε_t) error components. This method helps in minimizing the deviation of the original series from the trend as well as the curvature of the estimated trend. The cyclical component is calculated as the difference between the actual series and the trend.

$$y_t - \tau_t$$

The filter assumes linear growth of the series, so logged values of variables are used. The choice of λ depends on the frequency of data. (Hodrick & Prescott, 1981) originally proposed a value of $\lambda = 1600$ for quarterly data. They suggested that the smoothing parameter should be calculated as the ratio between the variables' cyclical component and that of the trend component (Monahov, 2023).

$$\lambda = \frac{\sigma^2_{cyclical}}{\sigma^2_{trend}} = \frac{5^2}{\left(\frac{1}{8}\right)^2} = 1600$$

For yearly data, no specific λ value is recommended. It is often selected from the range of $\{6.25, 100, 1600\}$. (Baxter & King, 1999) used a value of 10, while (Backus & Patrick, 1992) suggested a value of 100, which was suitable for their analysis. (Ravn & Uhlig, 2002) suggested that if the HP filter quarterly value of 1600 is correct, then the other value, λ , should be computed by this rule:

$$\lambda = 1600 \cdot p_q^4$$

Where p_q = number of periods per quarter

Based on this rule, for monthly data, $p=3$, then $\lambda = 1600 \cdot 3^4 = 129600$. A value of zero λ means that the output of the HP filter matches the input series exactly. The trade-off between the two

is governed by the smoothing parameter λ ; the higher the value, the smoother the estimated trend.

4.2.15 Cross-Correlation (Lead and Lag Relationship)

Cross-correlation analysis measures the interaction between cyclical components of dependent and independent variables. It explains a lead-lag relationship: Lag refers to the impact of a variable's past values on the current value of another variable, and lead measures the influence of a variable's current values on future movements of the other variable.

$$R_{xy}(\tau) = \sum_t x(t) \cdot y(t + \tau)$$

Where, $R_{xy}(\tau)$ = cross-correlation function at lag τ

$X(t)$ and $Y(t)$ = time series

τ = time lag

A positive value $R_{xy}(\tau)$ suggests an association between the two variables, and a negative value indicates an inverse relationship between them. Any correlation $r \geq 0.20$ is considered meaningful. This is a threshold based on commonly used benchmarks in the previous financial studies.

4.2.16 Structural Vector Autoregression (SVAR)

Structural Vector Autoregression (SVAR) uses the restrictions imposed by theory to identify structural shocks or high-frequency impulse responses from the system. The study employed SVAR to examine the cyclical independencies among the variables during the period of shocks. GDP was the dependent variable, and NFGBC and GFCF were the explanatory variables

$$GDP = f(NFGBC, GFCF) \dots\dots\dots 1$$

To estimate the model, equation 1 was transformed into an econometric equation as follows:

$$GDP_t = \alpha_0 + \alpha_1 NFGBC_t + \alpha_2 GFCF_t + \beta \varepsilon_t \dots\dots\dots 2$$

GDP serves as a dependent variable, which is a function of explanatory variables and structural shocks, depicted by $\beta \varepsilon_t$.

α_0 is the constant term,

α 's which are the parameters to be estimated.

(a) Vector Autoregression Framework

The VAR is a multivariate time series model, where each endogenous variable is a function of its own past values and other variables' past and current values.

$$Y_t = (y_{1t}, \dots, y_{2t}, \dots, y_{kt}) \dots\dots\dots 3$$

K is a set of endogenous variables

The VAR (p)- the process with lags can be illustrated in equation 4:

$$y_t = A_1 y_{t-1} + \dots A_p y_{t-p} + u_t \dots\dots\dots 4$$

Where,

A_i : are (K×K) coefficient matrices,

y_t : contains all the endogenous variables.

u_t : is a vector of white noise disturbance matrix $E(u_t) = 0$ and $\text{var}(u_t) = E(u_t u_t^T) = \Sigma_u$

The VAR model relies on key assumptions: the variables should be stable (stationary property), the linear relationship between the variables, and the constant covariance of the error term.

(b) Structural Vector Autoregressive Model

A VAR(p) can be expressed in structural representation, which allows for the examination of the contemporaneous relationship between the variables.

$$y_t = A_1^* y_{t-1} \dots A_p^* y_{t-p} + \beta \varepsilon_t \dots\dots\dots 5$$

$$y_t = A^{-1} A_1^* y_{t-1} + \dots A^{-1} A_p^* y_{t-p} + A^{-1} \beta \varepsilon_t \dots\dots\dots 6$$

Where,

ε_t : are structural shocks.

A and β : contain the contemporaneous and short-run coefficients, respectively.

(c) Structural Impulse Response Function and Variance Decomposition

The structural impulse response functions (SIRF) show how a shock to one variable impacts other variables in the model, assuming other shocks remain constant. For example, if NFGBC experiences a sudden shock, IRF illustrates how this would impact other variables. Whereas Variance decomposition further explains the variation in each variable due to shocks, for instance, it reveals how much variation in GDP is explained by NFGBC shocks. Given the

following reduced form Vector Moving Average representation recovered from the inversion of a stationary vector autoregressive representation (VAR):

$$y_t = A_1^{-1}(L) \dots \dots \dots 7$$

Where,

y_t : contains the endogenous variables.

$A_1^{-1}(L)$: illustrates the transmission of shocks across different lags.

ε_t : error term

We define $A^{-1}(L) = \phi(L)$ and obtain a process expressed as a linear combination of the past innovations by the WOLD representation:

$$y_t = \phi(L)u_t = \sum_{h=0}^{\infty} \phi_h u_{t-h} \text{ where } \phi_0 = I_m \dots \dots \dots 8$$

To identify the unobservable structural shocks ε_t from the observable reduced-form innovations in the SVAR representation, it is necessary to impose a set of restrictions. The SVAR model is specified as follows:

$$A_0 y_t = \sum_{i=1}^p A_i^* y_{t-i} + \beta \varepsilon_t \quad \varepsilon_t \sim N(0, I_m) \dots \dots \dots 9$$

Where,

A_0 : (m*m) contemporaneous effects matrix

A_i^* : (m*m) lagged coefficient matrix

B : (m*m) short-response matrix.

From the reduced form, $u_t = A^{-1} \beta \varepsilon_t$

And the variance-covariance matrix $u_t = A^{-1} B B^T A^{-T}$

(Johansen, 1995), (Amisano & Giannini, 1997), (Lutkepohl & Kratzig, 2004), (Lutkepohl, 2005) suggest that to exactly identify a structural model, the number of restrictions imposed is

$$\frac{k(k-1)}{2} \dots \dots \dots 10$$

Since this study incorporates three variables, both the short-run and long-run restrictions were imposed to capture the immediate effect as well as the persistent effects.

4.3 Concluding remarks

This chapter outlined the comprehensive data set and econometric tools and methodology employed in the study to examine the relationship between financial development and economic growth. Various diagnostic tests and stability tests were conducted to ensure the model's stability and research findings. The methods were carefully chosen depending on the stationary properties of the variables. The ARDL and panel ARDL frameworks were employed as the primary tools to examine the short-run and long-run relationships between the variables, given the non-stationary properties of the variables. Threshold regression was conducted to capture the nonlinear relationship between the stock market size and industrial production. Finally, SVAR was employed to investigate the structural relationship between the business and financial cycles. The following chapter applies these methodologies to present the empirical results and their interpretations.

Chapter V

THE SHORT-RUN AND LONG-RUN IMPACT OF BANK CREDIT ON ECONOMIC GROWTH

5.1 Introduction

The financial and banking sectors are the key drivers of the economy's growth. The relationship between financial development and economic growth has been a subject of empirical research in emerging and developed economies following the (Schumpeter J. , 1912) innovation theory. In India, the bank-based financial system plays a crucial role in driving economic growth. (Levine R. , 1997) and (Beck, Demirgüç-Kunt, & Levine, 2001) argued that a well-developed financial system, particularly efficient banks, provides credit to individuals, businesses, organizations, and the government for both investment and consumption purposes, which ultimately leads to economic growth. The banking sector in India has undergone significant changes since the post-liberalization era. Before 1990, growth was highly unstable and unreliable, as asserted by (Panagariya, 2004). However, in 1991, the Indian government adopted reforms, which motivated the entry of private and foreign banks. These policies led to more stable and sustainable growth from 1992 onwards (Subramaniam, 2004). Commercial banks are the major source of credit and the fastest-growing financial intermediaries in India, generating income for the banks.

However, between 2000 and 2010, increased bank credit led to inflation, which forced the RBI to increase the rate of interest. Despite this, the banking sector continues to play a crucial role in financial deepening and economic development. It facilitates credit availability and affordability, particularly for SMEs. In the pre-reform period (1972-1989), average economic growth was 4%, and bank credit as a share of GDP was 17%. In the post-reform period (1990-2013), economic growth increased by 6%, and bank credit as a share of GDP increased to 34%. A closer look shows that from 1990 to 1997, GDP averaged 5% while bank credit accounted for 21% of GDP. This improved to 6% growth and 28% credit from 1998 to 2004, and further to 8% growth and 50% credit from 2005 to 2014 (Mohanty, Kumar, & Patra, 2016). Since then, there has been a constant increase in bank credit and economic growth, indicating a close relationship between the two, aligning with the findings of (Pradhan, 2009) who found a

bidirectional relationship between financial development and economic growth in India, particularly banking sector development and growth. Similarly, (Sehrawat & Giri, 2015) confirmed a long-run relationship between both the bank-based and market-based indicators and economic growth, supporting the supply-lead hypothesis. However, in the recent period from 2014 to 2021, the credit levels remained consistent at 50-55%, and the growth rate experienced fluctuations owing to policy and global factors.

Over the years, government incentives such as priority sector lending (PSL) norms, the Kisan credit card scheme, and MUDRA Yojana have been implemented to bridge the credit gap for underprivileged sectors. These schemes focused on providing credit to MSMEs and women entrepreneurs, enhancing access to financial services. Under these incentives, credit of Rs ₹18.39 lakh crore has been provided to 34.93 crore accounts. In 1969, the RBI mandated that 40% of average net bank credit (ANBC) or credit equivalent off-balance sheet (CEOBS) be allocated to the priority sectors encompassing agriculture, MSMEs, housing, education, and social infrastructure. In 2020, the RBI announced funding support to startups and 7.5% of the ANBC or CEOBS, whichever is higher, to microenterprises. In 2021-22, total PSL by scheduled commercial banks stood at ₹ 42.6 lakh crore, with ₹ 14.25 lakh crore to agriculture and ₹ 5.97 lakh crore to MSMEs. Since digitalization has boomed the economy, credit cards and digital transactions have experienced a sudden rise, causing an increased demand for bank credit and a higher level of consumption, ultimately driving the economy.

Many existing studies in India focus on national-level aggregates, overlooking regional disparities. This highlights the need to understand the effectiveness of the distribution of bank credit among states and its impact on their economic growth. This study aims to explore the sub-national relationship between banking credit and economic growth, utilizing a panel data set of 32 states. In addition to this, this study re-examined the impact of non-food gross bank credit (NFGBC) as a proxy of bank credit and priority sector lending, particularly agriculture credit, on the economic growth at the national level. Analyzing this relationship at both the national and sub-national levels can be used as an essential gauge to guide further policies with a significant impact on the nation's economic growth and credit distribution.

The rest of the chapter is structured as follows: Section 5.2 outlines the objectives and hypotheses, followed by an analytical framework in Section 5.3. Section 5.4 presents the empirical results and a detailed discussion of the time series and state-wise panel analysis. The chapter concludes with a summary of key findings.

5.2 Objectives and Hypotheses

The chapter addresses two primary objectives, and these are as follows:

O_{1A}: To examine the dynamic relationship between non-food gross bank credit (NFGBC) and economic growth (GDP) at the national level in India.

The related hypotheses are

H_{1a}: There is no significant long-run relationship between non-food gross bank credit and GDP.

H_{2a}: Agricultural credit has no significant long-run impact on the GDP.

H_{3a}: There is no significant relationship between lending rates and GDP.

O_{1B}: To identify if the long-run relationship exists between bank credit and GDP among Indian states.

The related hypotheses are

H_{1b}: There is no co-movement between bank credit growth and GDP growth at the state level.

H_{2b}: There is no significant long-run relationship between bank credit and GDP across Indian states.

H_{3b}: Bank credit does not cause GDP in Indian states.

5.3 Analytical framework

This section outlines the time framework, variables, and econometric methodology utilized for the national and sub-national analyses guided by the differences in variables and time structure.

Aggregate Credit Growth Relationship (National-Level Analysis)

The national-level analysis for the annual period 1980 to 2021 employed the non-food gross bank credit (NFGBC) as an indicator of bank credit, which refers to the loans provided to industries, services, and personal loans, and GDP spliced at the 2011-12 base year. Agricultural credit (Agri), serving as a proxy for priority sector lending, was incorporated, reflecting the direct flow of credit to the underdeveloped sector of the economy. The lending interest rate was included as a controlled variable, which reflects the cost of credit. Given the mixed order of integration among the variables, the autoregressive distributed lag (ARDL) model was employed.

State-Level Credit Growth Relationship (Sub-National Analysis)

The sub-national analysis utilized the period 2001 to 2021, given the data constraints; for some states, the credit data was not available before 2000. Banking credit by scheduled commercial banks, as an indicator of bank credit and state GDP, was spliced at the 2011-12 base year. The study covered 32 Indian states and Union territories, based on the availability of data. The lending interest rate was also incorporated. Due to the different stationary properties, some variables were $I(0)$ while others were $I(1)$. The analysis employed the panel ARDL methodology, capturing within-state and cross-sectional dynamics among the variables.

5.4 Empirical Results and Discussion

This section presents the empirical findings on the short-run and long-run relationship among bank credit, GDP, and lending interest rates. It begins with examining the stationarity properties of the variables. The ECM and long-run results were further estimated and discussed in the subsequent sections.

(A) Aggregate Credit Growth Relationship Results

5.4.1 Trends in GDP Level and Non-Food Gross Bank Credit

Figure 5.1 depicts the annual growth rate trends between the GDP and the NFGBC across the period. The clear co-movement was visible between these two macroeconomic indicators. The credit growth experienced more volatility, spiking above 20%, while the GDP growth also experienced volatility, but it was less pronounced. The sharp decline in credit and GDP growth was associated with the major economic events and the crisis that occurred. Both the credit and GDP significantly fell in 1991, with the GDP falling to 1.1%, marked by the balance of payment deficit and the liquidity crunch (NagaRaj). GDP experienced a slowdown in the early 2000s due to the effects of the dot-com bubble burst. Earlier, due to the internet, many new startups were founded, taking advantage of new opportunities. Many investors put their money in large amounts. However, later they got to know about the real profitability of the companies. These companies were not generating profits, causing major shocks in the stock market (Kalinić , 2024).

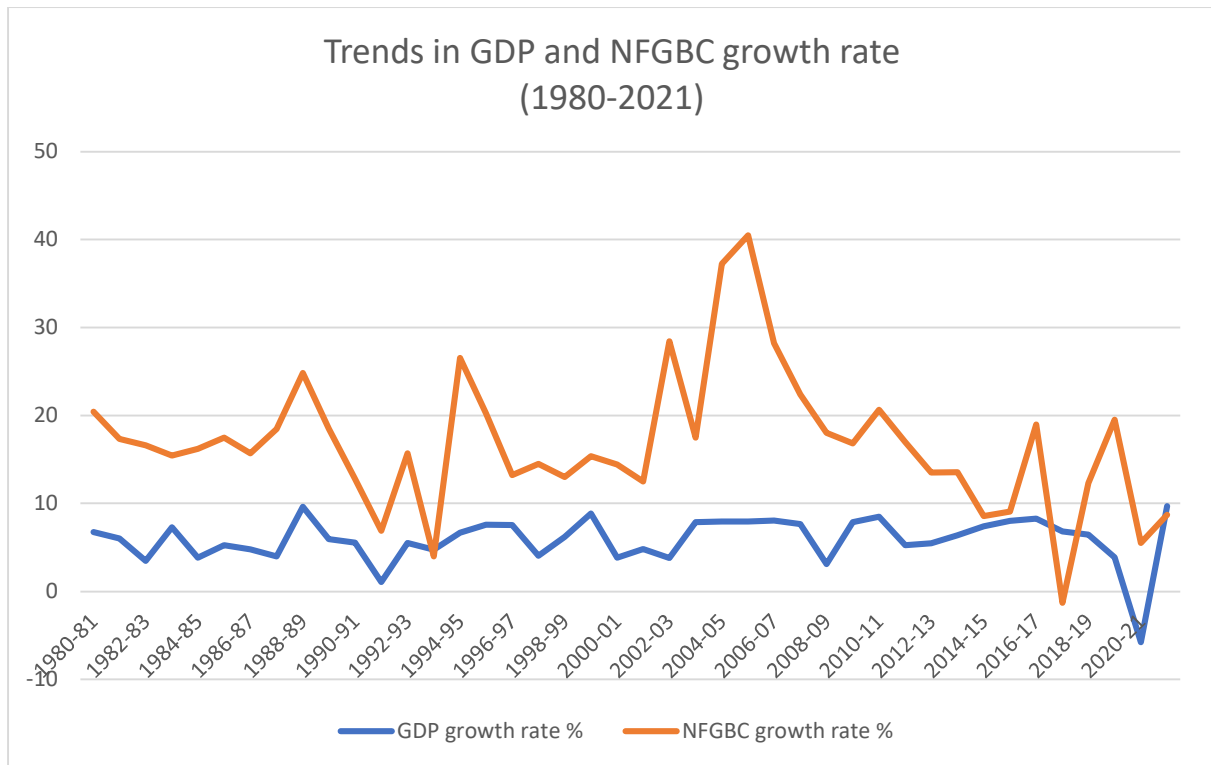


Figure 5.1 Co-movement between GDP and NFGBC Growth Rate (%)

While the NFGBC depicted a substantial increase in the non-food credit, with approximately 40% of the growth. The total bank credit by SCBs increased by ₹ 218,623 crores, with NFBC increasing by ₹ 213,464 crores (Reddy, 2005). In contrast, this increase didn't persist, and credit growth subsequently fell, facing a sharp downturn in 2018 due to the liquidity crisis of non-banking financial companies. Similarly, COVID-19 caused the sharpest GDP decline, by - 5.7%, followed by a rebound. Overall, the period of credit expansion followed by an increase in GDP growth indicates that credit availability influences real economic activity, highlighting a close relationship at an aggregate level.

5.4.2 Unit Root Test

It is a common practice in time-series analysis to perform a unit root test to examine the stationarity property of the variables. Models computed with non-stationary series face the problem of spurious regression (DEMİRKALE1, & OJAGHLOU, 2025).

Table 5.1 presents the results of the unit root test using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, using EViews 12.

Table 5.1 Unit Root Test Results

Augmented Dickey-Fuller*				
Variables	Level		1st Difference	
	Constant	Constant & Trend	Constant	Constant & Trend
GDP	0.448	-1.983	-5.819***	-5.789***
NFGBC	-0.874	-2.207	-4.093**	-4.136**
Agri	-0.206	-2.504	-3.020**	-2.959
Lending R	-0.654	-3.900**	-3.900**	-6.300***
Phillips-Perron				
Variables	Level		1st Difference	
	Constant	Constant & Trend	Constant	Constant & Trend
GDP	0.436	-2.033	-5.819***	-5.772***
NFGBC	-0.803	-1.333	-4.257***	-4.295***
Agri	-0.638	-1.534	-3.000**	-2.938
Lending R	-0.901	-3.900**	-9.271***	-9.933***

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

The results indicated that all variables except the lending rate were integrated of order one, i.e., I(1). This implies that GDP, NFGBC, and Agri variables were non-stationary at level but became stationary at their first difference according to both the ADF and PP tests. However, the lending rate was stationary at level. Hence, the ARDL model was appropriate for determining the short-run and long-run dynamics among these variables.

5.4.3 Autoregressive Distributed Lag Model (ARDL)

The ARDL model was estimated under the assumption that variables could be either endogenous or exogenous. The model focused on GDP as the dependent variable and NFGBC, agriculture, and lending rates as regressors. The number of lags was selected by the Akaike information criterion. The AIC criteria suggested the ARDL (1, 2, 2, 0) model.

Table 5.2 Short-Run Coefficients and ECM

Dependent variable: GDP

Model: (1, 2, 2, 0)

Huber-White-Hinkley Heteroskedasticity-consistent standard errors and covariance.

Variables	Coefficient	Std. Error	t-statistics	p-value
Δ GDP (-1)	0.747	0.104	7.125	0.0000
NFGBC	0.111	0.083	1.329	0.1934
NFGBC (-1)	-0.158	0.136	-1.159	0.2552
NFGBC (-2)	0.150	0.112	1.334	0.1918
Agri	-0.131	0.104	-1.263	0.2157
Agri (-1)	0.324	0.189	1.718	0.0958
Agri (-2)	-0.201	0.122	-1.637	0.1117
Lending R	-0.001	0.002	-0.810	0.4240
ECM (-1)	-0.252	0.051	-4.919	0.0000

R-squared 0.999

Adjusted R-squared 0.999

F-statistics 5029.01

Prob (F-statistics) 0.0000

To ensure robustness, the ARDL model (1, 2, 2, 0) was computed using Huber-White standard errors due to the presence of heteroskedasticity, and the results are presented in Table 5.2. The estimated ARDL model indicated that the current GDP exhibited a strong relationship with its lagged value, with a positive coefficient of 0.747 and significance at the 1% level. While the NFGBC had a weak short-run relationship with the GDP. Even at lag two, the coefficient remained positive but was not significant, which indicated a delayed and weak credit growth relationship. Agriculture credit showed a strong and positive impact on GDP in its first lag with a coefficient of 0.324; however, the coefficient was insignificant. Moreover, in lag two, it turned negative but remained insignificant, indicating inefficiencies and misallocation of credit. Likewise, the lending rate was found to be negative yet statistically insignificant. The ARDL model had an adjusted R-squared value of 0.99, indicating a very high level of fit. Further, the F-statistic was statistically significant at the 1% level. The AIC criteria were -4.52 and log likelihood 99, indicating a well-fitting model.

Finally, the ECM representation indicated that a system corrected its previous year's disequilibrium at a speed of 25% within one period of time, moving towards long-run equilibrium, and the coefficient was statistically highly significant at 1% level.

Table 5.3 Long-Run Coefficients

Dependent variable: GDP

Variables	Coefficient	Std. Error	t-statistics	p-value
NFGBC	0.408	0.155	2.630	0.0132
Agri	-0.032	0.163	-0.201	0.8416
Lending R	-0.006	0.0077	-0.881	0.3848
C	-0.0839	0.359	-2.336	0.0261

Table 5.3 presents the long-run ARDL results, revealing that NFGBC had a positive and statistically significant influence on the GDP, with a coefficient of 0.40. This implies that with a 1% change in the bank credit, GDP increases by 40%, highlighting the effective role of bank credit in stimulating long-term economic growth. Agriculture credit had a negative and insignificant influence on the GDP, implying structural inefficiencies and credit misallocation. Similarly, the lending rate had a negative and insignificant effect on the GDP in the long-run.

Table 5.4 ARDL Bound Test

F- Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signify.	I (0)	I (1)
		Asymptotic: n= 1000		
F- statistic	4.287	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size 40		Finite Sample: n= 40		
		10%	2.592	3.454
		5%	3.1	4.088
		1%	4.31	5.544

The bounds test findings presented in Table 5.4 revealed that the computed F-statistic value was 4.28, which was above the upper bounds critical values at both 5% (4.08) and 10% (3.45) significance levels; however, there was no cointegrating relationship at 1%.

This led to the rejection of the null hypothesis of no cointegration relationship at the 5% and 10% levels, suggesting the existence of a long-run relationship among the selected variables, which was also confirmed by the ECM.

5.4.5 Residual Diagnostic Tests

To ensure the robustness of the ARDL model, a series of residual diagnostic tests was conducted. These tests include the LM serial correlation test, the heteroskedasticity test, the Jarque-Bera normality test and the Ramsey RESET test.

Serial Correlation Test

Firstly, with the help of the Breusch-Godfrey LM test, the study tested whether the residuals exhibited autocorrelation.

Table 5.5 Breusch-Godfrey Serial Correlation LM Test

Null hypothesis: No serial correlation at up to 2 lags		
Alternate Hypothesis: Serial correlation up to 2 lags		
Statistics	Coefficient	p-value
F-statistic	1.6000	0.2192
Obs*R-squared	3.9752	0.1370

The findings in Table 5.5 indicated that residuals obtained from the ARDL model were free from correlation in the residuals up to two lags. The F-statistic (1.60) with a p-value of 0.2192 and observed R-squared of 3.97, with the associated p-value of 0.1370, implying that the model was free from serial correlation.

Breusch-Pagan-Godfrey Heteroskedasticity Test

To examine the presence of heteroskedasticity, the Breusch-Pagan-Godfrey test was employed to determine if the residual variance was dependent on the independent variables.

Table 5.6 Breusch-Pagan-Godfrey Heteroskedasticity Results

Null hypothesis: Homoskedasticity		
Alternate Hypothesis: Heteroskedasticity		
Statistics	Coefficient	p-value
F-statistic	2.663	0.0237
Obs*R-squared	16.295	0.0383
Scaled explained SS	11.620	0.1689

The results presented in Table 5.6 indicated that residuals from the ARDL (1, 2, 2, 0) model were not free from heteroskedasticity. The F-statistic and observed R-squared p-values were below the significance level; however, the scaled explained SS exceeded the significance level. This implied the rejection of the null hypothesis. Consequently, robust standard errors (White-Huber heteroscedasticity-consistent estimators) were applied to correct for any biased results.

Jarque-Bera Normality Test

The Jarque-Bera normality test was conducted to check if the observations were normally distributed. The null and alternative hypotheses are as follows:

H_0 : The data are normally distributed.

H_1 : The data are not normally distributed.

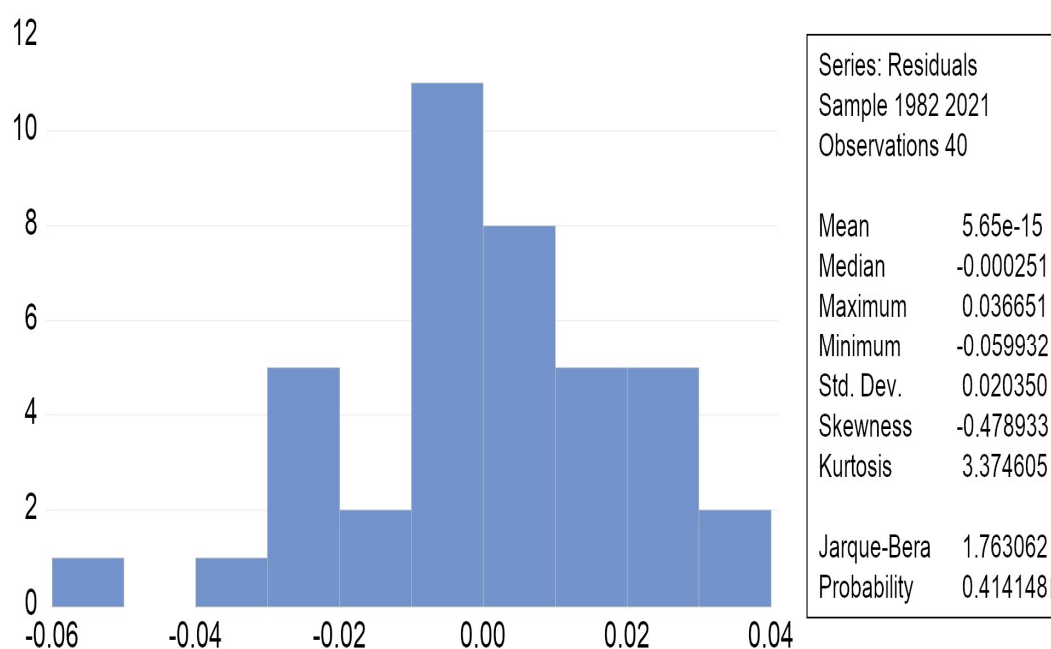


Figure 5.2 Residuals Normal Distribution

The JB test confirmed that residuals were normally distributed, skewness (-0.47) and kurtosis (3.37) were close to the expected values of 0 and 3, respectively, and the JB statistic value of 1.73, with the associated p-value of 0.41, suggesting that the null hypothesis couldn't be rejected and implying residuals followed a normal distribution.

Ramsey RESET test

This is the most common test used to find if the model suffers from misspecification, omitted variables, and incorrect function form, proposed by (Ramsey, 1969).

H_0 : The model is correctly specified.

H_1 : The model is not correctly specified.

Table 5.7 Ramsey Reset Test

	Value	df	p-value
F-statistics	0.442	30	0.6616
T-statistics	0.195	(1, 30)	0.6616
Likelihood ratio	0.259	1	0.6103

The results presented in Table 5.7 show that the model was free from any misspecification. Both f-statistics and t-statistics confirmed that the p-value of 0.6616, which was greater than the 5% level of significance, leading to rejection the null hypothesis, implying no specification bias. The acceptance of the null hypothesis implies that one variable can be explained by the other, implying a strong correlation between them.

5.4.5 Stability Tests

A CUSUM and CUSUM square test were performed to ensure the structural stability of the regression model. Figure 5.3 indicates that residuals were lying within 5% critical bounds, implying the stability of the parameters of the estimated model.

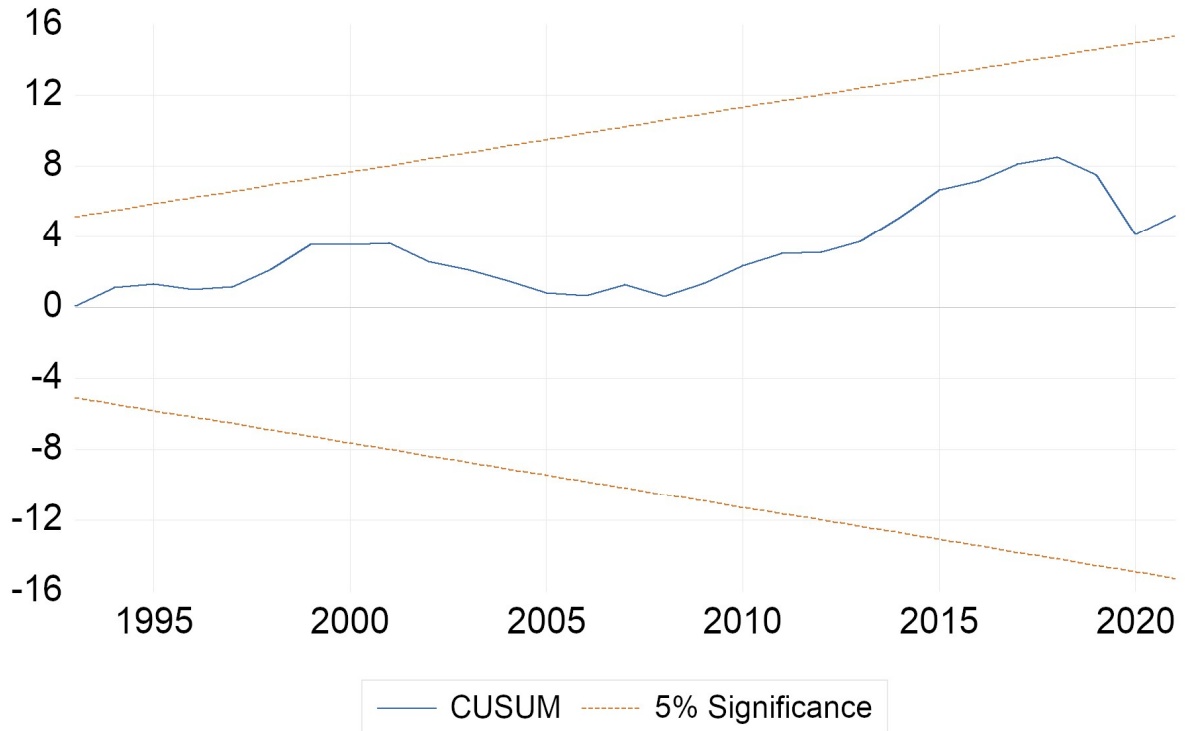


Figure 5.3 CUSUM Test

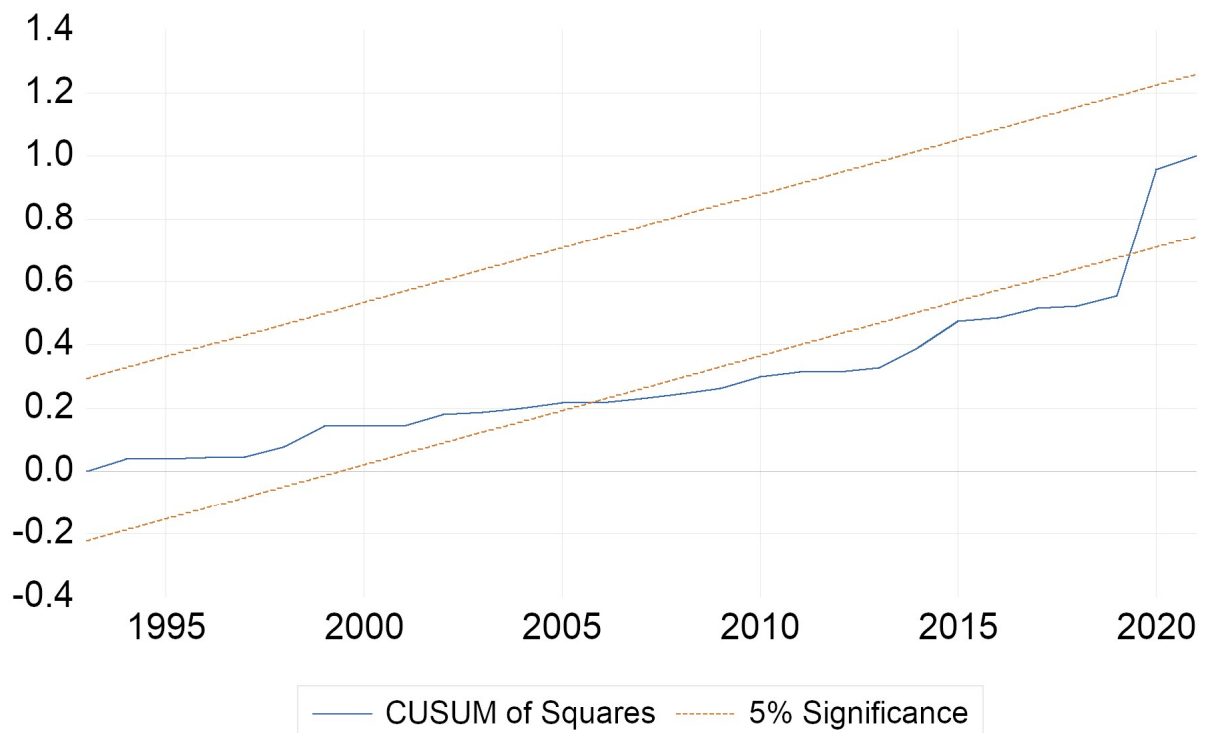


Figure 5.4 CUSUMQ Test

Figure 5.4 presents the CUSUM square test; the results showed some deviation, particularly after 2006, indicating some structural instability, aligning with the disruption caused by the

financial crisis of 2008 and COVID-19. However, the lines reverted within the bounds after some time. Overall, it confirmed that the model was structurally stable.

(B) State-Level Credit Growth Relationship Results

This section presents the relationship between the total bank credit by SCBs and the GDP of the 32 states.

5.4.6 Regional Trends in Credit and GDP Growth Rates

In the year 2020-21, the fiscal disparities were observed between the credit distribution and GDP share in the states, as reported in Table 5.8. Maharashtra's economic growth (13%) was relatively stable over the period and accounted for 29% of the total credit by SCBs.

Table 5.8 Top 5 State Shares in GDP and Bank Credit %

States	% of India's GDP	% of Total Bank Credit
Maharashtra	13	29
Tamil Nadu	8	9
Karnataka	8.1	7
Gujarat	8	5
Uttar Pradesh	8.7	4.8

The northern region is among the largest regions in India, comprising states like Haryana, HP, J&K, Punjab, Chandigarh, Rajasthan, and Delhi. It revealed a significant co-movement between the credit and GDP. However, Tamil Nadu accounted for a higher proportion of formal credit relative to its output. Similarly, Karnataka, with an 8.1% share in the GDP, received 7% of the total bank credit. While Gujarat contributed 8% to the GDP, its relative credit share was lower, reflecting medium credit penetration. Likewise, Uttar Pradesh also accounted for relatively less credit. Interestingly, Delhi commanded a high share of credit at 11.9%, indicating high credit exposure. These results highlight the credit-output disparities, with Maharashtra dominating as the financial hub of the country.

Northern Region

To investigate whether the bank credit expansion contributed to the state GDP, this study computed the growth rate of credit and GDP region-wise by computing the % change in values. Figure 5.5 captures the co-movement between the credit and GDP. This visual representation provided insights into whether the increased bank credit promoted the GDP growth rate of the particular region during the period 2001 to 2021. Delhi contributed 3.6% of India's GDP after 1991. This region contributed 26% of the national GDP in FY 2012-13, as per the KPMG-CII report. The results revealed that credit growth in the northern region was highly volatile, with an increased credit growth until 2006 reflecting expansionary credit facilities.

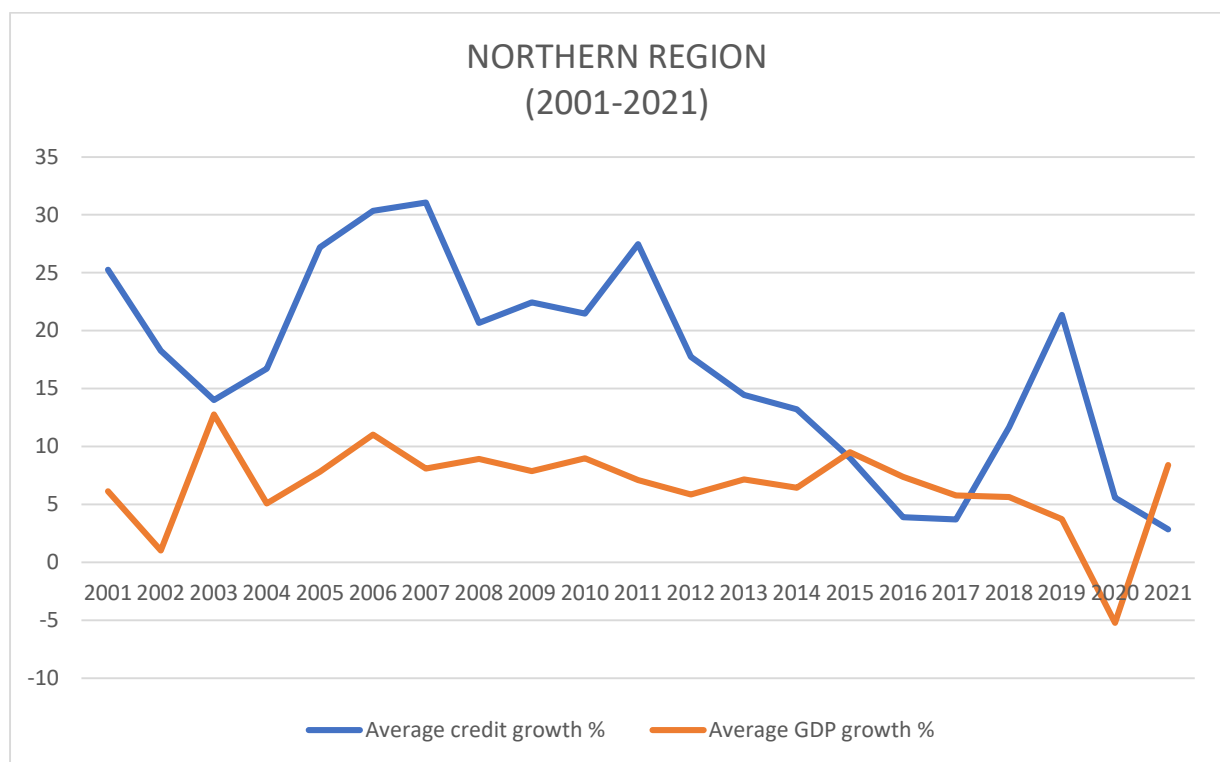


Figure 5.5 Northern Region—Average credit and GDP growth trends

Notably, the credit growth started declining post-2012 and continued to experience fluctuations thereafter. However, a sharp increase in 2019 was observed, possibly due to the credit injection in the economy to overcome the COVID-19 pandemic. Moreover, the GDP growth rate remained relatively stable over the years, except for volatility caused by the dot-com bubble burst and a sharp decline in economic growth because of the COVID-19 pandemic, followed by a steep recovery. Furthermore, a similar trend between credit and output growth was observed during the period 2001-2002 between the variables, when both variables experienced

a decline. In the period 2004-2007, both exhibited an upward trend, implying economic growth supported by credit expansion. During 2008-12, the variables experienced similar co-movement; after that, the variables started deviating. Overall, the findings concluded that credit positively contributed to the northern region's GDP; however, its contribution was limited.

Northeastern region

The northeastern region comprises Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. Figure 5.6 illustrates that bank credit growth and economic growth experienced limited co-movement in the early 2000s. However, credit growth exhibited a sharp surge, but did not influence the economic growth. Moreover, the fluctuations in credit growth were more pronounced than those of GDP growth.

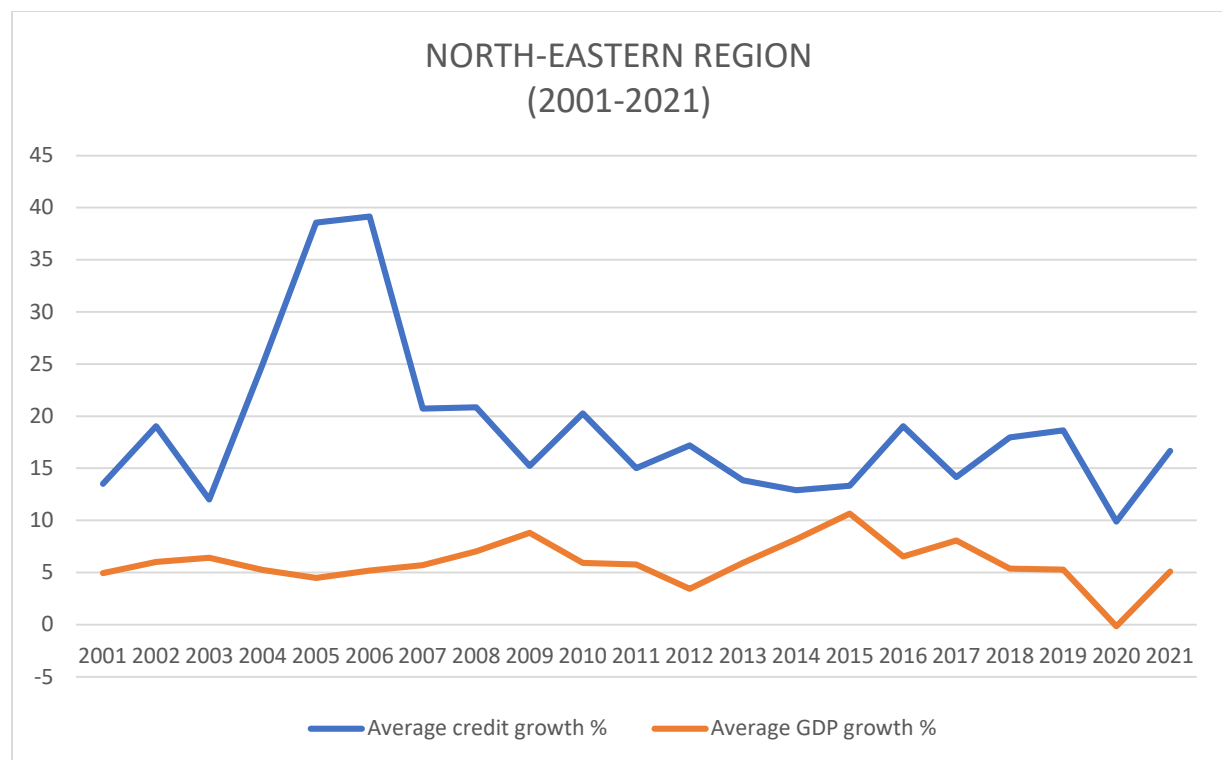


Figure 5.6 Northeastern Region—Average credit and GDP growth trends

The temporary credit growth surge in 2004-05 was possibly due to the rise in credit in Meghalaya and could also be attributed to a low base year in the previous year. The growth rate in this region was relatively low, up to 5.2% over 8 years. Particularly, Assam and Manipur experienced low growth because of poor agricultural and industrial performance. Moreover, the credit penetration was also low due to the limited absorptive capacity of these regions

(Mohanty, 2011). Post-2015, both the variables exhibited similar co-movements, experiencing mild fluctuations. When credit declined, GDP also declined. However, when credit recovered in 2016, GDP also experienced a recovery. Moreover, both the credit growth and economic growth experienced sharp fluctuations due to the COVID-19 pandemic.

Eastern Region

Figure 5.7 presents the Eastern region, which consists of 6 states: Bihar, Jharkhand, Odisha, Sikkim, West Bengal, and the Andaman and Nicobar Islands. The volume of bank credit in the Eastern region was relatively low in the early 2000s, with the credit-to-deposit ratio at 44.1% relative to other regions (Rajesh & Das, 2020). However, the banking access and usage of its services had significantly improved after 2005. During the early 2000s, both average credit growth and GDP growth rate displayed co-movement with a lagged response.

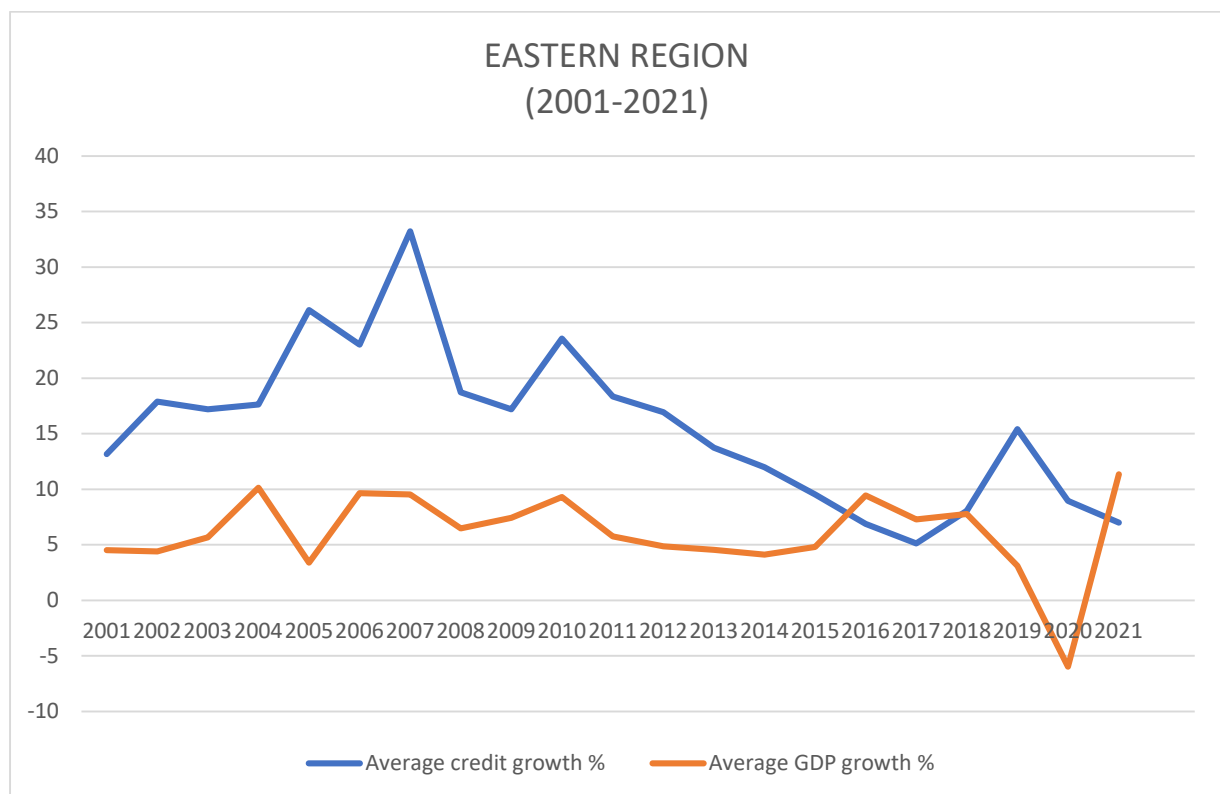


Figure 5.7 Eastern Region—Average credit and GDP growth trends

In the year 2003, economic activity increased, and credit growth followed it. This suggested a lead-lag relationship, where the economic activity preceded shifts in the credit growth rate. Such alignment indicated that growth in real activity drove a credit surge in these regions. West Bengal, being the fourth largest state in terms of economic growth, had the highest bank credit

volume, with a consistent and increasing trend over the years. However, post-2010, credit growth experienced a gradual decline, although GDP growth remained stable. Interestingly, the credit growth improved in 2019, possibly due to the liquidity programs introduced by the RBI to overcome the NBFC crisis in 2018. The results indicated mixed patterns, with some periods showing variable positive movements, while other periods showed them deviating, suggesting a weak or unstable long-run relationship between the variables, implying that credit growth does not always proportionally translate into GDP growth.

Central Region

The central region encompasses Chhattisgarh, Madhya Pradesh, Uttar Pradesh, and Uttarakhand, which experienced increasing industrial growth over the past two decades, as illustrated in Figure 5.8. A strong upward movement was witnessed in the credit growth, peaking in 2006, followed by fluctuations. GDP growth also experienced an upward trend, possibly due to an increasing and significant credit distribution, reflecting consistent economic development, effective financial services, and diverse financial infrastructure.

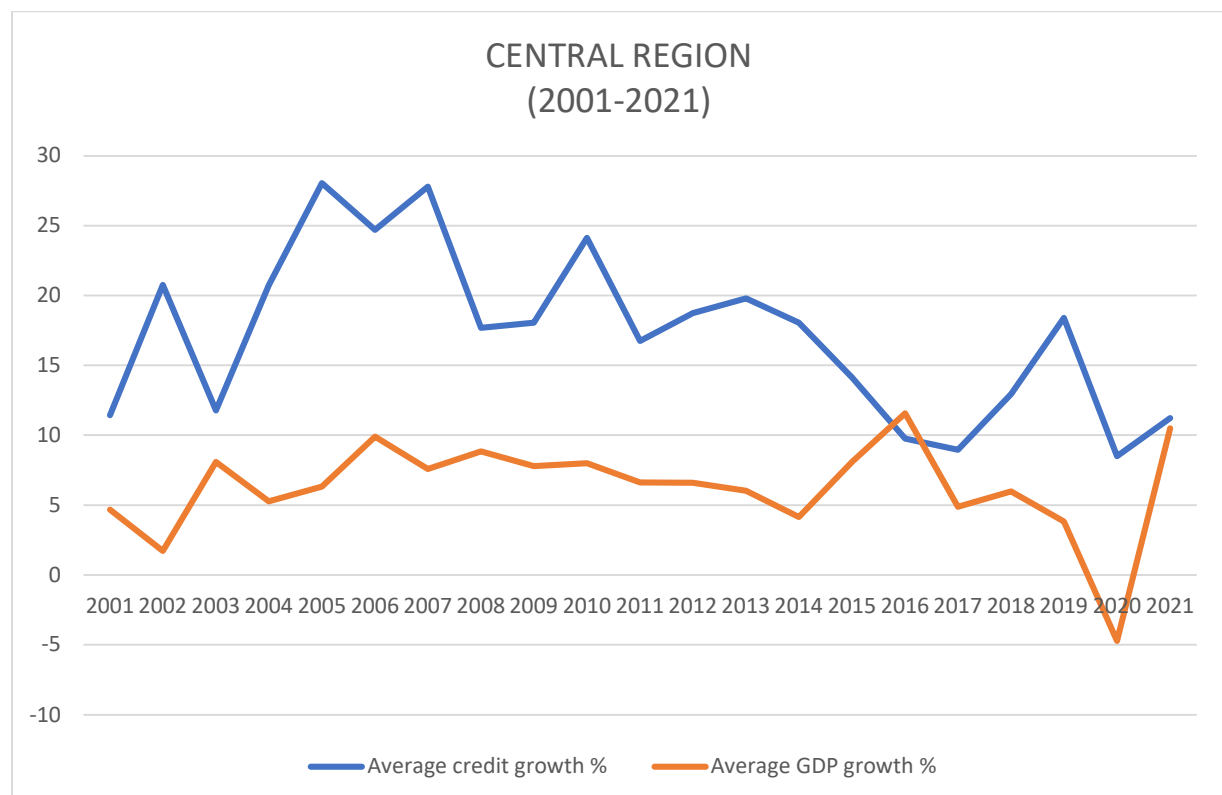


Figure 5.8 Central Region—Average credit and GDP growth trends

During the period 2007-14, credit growth was more pronounced than that of GDP growth, indicating some similar movements. However, the credit growth experienced a substantial decline post-2012, while GDP growth remained stable and surpassed credit growth in 2016. Interestingly, in 2019, the regions experienced a significant increase in credit growth, which could be attributed to the incentives taken by the RBI, like bank recapitalization, which caused a temporary boost in the credit growth. Both the credit and GDP growth trends exhibited a significant decline because of the worldwide lockdown in 2020, causing close movements during the period of economic crisis.

Western Region

Figure 5.9 presents the Western region, comprising states like Maharashtra, Gujarat, and Goa, which together account for nearly a quarter of India's GDP, with Maharashtra being the highest-performing state (Schorsch, 2015). GDP growth was relatively consistent over the years, although it remained minimal. According to the RBI, the credit growth experienced a substantial increase after 2004, particularly driven by Maharashtra.

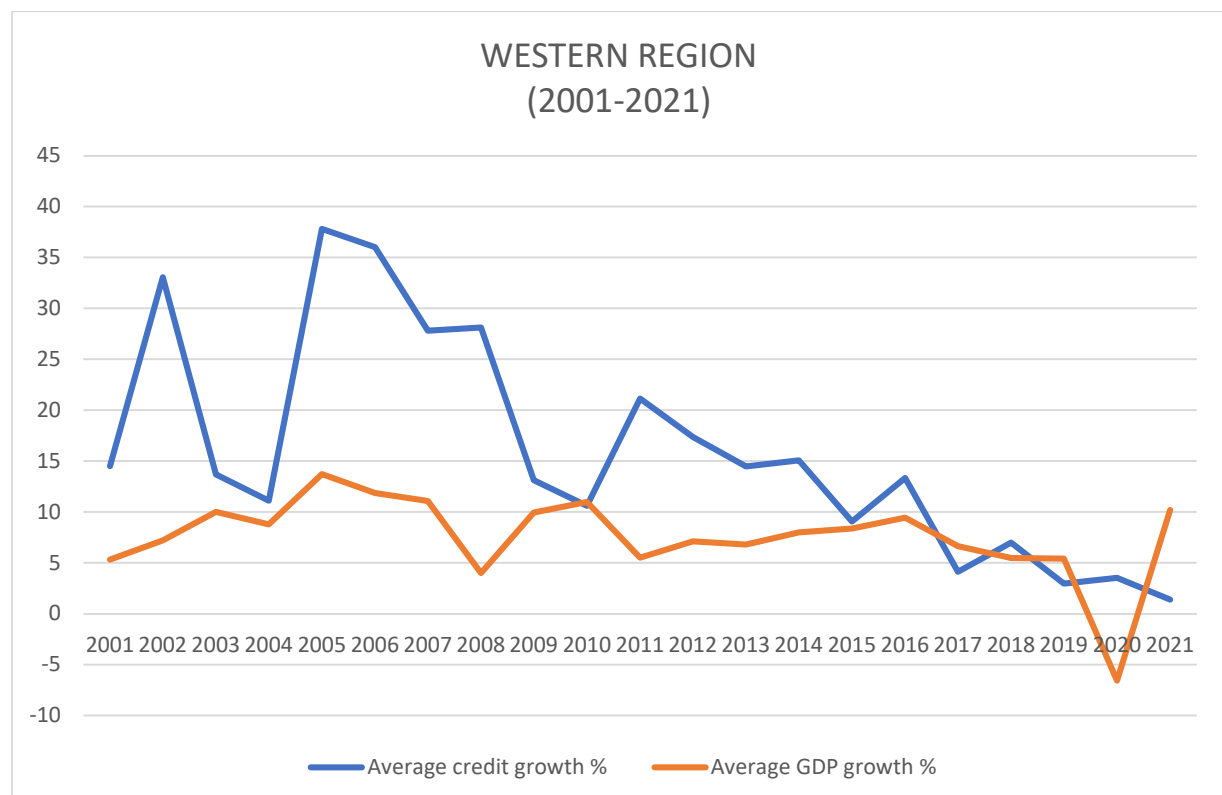


Figure 5.9 Western Region—Average credit and GDP growth trends

A pattern of short-run co-movement was observed between the variables from 2001 to 2004, suggesting that a consistent rise in banking credit was associated with industrial development and economic advancement. However, the volatility in banking credit was more pronounced than in economic growth, indicating that credit responded more sensitively to the economic and financial conditions during this period.

Furthermore, between the years 2004 and 2008, both variables experienced the same movements; when credit decreased, GDP also decreased, indicating that credit led growth. A sharp dip was experienced in 2008 owing to the global financial crisis, followed by a rebound. However, the trend diverged post-2010; credit growth started falling, while economic growth experienced a gradual rise and continued to rise. The impact of COVID-19 was visible on the economic growth, followed by a subsequent increase; however, the decline in credit growth was not pronounced. This indicated that the impact of credit on economic activity was not immediate and uniform across the years.

Southern Region

The southern region comprises more developed states like Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, Lakshadweep, Pondicherry, and Telangana. Tamil Nadu and Karnataka are leading the economic growth, accounting for 30%. During the early 2000s, particularly from 2001 to 2005, both experienced an upward trend in growth rates, outlined in Figure 5.10. Credit growth experienced a surge, which probably caused GDP to rise in the subsequent period. The credit growth peaked around 2006, which marked the period of infrastructure development and efficient financial intermediation. Karnataka and Tamil Nadu emerged as homes for the Information technology industries.

The increase in GDP growth rate was constant and significant in the states of Karnataka, Kerala, and Tamil Nadu, highlighting their developed financial infrastructure and stabilized economic activity. However, the credit growth subsequently declined after 2011, following the asset quality review, while the GDP growth rate experienced fluctuations. The overall results suggested that in the later years, from 2015 to 2018, both variables diverged, moving in opposite directions. Notably, credit and economic growth declined sharply in 2020 due to the economic slowdown caused by the COVID-19 pandemic.

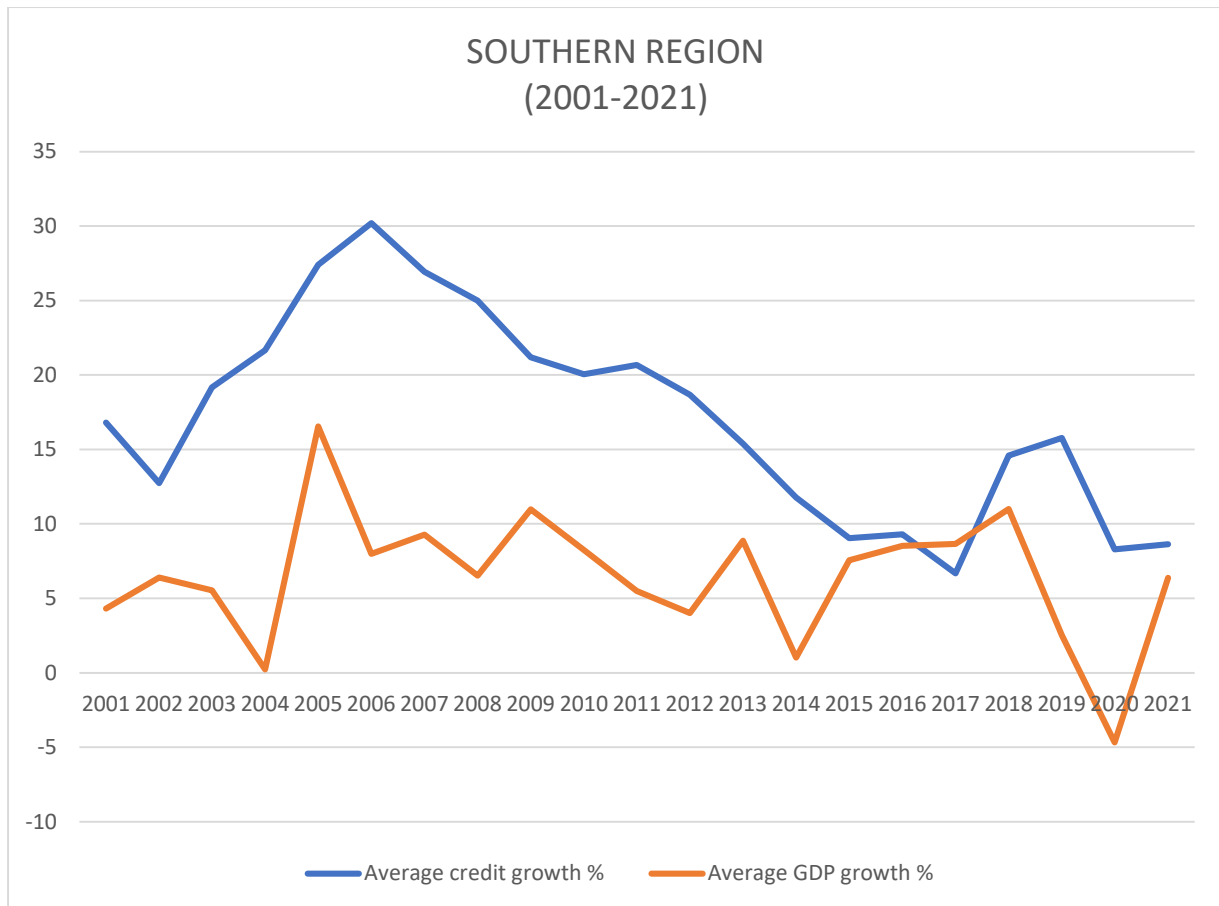


Figure 5.10 Southern Region—Average credit and GDP growth trends

The visual analysis of average credit growth and GDP growth revealed a mixed, region-specific relationship. While regions such as the Eastern and Western areas moved closely together in the early 2000s, some regions exhibited a lagged relationship. Additionally, many regions experienced a gradual decline in credit growth after 2011, accompanied by a weak and synchronized link between credit and GDP growth. In contrast, the declines during 2008 and 2020 affected both credit and GDP growth rates; India's GDP declined to 6.7% in 2008-09. This suggests that during economic shocks and crises, both variables tend to synchronize.

5.4.7 Unit Root Test

Table 5.9 presents the findings of the unit root test. Four-panel tests were employed, i.e., Levin, Lin, and Chu (LLC); Im, Pesaran, and Shin W-stat (IPS); ADF and PP Fisher. Based on the four tests, bank credit was stationary at level, indicating integration of order zero. Although GDP was stationary at level according to the Levin test, other tests suggested GDP became stationary after first differencing, considering it to be integrated of order one.

Table 5.9 Unit Root Test Results

Series (Level)	Levin, Lin, Chu t^*		Im, Pesaran, and Shin W-stat		Order of Integration
	t-statistics	p-value	t-statistics	p-value	
GDP	-9.219	0.0000	-1.447	0.1256	I(0)
Bank C	-12.50	0.0000	-1.89	0.0290	I(0)
Lending R	3.98	1.0000	4.10	1.0000	NS
First difference					
GDP	0.662	0.7462	-6.28	0.0000	I(1)
Bank C	-1.89	0.0290	-2.32	0.0099	I(0)
Lending R	-13.11	0.0000	-8.39	0.0000	I(1)
Series (Level)	ADF Fisher chi-square		PP Fisher chi-square		
GDP	71.90	0.2327	77.74	0.1160	NS
Bank C	128.5	0.0000	199.14	0.0000	I(0)
Lending R	14.88	1.0000	15.38	1.0000	NS
First difference					
GDP	160.3	0.0000	632.5	0.0000	I(1)
Bank C	87.24	0.0283	200.73	0.0000	I(0)
Lending R	182.0	0.0000	348.3	0.0000	I(1)

Furthermore, the lending interest rate was not stationary at the level and became stationary after first differencing across all four tests, suggesting integration of order one. The panel unit root test confirmed that variables were I(0) and I(1). A mixed order of integration allowed the use of the ARDL technique.

5.4.8 Dumitrescu-Hurlin Panel Causality Test

The study has also incorporated the (Dumitrescu & Hurlin, 2012) causality test to examine the direction of the relationship among the variables between the years 2001 and 2021. Under this test, both cross-sectional relationship and heterogeneity are taken into consideration, and this technique can be used even if the variable has no cointegration. It has been widely used in the literature (ERATAŞ, 2014), (Küçüksakarya, 2021). Table 5.10 indicates bidirectional causality

between bank credit and GDP among Indian states, the coefficient being statistically significant at the 1% level.

This supports that financial development and economic growth are mutually reinforcing. The lending rate caused GDP; however, the coefficient was significant at the 10% level, indicating a weak impact. While GDP caused lending rates at the 1% significance level, implying that economic growth influences monetary indicators.

Table 5.10 Dumitrescu-Hurlin Panel Causality Test Results

Direction of causality	W-statistics	Z-statistics	p-value	Significance
Bank C→ GDP	6.227	3.694	0.0002	*** (1%)
GDP→ Bank C	16.234	18.136	0.0000	*** (1%)
Lending R→ GDP	2.381	-1.855	0.0635	*(10%)
GDP→ Lending R	11.19	10.867	0.0000	***(1%)
Lending R→ Bank C	4.617	1.137	0.1701	NS
Bank C→ Lending R	12.22	12.354	0.0000	***(1%)

Interestingly, there was no causal relationship observed between interest rates and bank credit. However, there was a unidirectional relationship from bank credit to lending rates, the coefficient being significant at the 1% level. This implies that bank credit influences lending rates; increased liquidity demand causes interest rates to rise and vice versa.

5.4.9 Optimal Lag Length

Table 5.11 shows the different test statistics used to select the optimal lag length in the estimation of the panel ARDL model. Among all the criteria, SC and HQ were prioritized to select the optimal lag length, and they suggested two optimal lags. Moreover, this was an annual study; two lags were sufficient to understand the dynamics among the variables.

Table 5.11 Optimal Lag Length Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-2043.08	NA	0.593	7.992	8.017	8.002
1	578.53	5202.27	2.20e-05	-2.213	-2.113	-2.174
2	635.07	111.52	1.82e-05	-2.398	-2.224*	-2.330*
3	649.65	28.589	1.78e-05	-2.420	-2.172	-2.323
4	659.85	19.889	1.78e-05	-2.425	-2.102	-2.298
5	682.96	44.758*	1.68e-05*	-2.480*	-2.082	-2.324

* Indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final production error

AIC: Akaike information criterion

SC: Schwarz information criteria

HQ: Hannan-Quinn information criteria

5.4.10 Panel ARDL

To test the existing long-run and short-run cointegrating relationship between GDP, bank credit, and interest rates, the pooled mean group (PMG) method with Eviews-12 was performed in the study. Two lags were used in estimating the panel ARDL model as determined by the optimal lag length.

Table 5.12 Short-Run Coefficients and ECM

Dependent variable: GDP

Δ - First Difference

Variables	Coefficient	t-statistics	p-value
Δ GDP(-1)	-0.021	-0.500	0.6170
Δ Bank C	0.002	0.093	0.9254
Δ Bank C(-1)	-0.250	-6.289	0.0000
Δ Lending R	-0.001	-0.799	0.4247
Δ Lending R(-1)	-0.001	-0.751	0.4528
ECM (-1)	-0.257	-7.52	0.0000

Root MSE 0.034

Log Likelihood 1219.9

AIC -2.957

In the short-run, the past GDP had no meaningful impact on the current GDP, as shown in Table 5.12. It had a negative effect on the GDP in the current period with a coefficient of -0.021, indicating some short-run adjustments. Although the coefficient was statistically insignificant. Moreover, the change in GDP in the current period was positively influenced by the change in bank credit; however, the variable was not statistically significant. This implies that credit expansion did not immediately translate into real activity across the states. However, the lagged bank credit was negative and significant, implying that banking credit in the previous period had a contractionary impact on the GDP. Furthermore, the lending rate and lagged lending rate were negative and insignificant, indicating no influence of the previous year's interest rate on the GDP.

The coefficient of ECM(t-1) was -0.25 and statistically significant at the 1% level, as shown in 5.13, confirming a long-run stable equilibrium; 25% of disequilibrium from the initial period was corrected in the current period, confirming a moderate speed of adjustment.

The root MSE and AIC indicated the efficiency of the model, with low values suggesting that the model fits the data perfectly. Moreover, the log likelihood was relatively high, highlighting how well the model explained the observed data.

Table 5.13 Long-Run Coefficients

Dependent variable: GDP

Variables	Coefficient	t-statistics	p-value
Bank C	0.362	44.821	0.0000
Lending R	0.013	0.005	0.0112
C	0.261	6.345	0.0000

The results in Table 5.13 revealed a positive and highly significant long-run relationship between bank credit and GDP. The results indicated that a 1% increase in real bank credit was associated with a 0.36% increase in GDP across the states. The coefficient was statistically significant at the 1% level, suggesting an important role of banking credit in driving real

economic growth. Furthermore, the lending rate exhibited a positive relationship with the GDP. However, the magnitude was small, with a coefficient of 0.013, and statistically significant at the 5% level, suggesting that higher interest rates may reflect improved financial system real economic activity in the long-run. This positive relationship aligns with the findings of (Lee & Wener, 2018), who found a constant positive relationship between interest rate and nominal GDP in Japan, the UK, Germany, and the USA, with interest rates following GDP growth.

The long-run or cointegrating relationship between GDP and other variables can also be ascertained by the corresponding sign and statistical significance of the error correction term (ECM). Thus, there existed a long-run relationship between GDP, bank credit, and lending rates.

5.4.11 Residual Diagnostic Test

The residual diagnostic test was also performed on the panel data. The null and alternative hypotheses are as follows:

H_0 : The data is normally distributed.

H_1 : The data is not normally distributed.

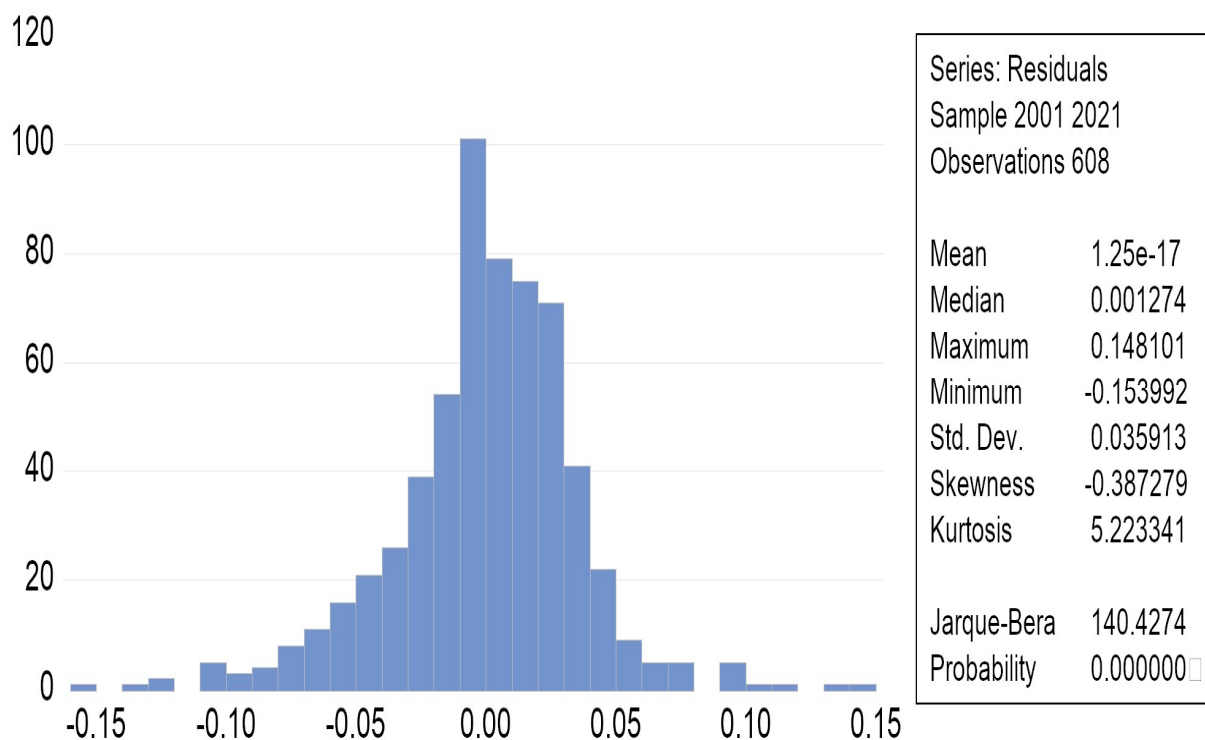


Figure 5.11 Residuals Normal Distribution

The histograms of residuals in Figure 5.11 supported that the data were not normally distributed. The skewness of -0.38 confirmed mild negative skewness, indicating that the residuals were slightly left-skewed, indicating the left tail was longer and flatter. Moreover, kurtosis (5.222) with a value greater than 3 indicated that the distribution had heavier tails and sharper peaks, suggesting the presence of extreme positive and negative events.

The Jarque-Bera of 140.42 with a probability value of 0.0000 indicated that residuals were not normally distributed, thereby the findings rejected the null hypothesis. The residual testing confirmed that the observations were slightly skewed, with a leptokurtic distribution indicating mild deviation from normality.

5.5 Conclusion

This paper attempted to analyze the long-run relationship and short-run dynamics between bank credit and economic growth from 1980 to 2021. The annual data on real GDP, lending interest rate, NFGBC and bank credit were obtained from various reports of the RBI's Handbook of Statistics on the Indian Economy and Handbook of Statistics on the Indian States. The credit-GDP relationship was examined at an aggregate level, using the ARDL framework, as the unit root test indicated that the variables were a combination of $I(0)$ and $I(1)$. The ARDL model revealed that GDP was significantly influenced by its past values. While NFGBC, agriculture credit and lending rate did not show any meaningful impact on GDP in the short-run. While the long-run estimates revealed a positive and significant influence of NFGBC on GDP, agriculture credit, and lending rate remained insignificant. The ECM results implied 25% of the disequilibrium in the previous period was corrected in the previous period, indicating a moderate speed of adjustment. Moreover, the bound test also confirmed the existence of a long-run cointegrating relationship among the variables. The model was free from the problem of serial correlation; however, there was a presence of heteroskedasticity, and to overcome that, the White-Huber heteroskedasticity-consistent estimator was computed. Additionally, the residuals were normally distributed and stable. CUSMUQ showed some instability after 2006, due to the structural shocks experienced by India.

The paper extended the literature on the nexus between bank credit, economic growth, and interest rates in India's 32 states from 2001 to 2021. The results revealed regional credit disparities among the states, highlighting different levels of financial infrastructure and banking facilities. Maharashtra accounted for 29% of the total credit while contributing 13%

to the total GDP. Regional credit and GDP growth patterns highlighted the credit-absorbing capacity of different regions. The patterns suggest that during the period of disruptions, credit and GDP align. Furthermore, the unit root test revealed mixed order of integration; therefore, the panel ARDL was conducted. Additionally, the Dumitrescu-Hurlin panel test revealed a bidirectional causal relationship between bank credit and GDP. While GDP and bank credit had a causal relationship with lending rates. Panel ARDL revealed a negative short-run impact of bank credit lag one on GDP, while the lending rate remained insignificant. ECM indicated that 25% of the errors were corrected in the current period. However, there was a positive and significant long-run impact of bank credit on GDP. The bound test also confirmed the presence of a long-run relationship among the variables.

Overall, the findings suggested a weak short-run relationship between bank credit and economic growth; however, the long-run relationship remained positive and significant at the 1% level, highlighting the important role of credit in sustaining long-term economic growth. The ECM indicated the speed of adjustment; nearly 25% of the disequilibrium was corrected in both models. Lending rates were insignificant at the national level, while they turned positive and significant in the long-run at the state level. Overall, the study suggests that bank credit can be a catalyst for economic growth in India.

Chapter VI

THE SHORT-RUN AND LONG-RUN IMPACT OF MONEY SUPPLY ON ECONOMIC GROWTH

6.1 Introduction

Monetary policy is a tool used by central banks to control liquidity in the economy by adjusting the money supply through open-market operations, as highlighted by (Kapur & Patra , 2012). The RBI raises or lowers the discount rate and manages reserve requirements. There are several monetary transmission mechanisms, such as traditional methods, i.e., interest rate channels and a bank lending channel, through which it is transmitted into the real economy (MATHAI). During periods of economic slowdown, central banks adopt an expansionary monetary policy by reducing interest rates. In contrast, during high inflation, a contractionary monetary policy is implemented by raising interest rates, making borrowing expensive, and reducing demand. Traditional theories suggest a constant positive relationship between money supply and growth, with a long and lagged relationship in the real sector. The short-run impact on the financial markets is due to changes in interest rates. However, some studies suggest the relationship between them varies depending on economic conditions.

Irving Fisher postulates that with every increase in the money supply, general prices increase, keeping output stable. Similarly, Milton Friedman assumes that inflation is a monetary phenomenon and is present everywhere, emphasizing that increases in prices are correlated with increases in the money supply (Savita, 2015), the study revealed the negative influence of increased money supply in India on the prices, where the GDP didn't increase in the same proportion as the demand of goods, causing inflation. These findings align with (Amaral, Dyhoum, Abdou, & Alijohani, 2022), the negative impact of continuous expansion in the money supply on the price level. However, Karl Marx views money as a medium of exchange, and inflation is also caused by contradictions within the capital system and credit. In 2016, the MPC introduced a flexible inflation-targeting framework (FITF) when the inflation was ranging between 8-12%, and an inflation target regime of 4 ± 2 was adopted. These targets will be revised every 5 years. Monetary policy and economic growth are closely related concepts, aiming to promote economic growth while managing inflation and business cycles. Monetary

policy should focus on price stability, which does not mean prices remain unchanged, but to ensure stability, there should be country-cyclical approaches.

In the late 1990s, India underwent economic reforms aimed at liberalizing and globalizing its economy. During this period, fiscal and monetary policy underwent major changes. The Monterey aggregates M2 and M3 represent the broad measures; however, M3 comprises M1 and M2. Given this, M3 has been chosen as the main monetary policy. This study examined the dynamic relationship between M3 and GDP using the ARDL approach from the period 1980 to 2021. The study incorporated control variables like the Consumer Price Index (CPI) as a measure of inflation and call money interest rates (IR) as a proxy for interest rates. The variables used were log-transformed real GDP, M3, CPI index, and interest rates %, along with dummy variables to better understand how these variables interact during periods of fluctuations and shocks.

The rest of the chapter is structured as follows: Section 6.2 outlines the objective and hypotheses of the study, followed by the GDP and M3 trends in Section 6.3. Section 6.4 gives evidence and estimated parameters from the ARDL model, followed by residual diagnostic tests. The discussion and conclusion are presented in Section 6.5.

6.2 Objectives and hypotheses

O₂: To determine the relationship between broad money supply (M3) and economic growth (GDP).

Hypotheses:

H_{2a}: There is no long-run relationship between M3 and GDP.

H_{2b}: The impact of M3 on GDP growth is not linear during the period of economic shocks and crises.

H_{2c}: Inflation (CPI) has no significant effects on GDP.

H_{2d}: Inflation (CPI) has no significant effects on GDP during structural instability.

H_{2e}: Interest rates do not have a more direct impact on GDP across the sample.

H_{2f}: The financial crisis of 2008 has no short-run significant effects on GDP.

H_{2g}: The COVID-19 pandemic has no short-run impact on GDP.

6.3 Empirical Results and Discussions

This section presents the short-run and long-run dynamics and major findings from the Autoregressive Distributed Lag Model (ARDL). Further, the dummy variables were used to find the relationship between the variables during the 2008 financial crisis and the COVID-19 period.

6.3.1 Trends in Broad Money Supply and Economic Growth

This graph in Figure 6.1 shows the recent trends in the growth rates of GDP and M3 variables, highlighting the key effects of economic events and policy changes. The trends revealed a visible co-movement between the variables, indicating a very close relationship between them. During the expansion, both exhibited an upward trend while declining during the period of contraction until 2007. M3 growth was volatile in the early 1990s, often driven by credit expansion, and this trend persisted till 2004, reflecting slow GDP, adjustments in monetary policy, and external shocks. After this, it declined in 2008 due to external shocks tied to the global financial crisis. Demonetization in 2016 led to a period of downfall because of liquidity constraints with the withdrawal of 500 and 1,000 notes, which accounted for 86% of the currency in circulation. Despite returning 99% of the money to the central bank, it caused a temporary shortage (Chanda & Cook, 2022). The purpose of this action was to curb black money and promote digital transactions. The growth rate of M3 has fallen from 12.94% to 6.8%; since then, there has been a declining trend (Purohit, 2022).

Lastly, it was interesting to note that after the economy's collapse in March 2020, M3 initially fell before rapidly expanding, highlighting the RBI's policy response. The RBI injected liquidity into the system and implemented less stringent loan requirements. There was a 6.7% increase in the M3 growth rate, marking the highest growth in seven years. This was a temporary rise due to an excessive withdrawal of cash to meet the basic needs during the lockdown. Additionally, central banks allowed lenders to offer a delay on loan repayments and interest payments until August 2020. M3 remained almost stagnant afterwards due to the slowdown in bank deposits, causing a decline in surplus liquidity (2022).

Additionally, GDP exhibited relatively less pronounced fluctuations. In 1991, it sharply declined because of the BOP crisis. Similarly, due to the dot-com bubble bust in 2000, causing major companies to incur losses, those lacking sustainable business models and profitability,

and about 48% of the companies that were ICT and internet-based, survived. Even some India-based companies faced several challenges, like Satyam Infoway, Reddif.com, etc (AngleOne).

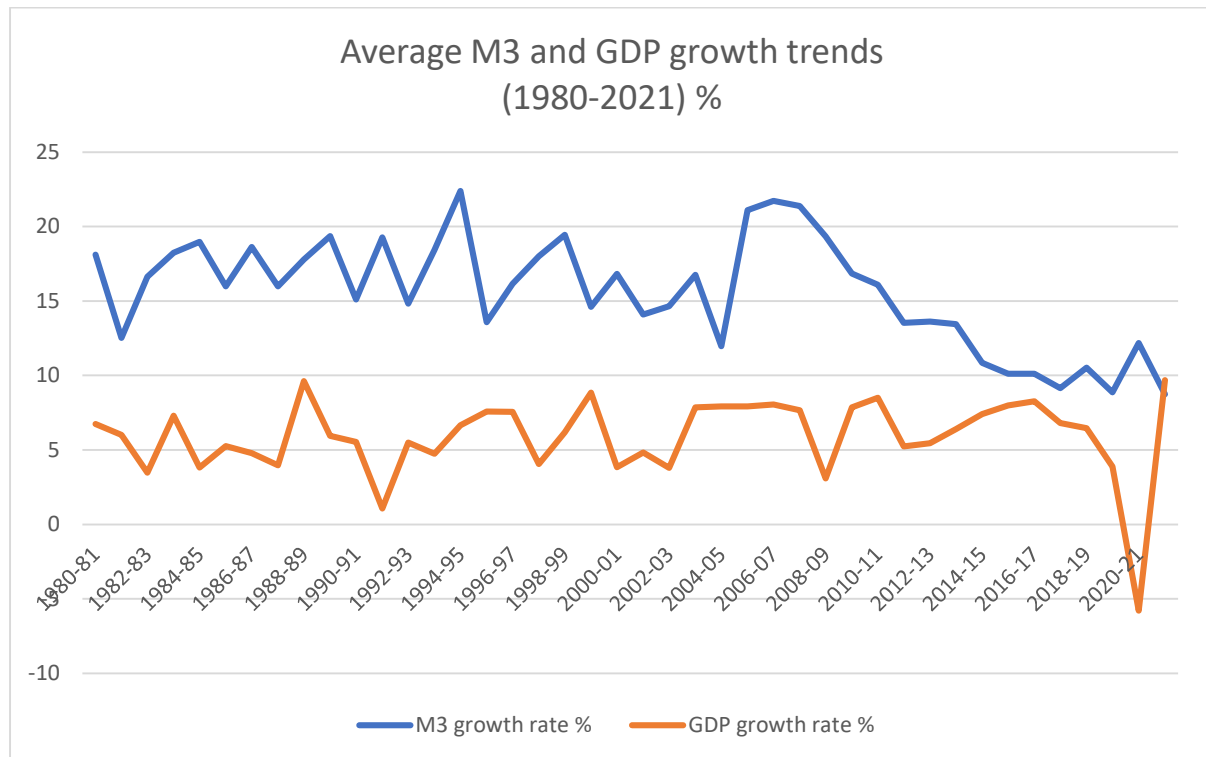


Figure 6.1 Average M3 and GDP growth trends

Similarly, in 2002, policy changes or government changes caused a decline. Afterwards, it showed stable growth until 2008. The 2008 financial crisis similarly caused GDP to decline. However, the impact on India was not as severe as it was on other economies. The GDP growth rate fell from 9% per annum to 6.8%. Automobiles, textiles, gems, and other export-oriented industries saw a significant decline. There was a rise in unemployment in the textiles, leather, and jewelry sectors (Bose, 2021). The most significant contraction occurred as a result of COVID-19 in 2020, causing the GDP growth rate to decline to -5.7%. Following the crash, there was a rebound in GDP as economic activities resumed.

6.3.2 Unit root test

Two unit root tests were employed, i.e., Augmented Dickey-Fuller (ADF) and Peter Phillips-Pierre Perron (PP). The results are presented in Table 6.1. The ADF and PP Fisher chi-square tests showed that the variables were I (0) and I (1). A mixed order of integration allowed the use of the ARDL technique

Table 6.1 Unit-Root Test Results

Augmented Dickey-Fuller*					
Variables	Level		1 st Difference		Order of Integration
	Constant	Constant & Trend	Constant	Constant & Trend	
GDP	0.448	-1.983	-5.819***	-5.789***	I(1)
M3	-2.364	1.124	-1.141	-2.644	NS
CPI	-1.875	-2.076	-3.744**	-3.004	I(1)
Interest R	-2.742*	-3.833**	-5.833**	-5.889***	I(0)
Phillips-Perron					
Variables	Level		1 st Difference		
	Constant	Constant & Trend	Constant	Constant & Trend	
GDP	0.436	-2.033	-5.819***	-5.772***	I(1)
M3	-2.622*	1.656	-2.867*	-4.292**	I(1)
CPI	-2.046	1.790	-3.765**	-4.037**	I(1)
Interest R	-2.541	-3.759**	-12.297***	-12.446***	I(0)

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Both the ADF and PP Fisher found GDP and CPI to be stationary at the first difference. However, the PP test revealed M3 was stationary at the first difference and borderline at the level. The interest rates were found to be stationary at both levels and the first differences. Some of the variables were I(0), and others were I(1), allowing us to use the ARDL technique.

6.3.3 ARDL Model

The study employed the ARDL to examine the relationship between GDP, M3, CPI, and interest rates. The estimation was done on the aggregate level to better capture the dynamics among

the variables across the entire period, accounting for major reforms and structural shocks. The model was estimated with 1 lag, as suggested by the AIC criterion.

Table 6.2 Short-Run Coefficients

Dependent Variable—GDP

Selected Model: ARDL (1, 1, 0, 0)

Variable	Coefficient	t-statistic	Prob
GDP(-1)	0.804	13.676	0.0000
M3	-0.250	-1.149	0.1645
M3(-1)	0.393	1.958	0.0582
CPI	-0.135	-2.100	0.0429
Interest R	-0.007	-0.531	0.5983
ECM	-0.195	-5.126	0.0000

R-squared 0.999

Adjusted R-squared 0.999

F-statistics 7274.5

Prob (F-statistics) 0.0000

The results outlined the short-term dynamics between GDP and its determinants, shown in Table 6.2. A positive short-run relationship was observed between GDP and its first lag at the 1% significance level, implying that a 1% increase in lagged GDP led to an 80% increase in current GDP. Similarly, M3 and GDP exhibited a negative relationship; however, the coefficient was insignificant. While the lagged M3 reflected a positive influence on GDP, implying delayed effects, it had weak statistical significance at the 10% level. According to the Keynesian view, a higher money supply reduces interest rates and thus encourages consumption and investment. Furthermore, CPI had a negative and significant influence on GDP. However, no significant relationship was found between interest rate and GDP.

Finally, the corresponding sign and statistical significance of the ECM have confirmed the long-run or cointegrating relationship between GDP and other variables. The coefficient of the ECM (-0.195) showed a negative and highly significant value at the 1% significance level, implying that after a short-run shock, it deviated to long-run equilibrium at the rate of 19%, indicating a long-run relationship between the variables.

Table 6.3 Long-run Coefficients

Dependent variable: GDP

Variables	Coefficient	t-statistics	p-value
M3	0.731	4.512	0.0001
CPI	-0.693	-2.703	0.0456
Interest R	-0.003	-0.522	0.6010
C	7.994	7.364	0.0000

The long-run results in Table 6.3 suggest that M3 positively influenced GDP; with a one-unit increase in M3, GDP increased by 0.731 units. The coefficient was statistically significant at the 1% level, indicating a strong long-run correlation between them, aligning with the results of (Pavithra, 2023). Conversely, CPI exhibited a negative and significant relationship with the GDP, suggesting that inflation beyond a particular threshold causes a decline in GDP (Srinivas). Similarly, a negative and expected sign was observed between interest rates and GDP; however, it was not statistically significant (Bhat & Laskar, 2016).

Table 6.4 ARDL Bound Test

F- Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Significance	I (0)	I (1)
Asymptotic: n= 1000				
F- statistic	4.717	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Finite Sample: n= 40				
Actual Sample Size	41	10%	2.592	3.454
		5%	3.1	4.088
		1%	4.31	5.544

The F-bound test was conducted to test the cointegration among the variables. The results in Table 6.4 reveal that the value of the F-statistic (4.717) exceeded the upper limit at the 5% significance level.

Consequently, the null hypothesis of no co-integration was rejected, implying all the variables were associated together in the long run or had a stable long-run relationship. Also, confirmed by a negative and statistically significant ECM.

6.3.4 Diagnostic Tests

The diagnostics and stability tests on the ARDL model (1, 1, 0, 0) were also conducted to ensure the efficiency of our findings.

Serial LM Correlation Test

The Breusch-Godfrey LM test was employed to test whether the residuals exhibited autocorrelation, as presented in Table 6.5.

Table 6.5 Breusch-Godfrey Serial Correlation LM Test

Null hypothesis: No serial correlation at up to 2 lags		
Alternate Hypothesis: Serial correlation up to 2 lags		
Statistics	Coefficient	p-value
F-statistic	0.461	0.6343
Obs*R-squared	1.175	0.5724

The calculated p-value for both the F-statistics and the observed R-squared was greater than 0.05, implying there was no autocorrelation up to two lags. This suggested that the results obtained from the ARDL model were not spurious.

Breusch-Pagan-Godfrey Heteroskedasticity Test

The results displayed in Table 6.6 indicate that the model was free from heteroscedasticity. The p-values of the F-statistic and observed R-squared were greater than 0.05.

Table 6.6 Breusch-Pagan-Godfrey Heteroskedasticity Test

Null hypothesis: Homoskedasticity		
Alternate Hypothesis: Heteroskedasticity		
Statistics	Coefficient	p-value
F-statistic	2.309	0.0649
Obs*R-squared	10.169	0.0706
Scaled explained SS	18.512	0.0024

The greater p-values implied no rejection of the null hypothesis, suggesting no evidence of heteroskedasticity present in the model.

Jarque-Bera normality test

Figure 6.2 shows the data is not normally distributed, with a significant p-value at the 1% level. This is further supported by skewness (-1.27), indicating a left-skewed distribution. Similarly, kurtosis (5.995) suggests the presence of outliers and extreme values in the distribution.

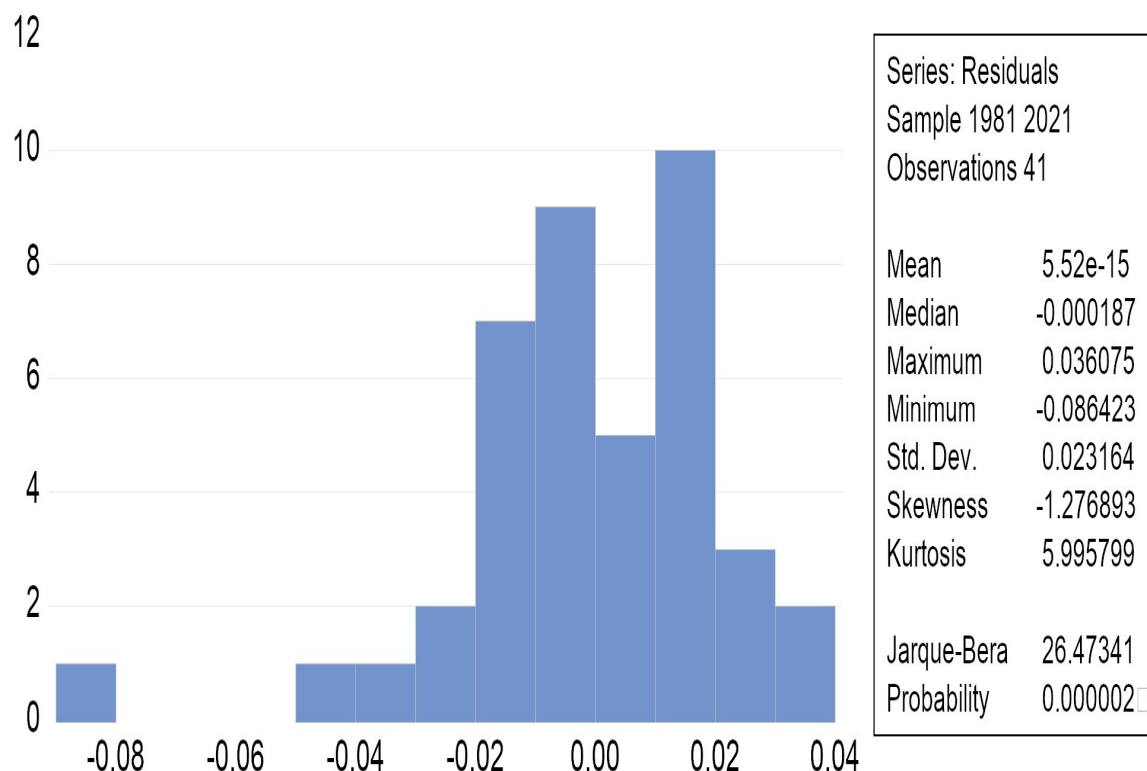


Figure 6.2 Residuals Normality Test

6.3.5 Stability Tests

A CUSUM and CUSUM square test were performed to confirm the stability of the model. The hypotheses are as follows:

H_0 : There is no structural change in the parameters.

H_1 : There is a structural change in the parameters.

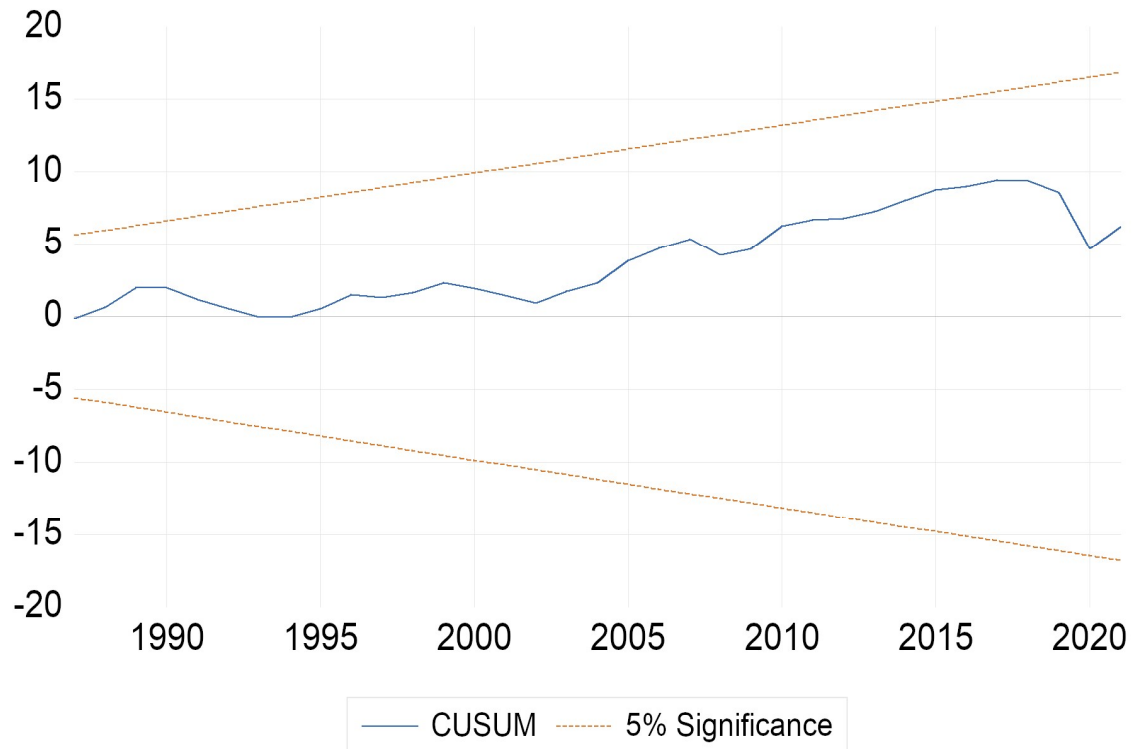


Figure 6.2 CUSUM Test

Figure 6.2 presents that the CUSUM line lies between the two critical lines at a 5% significance level, implying that the alternative hypothesis was rejected, suggesting the ARDL model was structurally stable.

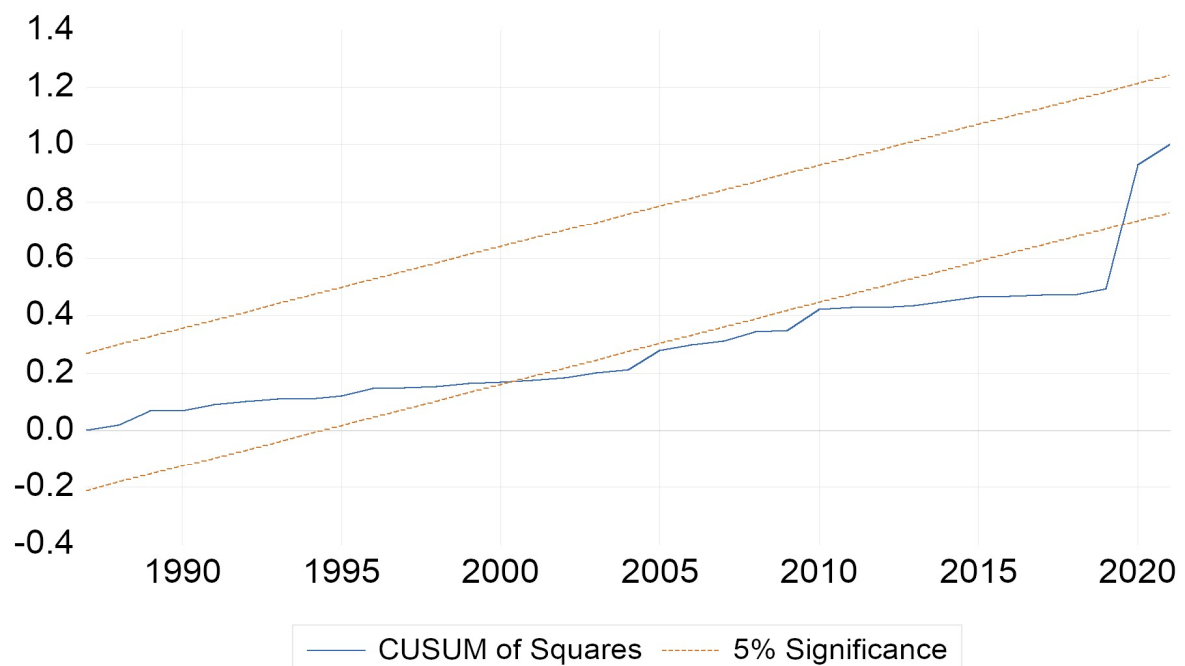


Figure 6.3 CUSUMQ Test

However, the CUSUM of the test square displayed in Figure 6.3 indicates a notable fluctuation beginning around 2001. Particularly, fluctuations were observed in 2008 and 2020 because of the global financial crisis and the COVID-19 pandemic, respectively.

6.3.6 Dummy Variable Specifications for Crisis Period

In response to the instability captured in the CUSUM of squares, two dummies for the crisis period were introduced to examine the short-run effects of the structural breaks on the dynamics among the variables.

If Year = 2008, then $D1 = 1$.

and 0 otherwise,

If Year = 2020, then $D2 = 1$.

and 0 otherwise,

This period was challenging for the Indian economy due to the 2008 financial crisis, which was triggered by the collapse of Lehman Brothers, a major US investment bank, causing an adverse effect on the Indian stock market. Capital flows were severely impacted because of the large withdrawals of capital from Indian markets, from 3.1 in 2005-05 to 9.3 in 2007-08. Commodity prices, including oil, and overall food prices increased, causing WPI inflation to spike to 12.8% in 2008. To counteract the negative effects of the crisis, the RBI implemented three measures: tax relief to boost demand, increased public expenditure to create employment opportunities, and monetary ease to facilitate credit and finance (Bajpai, 2010). This period marked a slowdown in industrial and financial growth, resulting in a structural breakdown.

The economic growth collapsed in March 2020 to -24.4% due to the major shock caused by COVID-19, followed by a further decline of 7.4%. The overall contraction rate in India was 7.4% (in real terms), far exceeding the declines in other economies. The GDP declined by 3.3% in emerging economies and 2.2% in developing economies (Dhingra & Ghatak, 2021). Major economic sectors, including agriculture, industry, and employment, were affected. 35% of the MSMEs closed due to the extended lockdown and lack of demand. 13 million people lost their jobs, causing high unemployment (Ramakumar & Kanitkar, 2021).

Unemployment rose from 7.9% to 12% during the second quarter of 2021, and individual income dropped by 40%. Due to high prices, the demand for essential commodities declined. “The consumer sentiments have been hit hard during the second wave” (Das, 2021), leading to

a shortage of aggregate demand. COVID-19 significantly affected the tourism and military sectors. According to IATO, these industries faced a loss of about 85 billion rupees due to travel restrictions (Upadhyay, 2021).

6.3.7 Short-run ARDL model with dummies

A short-run aggregate analysis with the inclusion of two dummies was conducted to examine the relationship between macroeconomic variables in the crisis period.

Table 6.7 Short-Run Coefficients

Dependent Variable—GDP

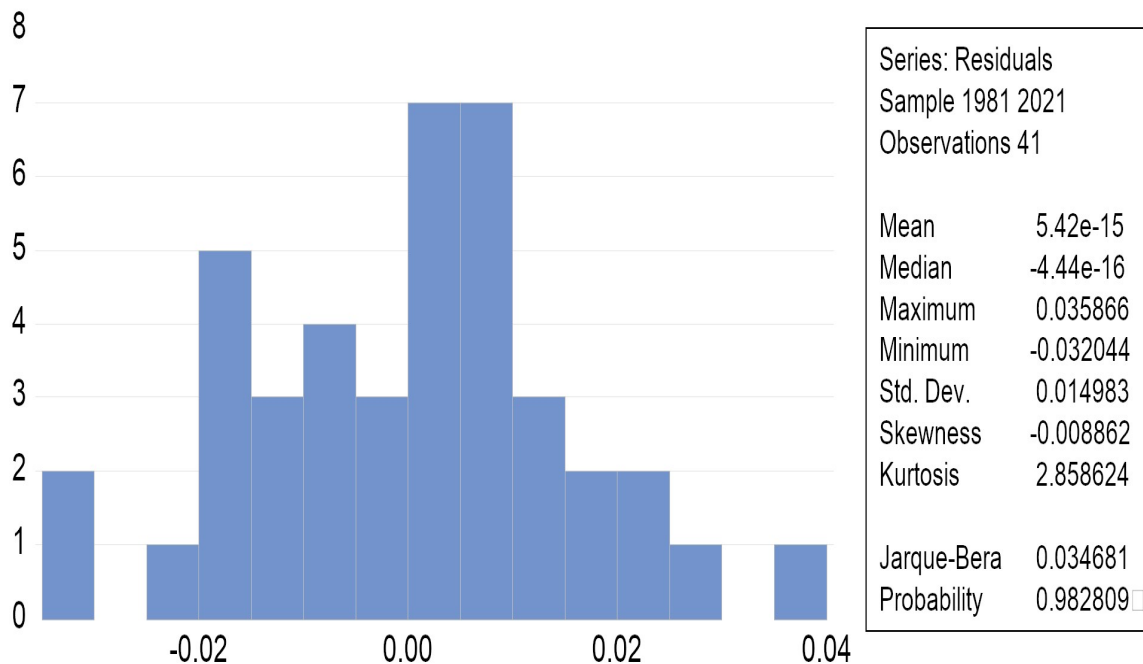
Selected Model: ARDL(1, 0, 0, 0, 0, 1)

Variable	Coefficient	t-statistic	Prob
GDP (-1)	0.928	28.553	0.0000
M3	0.075	2.888	0.0068
CPI	-0.089	-2.099	0.0435
Interest R	-0.001	-1.115	0.2727
D1 (2008)	-0.046	-2.548	0.0156
D2 (2020)	-0.117	-6.261	0.0000
D2 (-1)	0.027	-1.538	0.1335
ECM	-0.071	-26.222	0.0000

The short-run analysis shown in Table 6.7 reveals that GDP had a strong immediate impact on itself, suggesting output is influenced by its past values. Similarly, M3 had a positive and significant impact on the GDP, with a coefficient of 0.075 and statistically significant at the 5% level, reflecting the positive impact of monetary expansion on GDP during the shocks. Many works of literature suggested that monetary policy played an important role in countering the effects of COVID-19 by easing monetary conditions by injecting large amounts of credit and reducing repo rates in March 2020 (Behera, Gunadi, & Rath, 2023) (Chakraborty & S, 2022).

A CPI of 0.089 exhibited a negative and significant relationship, indicating that inflation during the uncertainty period creates a contractionary influence on GDP. However, the interest rate exhibited a negative but insignificant relationship with GDP. Additionally, D1 (2008) also

negatively impacted GDP, with a significant coefficient linked to global trends of output loss due to the financial crisis. Moreover, D2 (2020) was stronger and significant, highlighting a severe impact on India's economic growth. While D2 lag had a positive but insignificant impact on GDP. Lastly, the ECM coefficient was negative and insignificant, indicating that deviations in GDP caused by shocks adjusted back towards equilibrium at the speed of only 7%, which can be expected due to slowdowns and uncertainties in the economy.



6.4 Conclusion

The study used the econometric ARDL method to explore the dynamics among GDP, M3, CPI, and interest rates during the annual period from 1980 to 2021. The data for GDP, M3, and interest rates were obtained from the report of the RBI Handbook of Statistics and CPI Index 2015 from the Federal Reserve Economic Data. The findings imply that money supply is a key driver of economic growth in developing countries like India, aligning with the findings of (AlHarbi, Sbeiti, & Ahmad, 2024); however, it depends on the economic conditions. The positive and consistently significant coefficient of M3 in both the short-run and long-run implied that higher liquidity in the economy influences growth. Inflation has shown a detrimental impact on economic growth since high prices reduce purchasing power and aggregate demand. India's flexible inflation targeting, adopted in 2016 by the RBI, where inflation with a target of 4% and a tolerance band of 2% was recommended; above this,

inflation can affect the output. Therefore, this study suggests maintaining inflation under this limit. Moreover, interest rates were also negatively associated with growth; however, they had no significant impact. The ECM and bound tests confirmed the long-run relationship among the variables. Also, there was no problem of serial autocorrelation, and the model was well-established. Moreover, the results of the CUSUM test revealed that the graphs did not exceed the critical bound lines at a 5% significance level. This suggests that findings from this model were consistent and reliable. However, the CUSUM of squares test detected some instabilities, motivating us to explore the short-run impact of major economic crises on the GDP.

To account for these breaks, the study incorporated two dummies for 2008 and 2020. Re-estimating the ARDL short-run model, the findings indicated a consistent positive influence of M3 on GDP, reflecting its linear effect on growth, with the coefficient improved, affirming the Keynesian perspective. In contrast, CPI continued to negatively impact the GDP, supporting the idea that a rise in prices during shocks affects GDP. The dummy for both 2008 (D1) and 2020 (D2) exhibited a negative and significant impact on economic growth, supported by the macroeconomic trends. Importantly, the ECM was low, 7%, which reflects that the economy takes time to return to the equilibrium path during the period of uncertainties. The study findings align with the monetarists' view that changes in monetary variables influence real variables.

The only challenges any central bank faces are inflation and liquidity. RBI manages liquidity in the system using tools such as the continuous development of the call money market and reductions in the repo rate, reverse repo rate, cash reserve ratio, and statutory liquidity ratio to control the money supply. Therefore, the study suggests that managing M3 is essential for maintaining a stable GDP. Additionally, it's important to keep inflation and interest rates below the threshold level.

Chapter VII

STOCK MARKET DYNAMICS AND ECONOMIC ACTIVITY

7.1 Introduction

Financial development and economic growth are closely related concepts. A strong financial system comprising money and capital markets plays a significant role in stabilizing macroeconomic indicators, as suggested by (King & Levine, 1993). (Johnson, 1983) argues, “The stock markets are a complex of institutions and mechanisms through which funds for purposes longer than one year are pooled and made available to businesses, government, and individuals and through which instruments already outstanding are transferred. A healthy stock market indicates an optimistic attitude among investors about future economic prospects. It may also see the stock market as a predictor of real business cycles. According to (Fischer & Merton, 1984), the stock market has historically determined 6 out of the last 10 recessions. This implies the ability of the stock market to predict recessions. The stock market reflects investors' expectations of future profits and earnings. It has been observed that it's a leading indicator of real growth, predicting turning points in business cycles; historical crises have shown that even when the economy was in recession, the stock market was upward sloping (Management, 2009). The Bombay Stock Exchange (BSE), established in 1875, is the oldest stock exchange in Asia and the 10th oldest in the world, with a market capitalization of \$1.7 trillion. The National Stock Exchange (NSE) was set up in 1992 in Mumbai and has a market capitalization of \$1.65 trillion (Mahajan, 2023), with 2166 companies listed as of December 2023. Both indices are the key parameters of financial activity in India, and therefore, the study incorporated them to study the structural and cyclical dynamics between the stock market and real economic activity.

Industrial growth is now considered an important indicator of business cycles. Earlier works of literature have also used IIP to represent fluctuations in economic activity (Chitre, 2001). While the role of IIP in GDP has declined, it continues to play an important role in determining the cyclical components of growth. Also, being available at monthly and quarterly data is appropriate for forecasting economic conditions (Mohanty , Singh, & Jain, 2003). During an

economic boom, profits are expected to rise, as are stock market prices. However, during the period of economic slowdown, there can be asset liquidation, causing a decrease in stock prices.

India's GDP growth rate declined post-2017 from 8.17% to 7.17%. Afterwards, it experienced a downward fall. However, during the COVID-19 pandemic, India's growth rate further declined to 4.43%, while pre-pandemic it was 7% (Surya, 2024). The stock market also experienced a decline during the period. During the crisis period, investment is expected to decline because consumers feel fear of declining economic activity. However, (Shankar & Dubey, 2021) reported a positive impact of a crisis on trading volume, causing low volatility in the market. The stock market became a hotspot for investors because of the low prices and the expectation of high returns in the near future. The large influence of change in interest rates and monetary policy during the period of the pandemic was observed by (Schrunk, 2024).

(Meshram & Jadhav, 2020) asserts that the stock market plays an important role in the overall development of the economy. The developed capital market provides access to global funds. It provides a platform for investors interested in buying and selling listed securities. By reducing interest rates, the demand for money increases, and investors invest in the economy, which causes stock prices to increase. The financial crisis of 2008 increased the volatility of the stock market due to global trends (Mandal & Bhattacharjee, 2012). This highlights the importance of analyzing the effects of the global market on Indian financial markets. Hence, the study incorporated crude oil prices as a global indicator to investigate the impact of global volatility on the Indian economy.

7.2 Objective and Hypotheses:

The following objective is addressed in this chapter:

O₃: To examine the relationship between the combined market capitalization of NSE and BSE and India's economic growth.

The related hypotheses are

H_{3a}: There is no significant long-run relationship between combined stock market capitalization and economic growth.

H_{3b}: Crude oil has no significant impact on India's economic growth.

H_{3c}: COVID-19 has no significant short-run and long-run impact on economic growth.

H_{3d}: There is no nonlinear relationship between market capitalization and economic growth.

7.3 Data and Variables

Data on the stock market variables (BSE and NSE) and macroeconomic variables (IIP) were sourced from the RBI “Handbook of Indian Economy.” The data on the global indicator crude oil were obtained from the IMF. Monthly data from April 1996 to December 2021 were employed. The General Index of Industrial Production (IIP) was used instead of real gross domestic product because the data were unavailable. IIP measures the growth of various industries and, therefore, serves as a proxy for real economic activity. The IIP was released by the Central Statistical Organization as a monthly series in 1931, during the pre-independence era, and is now released by the Ministry of Statistics and Programme Implementation (MoSPI). IIP reflects sudden changes and fluctuations, capturing the shifts in the demand and supply chain (Vatsa, Basent, Mixon Jr, & Upadhyaya, 2024). Researchers have widely used IIP to study the short-run dynamics, lead-lag relationship, and cyclical business dynamics (Avyukt, 2018). Additionally, crude oil was used to investigate whether the global shocks have a transmission effect on India’s growth.

The total market capitalization was derived by aggregating the market capitalization of BSE and NSE. Given the high-frequency data, dummies were introduced to capture the effect of the dot-com bubble bursts, the global financial crisis, and COVID-19, which were visibly observable. Moreover, the threshold regression was included to examine whether the relationship between the Indian stock market and economic growth changes across different regimes.

If the month is March 2001, then $D1 = 1$.

and 0 otherwise,

If the month is October 2008, then $D2 = 1$.

and 0 otherwise,

If the month is April 2020, then $D3 = 1$.

and 0 otherwise,

These monthly dummies were incorporated, keeping in mind the economic shocks given their adverse impact on India’s economic growth during that particular month.

7.4 Empirical Results and Discussion

This section examines the relationship between the total market capitalization and economic growth. Additionally, this also presents the findings of threshold regression capturing the non-linear regime stock market and output relationship.

7.4.1 Unit root test

The unit root test presented in Table 7.1 employs the ADF and PP tests. The results revealed that the variables were I (0) and I (1), mixed order integration.

Table 7.1 Unit root test results

Augmented Dickey-Fuller*					
Variables	Level		1 st Difference		Order of Integration
	Constant	Constant & Trend	Constant	Constant & Trend	
IIP	-1.528	-0.955	-5.965***	-6.119***	I(1)
Market Cap	-0.311	-2.368	-15.808***	-15.785***	I(1)
Crude oil	-2.019	-2.350	-13.075***	-13.064***	I(1)
Phillips-Perron					
Variables	Level		1 st Difference		
	Constant	Constant & Trend	Constant	Constant & Trend	
IIP	-1.305	-5.991***	-54.114***	-71.839***	I(0)
Market Cap	-0.239	-2.564	-15.868***	-15.847***	I(1)
Crude oil	-1.734	-1.963	-12.809***	-12.793***	I(1)

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

According to the ADF test, all variables were I (1); they were stationary at the first difference. However, the PP test revealed that the total market cap was stationary at both levels and the first difference. At the same time, the other variables remained stationary at the first difference, supporting the use of the ARDL model.

7.4.2 ARDL Model

The study utilized the ARDL model to determine the dynamics among IIP, total market capitalization, and crude oil. Given the monthly analysis, four lags were used to capture the relationship and delayed impact of the stock market on industrial production. With the presence of structural shocks, the dummies were also included to capture their short-run and long-run impact on industrial output.

Table 7.2 Short-run relationship

Dependent Variable—IIP

Selected Model: ARDL (4, 0, 2, 1, 0, 3)

Variable	Coefficient	t-statistic	Prob
IIP(-1)	0.268	4.782	0.0000
IIP (-2)	0.452	8.066	0.0000
IIP (-3)	0.249	4.303	0.0000
IIP (-4)	-0.145	-3.378	0.0008
Market Cap	0.052	4.739	0.0000
Crude oil	0.044	1.545	0.1231
Crude oil (-1)	-0.109	-2.364	0.0187
Crude oil (-2)	0.070	2.327	0.0206
D1	0.051	1.190	0.2349
D1 (-1)	-0.062	-1.434	0.1525
D2	0.033	0.765	0.4447
D3	-0.888	-19.110	0.0000
D3 (-1)	-0.095	-1.446	0.1490
D3 (-2)	0.348	5.597	0.0000
D3 (-3)	0.337	5.577	0.0000
ECM	-0.175	-5.906	0.0000

R-squared 0.9897

Adjusted R-squared 0.9891

F-statistics 1856.4

Prob (F-statistics) 0.0000

The results in Table 7.2 demonstrate a consistent positive relationship between IIP and its lagged values up to three lags, with the coefficient being positive and statistically significant at the 1% level. However, in the fourth lag, it became negative but still significant, which reflected lagged industrial output influencing current IIP, followed by moderation. Similarly, total market cap and IIP exhibited a positive relationship; the coefficient was significant at the 1% level, indicating IIP's positive response to stock market conditions. Furthermore, crude oil had no immediate effect on IIP, while crude oil lag had a negative and significant influence on IIP. Moreover, the crude oil lag three turned positive and significant, reflecting cost-push pressures followed by production adjustments. However, no significant impact of the dot-com bubble burst, D1 was found on IIP, indicating no short-run delayed impact as well.

Similarly, the global financial crisis D2 had no significant impact on IIP, implying Indian economic activity remained unaffected by the crisis. However, a significant impact was observed on the stock market. Sensex falls 1408 points, or 7.45%, due to the global financial crisis. In contrast, COVID-19 severely impacted the output, also confirmed by the negative value of D3. It caused a sharp decline in IIP from 51.8 in March to 27.4 in April, which was the sharpest decline in Indian history (Varghese & Chandramana, 2022). It was a short-lived collapse followed by a recovery. The recovery was captured by the lag two and three, being statistically significant and positive. These lagged dummies allowed us to capture the transmission effects of these shocks over several months.

Finally, ECM has confirmed the long-run and cointegrating relationship between IIP, the stock market, crude oil, and other variables. The coefficient of the ECM (-0.175) was negative and statistically significant at the 1% level, indicating that after a short-run disequilibrium, the economy returned to long-run equilibrium at the rate of 17%, confirming a long-run relationship among the variables. The model demonstrated goodness of fit with an adjusted R-squared of 0.9891. Moreover, the f-statistic of 1856.4 also confirmed that the model was stable with a statistically significant p-value.

The long-run findings in Table 7.3 reveal that total market cap positively and significantly influenced IIP; with a one-unit increase in total market cap, IIP increased by 0.274 units. This indicated a strong long-run relationship between the stock market and output, aligning with the results of (Mohanty & Roy, 2023).

Table 7.3 Long-run relationship

Dependent variable: IIP

Variables	Coefficient	t-statistics	p-value
Market Cap	0.300	16.501	0.0000
Crude oil	0.032	0.858	0.3911
D1	-0.060	-0.171	0.8638
D2	0.192	0.763	0.4455
D3	-1.694	-2.643	0.0087
C	4.280	29.242	0.0000

However, crude oil had no significant long-run impact on India's output (Ingole, 2023). Additionally, there was no evidence of a significant impact of the dot-com and financial crises on IIP. However, a strong negative effect of COVID-19 was observed, justifying the large coefficient.

Table 7.4 Bound test results

F- Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Significance	I (0)	I (1)
		Asymptotic: n= 1000		
F- statistic	4.882	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	305	Finite Sample: n= 80		
		10%	2.303	3.154
		5%	2.55	3.606
		1%	3.351	4.587

The F-bound test was conducted to confirm the long-run relationship among the variables. The results in Table 7.4 reveal that the F-statistic of 4.882 exceeded the upper limit at all significance levels. Hence, the findings supported the rejection of the null hypothesis, indicating all the variables were related, implying the existence of a long-run stable relationship between IIP and all the explanatory variables.

7.4.3 Diagnostic Tests

Several diagnostic and stability tests were performed to ensure the robustness and reliability of the ARDL findings.

Serial LM Correlation test

Table 7.5 presents the results of the correlation test. The calculated p-value for both the F-statistics (0.630) and the observed R-squared (1.335) was greater than 0.05, rejecting the alternative hypothesis, implying there was no autocorrelation up to two lags.

Table 7.5 Breusch-Godfrey Serial Correlation test

Null hypothesis: No serial correlation at up to 2 lags		
Alternate Hypothesis: Serial correlation up to 2 lags		
Statistics	Coefficient	p-value
F-statistic	0.630	0.5329
Obs*R-squared	1.335	0.5130

Breusch-Pagan-Godfrey Heteroskedasticity Test

The results displayed in Table 7.6 indicate that the p-values of the F-statistic and observed R-squared were statistically insignificant.

Table 7.6 Breusch-Pagan-Godfrey Heteroskedasticity test

Null hypothesis: Homoskedasticity		
Alternate hypothesis: Heteroskedasticity		
Statistics	Coefficient	p-value
F-statistic	0.594	0.8790
Obs*R-squared	9.122	0.8710
Scaled explained SS	10.344	0.7979

This implies that no heteroskedasticity was present in the model, and residual variance was constant. Moreover, the p-value of scaled SS was also insignificant. Thereby, the finding failed to reject the null hypothesis, suggesting residuals exhibited homoscedasticity.

Jarque-Bera normality test

The Jarque-Bera test was employed to examine the nature of the distribution of the variable's values, as shown in Figure 7.1.

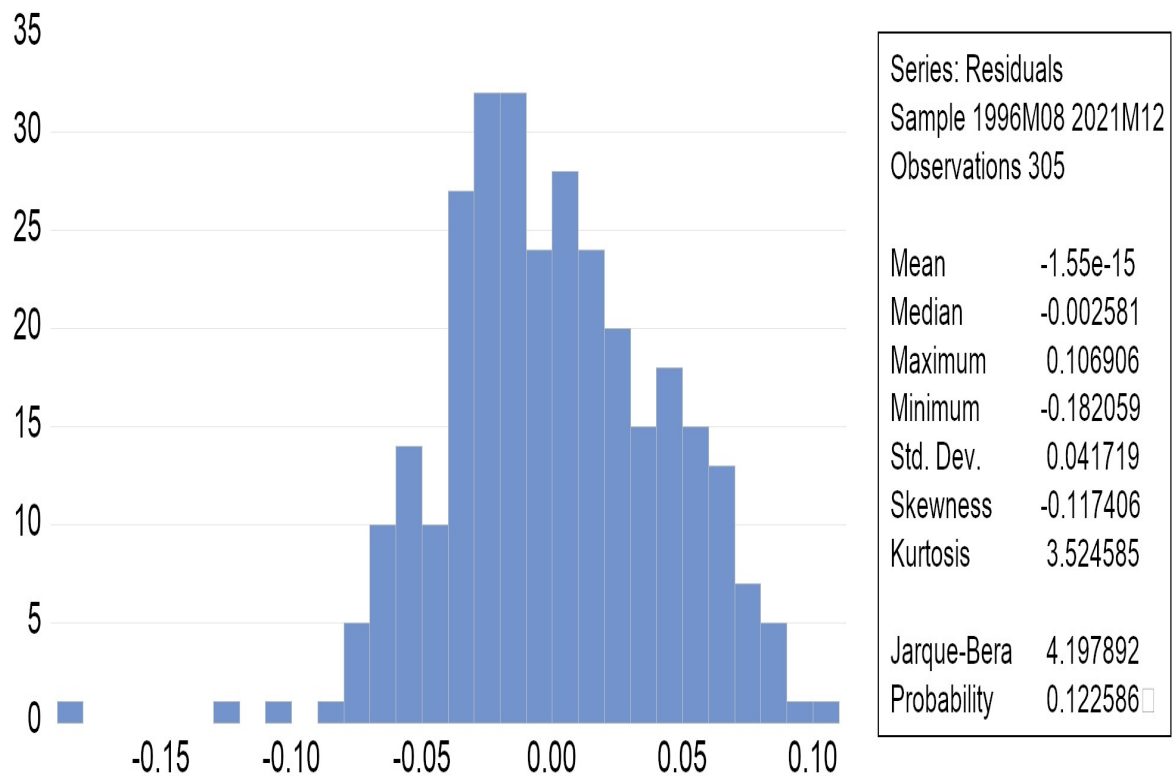


Figure 7.1 Residuals normality test

The JB statistic of 4.199 confirmed that the data were normally distributed, with the p-value being statistically insignificant. This was further supported by skewness (-0.117), indicating slightly left-skewed residuals. Similarly, a kurtosis of 3.524, slightly greater than 3, suggested slightly heavier tails, confirming that the model was free of outliers. Overall, the findings confirmed that the results were normally distributed.

7.4.4 Stability Tests

To examine the stability of the model, the CUSUM and CUSUM square tests were employed.

CUSUM test

H_0 : There is no structural change in the parameters.

H_1 : There is a structural change in the parameters.

The CUSUM line displayed in Figure 7.2 remains between the two critical lines at a 5% significance level, indicating that the alternative hypothesis was rejected and confirming the stability of the ARDL model. This also validates the findings of the short-run and long-run ARDL.

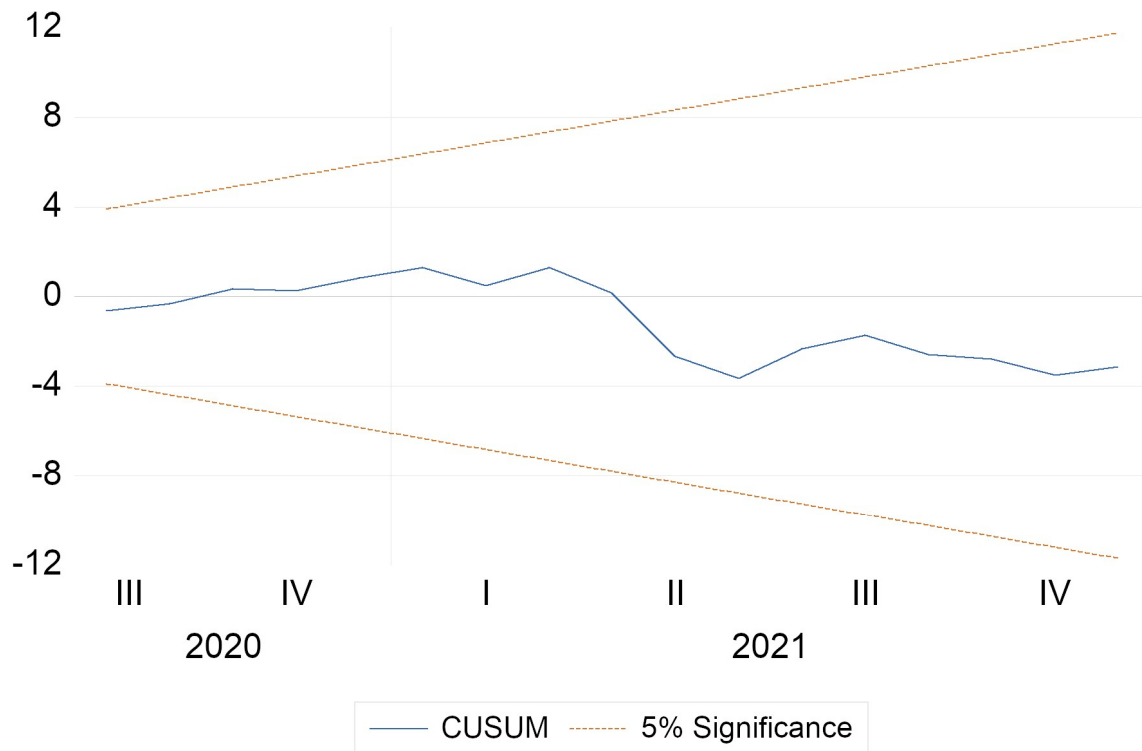


Figure 7.2 CUSUM test

As indicated in Figure 7.3, the CUSUMQ line remains between the upper and lower critical bounds, ensuring the stability of the model. However, the results were concentrated over the period 2020-2021, due to the monthly data. This period was majorly affected by COVID-19, but with the inclusion of dummy, which significantly captures its impact on IIP. These structural breaks, dummies, were appropriately captured in their impact on output, ensuring the reliability of the model. The stability in the CUSUM and CUSMUQ tests confirmed that the model performed in a stable way, adjusting for these shocks.

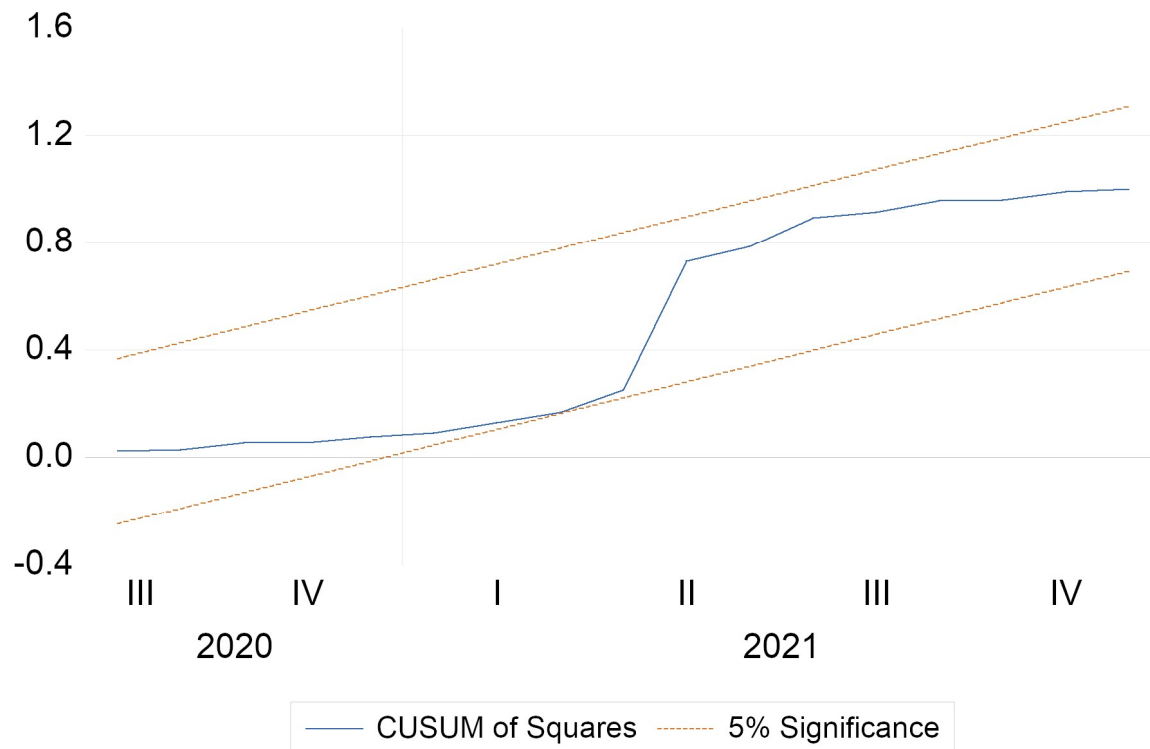


Figure 7.3 CUSUMQ test

While the ARDL model captures the short-run and long-run dynamics between the stock market and economic activity, under assumes that the economic state remains constant. However, financial markets are often volatile in nature, and the stock market growth relationship varies depending on the regime. To understand these dynamics, the study further employed the Markov Switching Regression model.

7.4.5 Threshold Regression

Switching regression model allows the parameters to change depending on the regime, capturing non-linear behavior. (Hansen, 1999) argues that these models are commonly applied in economics because real economy and financial markets interact nonlinearly due to investors' sentiments, liquidity constraints and regime-dependent behavior. Building on a regime-dependent relationship, (Bhattacharya & Bhattacharya, 2022) show that the relationship between the stock market and macroeconomic indicators is not consistent across market conditions. Motivated by this, this study has incorporated a discrete threshold regression model, which simply divides the sample into distinct regimes based on whether the threshold variable

crosses an unknown threshold value. This model allows us to examine the impact of the stock market on IIP during these distinct periods of low and high fluctuations.

Table 7.7 Threshold Regression Estimates

Variables	Coefficients	Std. Error	P-value
Market Cap < 11698.76			
Market Cap	4.79E-05	1.42E-05	0.0008
C	3.2742	0.1334	0.0000
11698.76 <= Market Cap < 22016.76			
Market Cap	7.35E-06	4.33E-06	0.0909
C	3.7890	0.0661	0.0000
22016.76 <= Market Cap < 81466.53			
Market Cap	7.17E-06	4.92E-06	0.0000
C	3.9013	0.0179	0.0000
81466.53 <= Market Cap < 1469301.1			
Market Cap	3.93E-06	4.28E-07	0.0000
C	4.1112	0.0511	0.0000
1469301.1 <= Market Cap < 275389.3			
Market Cap	-4.26E-07	1.05E-06	0.6853
C	4.8197	0.2018	0.0000
275389.3 <= Market Cap			
Market Cap	1.12E-07	9.51E-08	0.2414
C	4.8221	0.0337	0.0000

R-squared 0.9607

Adjusted R-squared 0.9592

Log likelihood 331.8539

F-stat 0.0000

A threshold regression was used to identify a threshold range for market cap and its effect on IIP, as shown in Table 7.7. The results revealed six different regimes where IIP responds to market capitalization in varying ways. In the low market capitalization regime, IIP responded positively and significantly to increased stock market returns. After a slight increase in market capitalization, the IIP coefficient increased significantly but then became insignificant. When

the market reached a moderate size, the impact became strong and significant. Furthermore, as the market size expanded substantially, the impact remained positive and significant, though it was low in magnitude. However, in the high market capitalization regime, fluctuations in the stock market did not lead to meaningful changes in industrial output. At the highest regime, the coefficient turned positive but remained insignificant. The findings imply that the stock market impacts IIP when its size is small, and as the size expands, the influence becomes stronger, eventually fading out at a very high market capitalization, due to high volatility and investor sentiment.

7.5 Conclusion

The dynamic nature of the financial market highlights its sensitivity to booms and busts. The financial crisis of 2008 and the recent COVID-19 pandemic have made it essential to examine both the structural and cyclical relationship between the Indian stock market and real activity (IIP). Subsequently, three dummy variables were introduced to capture the effects of the dot-com bubble burst (D1), the financial crisis (D2) and COVID-19 (D3). This study used high-frequency monthly data from April 1996 to December 2021. The structural dynamics analyzed with an ARDL model, using four lags, revealed a significant short-run relationships between the stock market and IIP, suggesting that the stock market influences industrial output, while IIP was largely explained by its past values. Crude oil showed a mixed relationship: at lag 1, it had a negative effect on IIP, and at lag 2, it had a positive effect. Regarding structural shocks, D1 and D2 were insignificant, whereas D3 had a strong short- and long-run negative impact on IIP. The long-run estimates confirmed the persistent positive influence of the stock market on IIP, while crude oil had no lasting effect. The ECM and bound tests verified a valid long-run relationship among the variables. The diagnostic test revealed that the residuals were autocorrelated and heteroskedastic. Moreover, the residuals were normally distributed. The CUSUM and CUSUMQ tests confirmed the model's stability; variance instability was absorbed by including dummy variables. The threshold regression also confirmed the positive and significant relationship between IIP and market capitalization; low growth rates were associated with higher industrial output, and gradually the effect declined as the market size expanded. These findings highlight the non-linear and regime-specific interaction between the financial market and the real economy.

Chapter VIII

EXAMINING THE FINANCIAL CYCLES IN INDIA

8.1 Introduction

The method of estimating the business cycle and implementing a policy framework for monitoring and controlling GDP fluctuations is a well-established practice conducted by various international agencies. However, the examination of the financial cycle and its influence on the economy gained policymakers' attention after the 2008 subprime crisis. Business cycles analyze the economy's condition from the expansionary to the contractionary phase. The expansion phase is marked by increased economic activity and high growth rates. While contraction phases see a slowdown in economic activity. In contrast, financial cycles involve growth in asset prices and credit. As proposed by (Borio C. , 2012), "self-reinforcing interactions between perceptions of value and risk, attitude towards risk, and financing constraints, which translate into booms followed by busts." Financial cycles relate to trends in real bank credit, credit-to-GDP ratio, real equity prices, real effective exchange rate, and real house prices. Fluctuations in stock, bond, and foreign exchange markets are driven by various economic factors such as policy decisions, government interventions, speculation, and expectations. The credit-to-GDP ratio's deviation from its long-term trend serves as an early warning indicator for financial crises. The large gaps signal a bank crisis or disruptions (Szemere, 2016).

Hyman Minsky, in his "financial instability hypothesis," outlined three stages of instability. During the period of Hedge, the credit demand remains moderate due to the recession losses. Recovery leads to increased credit demand, asset price booms, and economic growth, creating an increased debt burden in the speculative stage. Finally, during the Ponzi stage, the increased debt burden led to financial stress, asset liquidation, and declining asset prices, which resulted in a recession. A credit rise stimulates the demand for houses, causing asset price growth. As a result, increased mortgage value reduces the demand, reversing the process. These self-reinforcing interactions cause disruptions. (Borio & Disyatat, 2011) discussed a 'policy drift,' where a prolonged period of low-interest rates encourages borrowing and subsequent demand

for money, which results in increased prices of houses, shares, and other assets, causing financial stress and obligations.

The key differences between business and financial cycles are, first, that financial cycles explain the expansions and contractions in the financial markets, while business cycles represent the fluctuations in real economic activity. Second, financial cycles tend to be more volatile than business cycles, larger in amplitude. Third, the length of the cycle varies between 8 and 20 years or so. Fourth, the business cycle does not drive financial cycles, but only during the period of booms, busts, and disruptions (Filardo, Lombardi, & Raczko, 2019). These features should not be interpreted as suggesting any absence or weak relationship between financial cycles and business cycles. The empirical literature has produced mixed results, some supporting the positive relationship.

Several studies have contributed to the empirical study of financial cycles; however, (Behra & Sharma, 2019) explored the interactions between financial cycles and non-performing assets to examine uncertainties. There was a rise in non-performing assets. As of March 31, 2018, the total volume of gross NPA in the economy stands at Rs 10.35 lakh crores. About 85% of these NPAs are from loans and advances of public sector banking. NPA of banks has expanded from 2.3% of total loans in 2008 to 9.3% in 2017, with it standing at 8.2% in March 2020. According to ICRA, gross and net NPAs were expected to increase to 10.1-10.6% and 3.1-3.2%, respectively, by March 2021. Simultaneously, there was a decline in GDP at (2011-12) prices from 8.17% to 7.17% in 2017, then 6.12% in 2018 and 4.5% in Q2 (2019-20) from 5% in Q1. The GDP for the entire financial year (2020-21) contracted by 8%, marking a historic downturn in the Indian economy, attributed to the nationwide lockdown in response to the COVID-19 pandemic (Paul, 2018).

Besides credit and money supply, capital formation also contributes significantly to economic stability and financial development. Gross capital formation refers to the additional fixed assets, like plants, machinery, roads, railways, infrastructure, schools, hospitals, and commercial and industrial buildings. It also includes net changes in the level of inventories in the economy. (Kendrick, 1961), (Kuznets, 1965), and (Solow, 1957) argued that capital formation, technical progress, and labor are the three main sources of economic growth. Increased GFCF encourages more employment opportunities and enhanced economic growth. There has been a persistent decline in GFCF as a percentage of GDP since the 2008 crisis. According to the World Bank, in 2020, India's GFCF accounted for 28.1% of GDP and 29% in

fiscal year 2021, indicating a gradual recovery post-COVID. These uncertainties drew attention to the interaction between business and financial cycles, with the incorporation of important macroeconomic indicators such as investment and the broad money supply. To further examine these interactions, a Structural Vector Autoregression (SVAR) framework is applied to capture the structural dynamics among credit, investment and business cycles.

The paper's structure is as follows: Section 8.2 provides the objectives and hypotheses addressed in this chapter. Section 8.3 presents the data and variables utilized. Section 8.4 presents the findings obtained from the estimation, followed by conclusions in Section 8.5.

8.2 Objective and Hypotheses

The following objective is addressed in this chapter:

O₄: To examine the existence of financial cycles in India and their relationship with business cycles.

The related hypotheses are

H_{4a}: Financial cycles measured through non-food gross bank credit (NFGBC), credit-to-GDP ratio, and construction GDP (house prices proxy) do not exhibit cyclical components.

H_{4b}: The financial cycles do not differ significantly in duration or amplitude from business cycles.

H_{4c}: Credit cycles are not synchronized with business cycles.

H_{4d}: Credit cycles do not lead business cycles.

H_{4e}: There is no structural relationship among credit, investment and business cycle.

8.3 Data and variable construction

This paper conducted an analysis utilizing annual data spanning from 1980 to 2021 at the aggregate level. Non-food credit (NFGBC), comprising credit provided to agriculture, industry, services, personal loans, and economic growth (GDP), was examined as a primary indicator to analyze the interactions between the credit and the business cycle. Other financial indicators suggested in the literature, such as (a) the credit-to-GDP ratio, which indicates the proportion of credit relative to the size of the economy, and (b) construction GDP to represent the fluctuations in house prices, the annual data on the house price index was not available;

however, it showed a strong positive relationship with the quarterly index available (Behra & Sharma, 2019). To account for potential measures of credit-business synchronization, the study also incorporated various macroeconomic factors as possible indicators, like (c) broad money (M3) as a proxy of money supply in the economy: changes in money supply impact credit and growth, and (d) gross fixed capital formation (GFCF); a higher level of investment indicates increased demand for credit and potential economic growth. The annual data used in this study were collected from reliable sources like the World Bank database and the Reserve Bank of India.

The investment cycles are significant in India for estimating credit cycles and business cycles, as they represent fluctuations in economic activity and are key indicators of growth. Food credit and non-food credit are formal measures of credit expansion. Non-food credit represents credit to various sectors and was considered a representation of the credit cycle (Banerjee, 2011) (Saini, Ahmad, & Bekiros, 2021). GDP was taken as a representative variable for the business cycle (Thomson & Vuuren, 2016). Nominal GDP was used to calculate the credit-to-GDP ratio to ensure consistency with credit, as both were adjusted for inflation, following the suggestion by the BIS. Turning points in the economy are named peaks and troughs, indicating the highest and lowest points that the economy can reach under current economic conditions. (Jonung & Fregert, 2010), while GFCF captured trends and cyclical movements in investment.

8.4 Empirical Results and Discussions

This section characterizes the financial indicators and macroeconomic variable cycles derived using the Hodrick-Prescott filter and financial and business cycles interactions to examine if the fluctuation in financial indicators predicts downturns in economic growth. The HP filter decomposes the series into trend (long-term) and cyclical component (short-term movements).

8.4.1 Characteristics of cycles

The graphs present the characteristics of cycles, which include the number of peaks, troughs, cycle duration, the longest cycles (peak to peak or trough to trough), all the major events that happened and their amplitude (magnitude of deviation from trend) and the slope (if expansions or contractions have a steeper slope). This paper employed $\lambda=100$, as suggested for an annual study (Backus & Patrick, 1992).

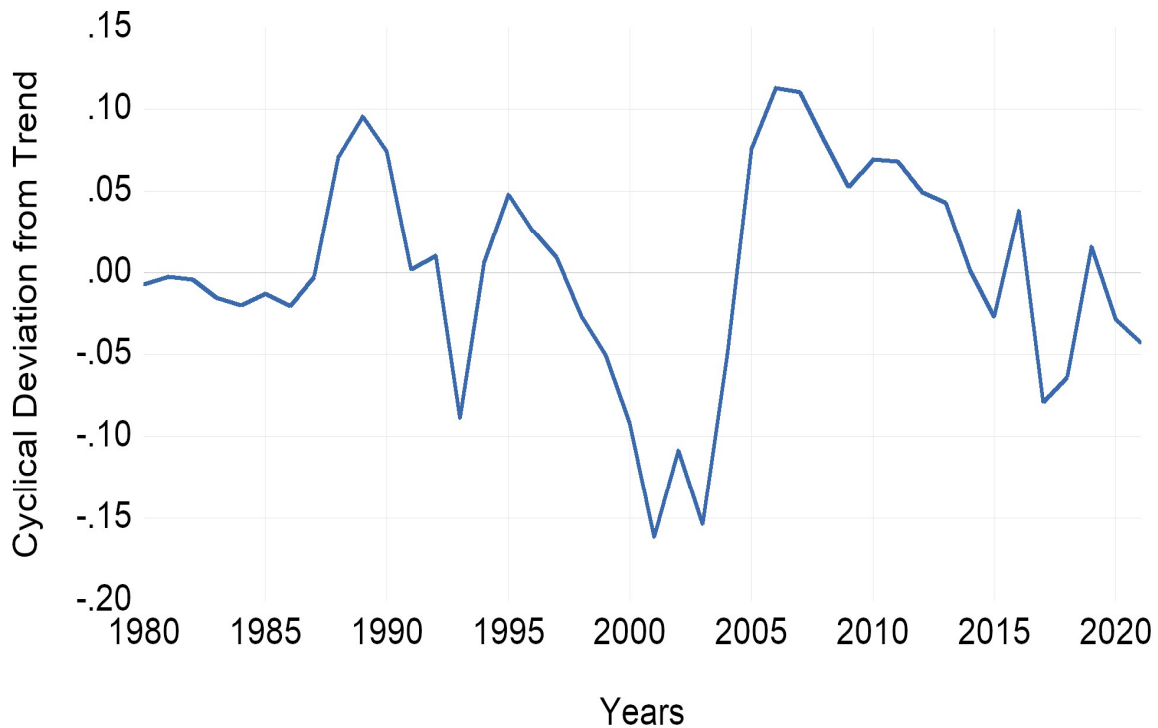


Figure 8.1 Non-food gross bank credit (NFGBC) cycles

It was observed that during the period, NFGBC exhibited 8 peaks and 8 troughs, corresponding to 7 expansions and 7 contractions, as displayed in Figure 8.1. The longest cycle lasted for 10 years, from 2006 to 2016 (peak to peak). Initially, NFGBC experienced a continuous decline until 1985. In 1990, there was an increase in credit linked to an early phase of financial reforms and increased investment activities. However, there was a significant decline in NFGBC in 1993, which could be due to the tightening of monetary policy or a policy change.

The post-1990 period marked a significant economic slowdown, resulting in a rise in NPAs within the banking sector. The largest cycle with a high amplitude of 0.2093 was observed, indicating a sharp decline between the years 1995 and 2001. While the total bank credit increased by 14.6% in 2003-04 and approximately 15% of GDP between 2003 and 2007 (Shah, 2015). RBI introduced the inflexible exchange rate, which caused a decline in the interest rate level (Zeileis, Shah, & Patnaik, 2010), causing a credit boom in the economy.

Similarly, an amplitude of 0.2744 between 2003 and 2006 reflected significant expansion; both expansion and contraction exhibited significant fluctuations. Interestingly, during the 2007 global financial crisis, NFGBC exhibited a sustained decline. While a peak was observed in 2016, there was a growth of 8.6% in April, possibly because of increased demand, as there was a cut in the repo rate to 6.50% from 6.75% and further to 6.25% in 2016. However, the increase

was followed by a sharp decline to 3.3% in 2017, which was the lowest in the last decade (Bureau, 2017).

Furthermore, demonetization and COVID-19 caused a sharp decline as well. The NFGBC growth declined to 6% in 2019-20 from 13% in 2018-19. However, it was a short-lived collapse followed by a quick recovery with an average growth of 8.7% in 2021-22 (RBI, 2020). Notably, the expansions had a steeper slope than the contractions, implying that expansions grow more than contractions, which aligns with a typical feature of financial cycles.

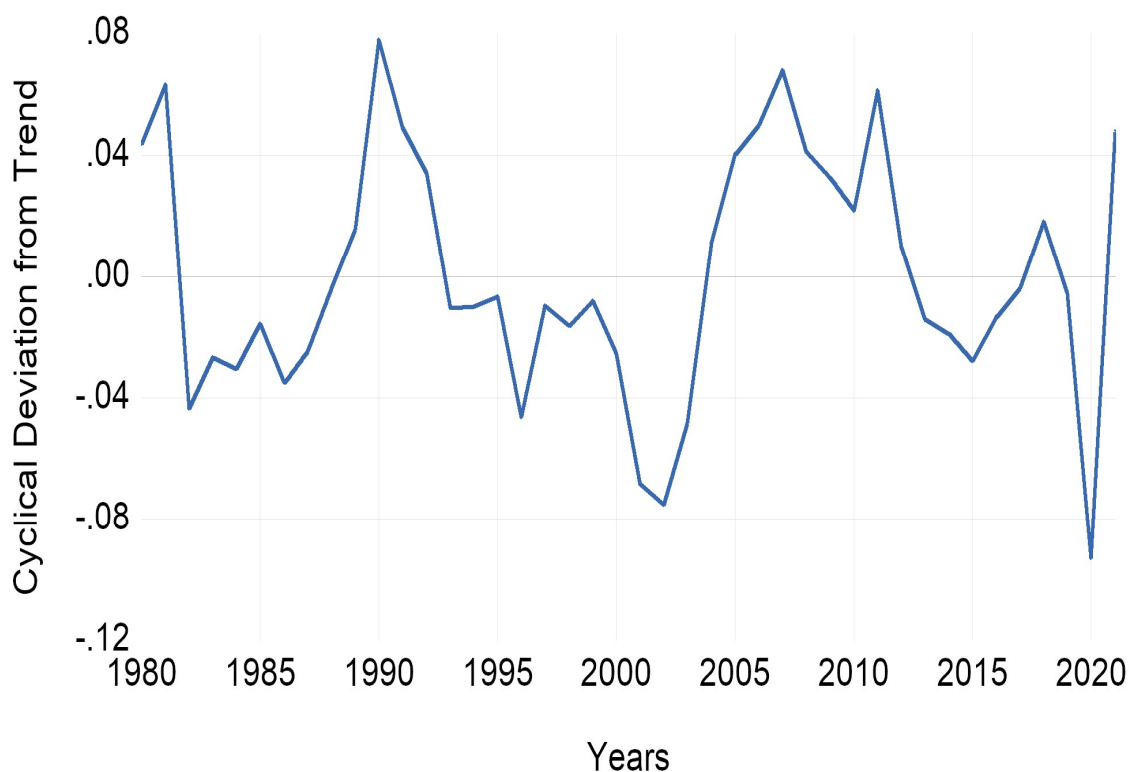


Figure 8.2 House price cycles

Over the years, house prices proxied by the construction GDP displayed 7 peaks and 9 troughs, a complete cycle, along with 6 expansions and 6 contractions as outlined in Figure 8.2. The real estate market experienced a negative growth in the 1980s and 1990s due to low demand for houses, particularly due to bureaucracy, high interest rates, and the land tenure system. The real estate market picked up only after the financial reform in 1991, and even the highest peak occurred in 1991 as well, when the credit boom boosted the economy and the property prices went up before declining due to the BOP crisis. Post-crisis, it started to rebound, followed by a gradual decline. The longest cycle (peak to peak) in construction GDP was observed for 17

years, between 1990 and 2007. The most significant expansion occurred between the years 2002 and 2007, with an amplitude of 0.148.

However, the largest contraction occurred between 2018 and 2020 with an amplitude of 0.1113. Finally, the contractions had a steeper slope than the expansions, reflecting real estate market sensitivity to the shocks.

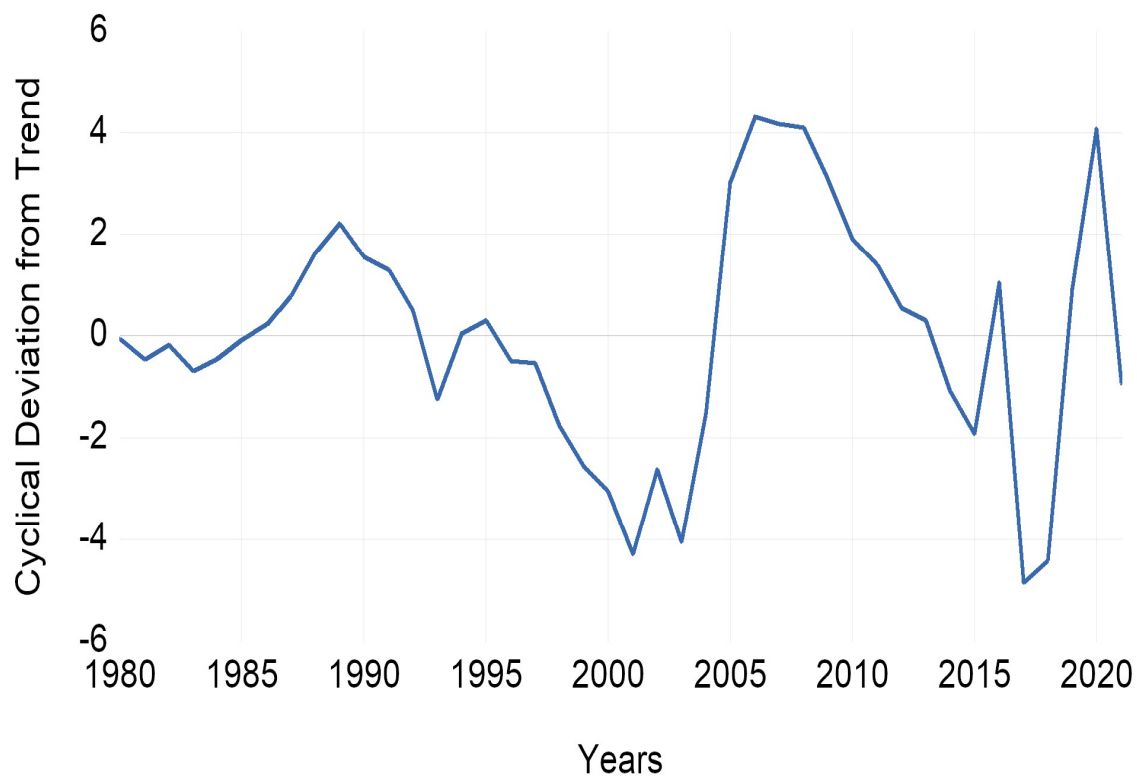


Figure 8.3 Credit-to-GDP ratio (CGR) cycles

The cyclical component of the credit-to-GDP ratio, as shown in Figure 8.3, exhibited 7 peaks and 7 troughs, along with 7 expansions and 6 contractions. The peaks indicated the phase of excessive credit growth relative to GDP, a period of credit expansion. While the trough reflected the period of economic distress, the credit-to-GDP ratio was lower. The average peak-to-peak cycle was nearly 6 years; however, the longest cycle was observed between the period 2006 and 2016, lasting for 10 years. This period marked a continued decline in the ratio post the financial crisis, where credit declined disproportionately with the GDP. Also, with the rise in NPAs in 2012, particularly in public sector banks, there was a sharp decline in banking credit. The amplitude of contraction was -6.2% from 2006 to 2015, indicating a significant decline.

Notably, the most significant expansion occurred during the period 2017 to 2020, with a high amplitude of 9.0%, possibly due to stabilization after demonetization and a push in bank credit,

reflecting the positive impact of improved financial conditions on economic activity, particularly during the period of instability. A sharp contraction happened in 2020 due to COVID-19. Moreover, the slope revealed steeper expansions than contractions. These cycles illustrated that credit moves in a wave-like manner; more credit can lead to inflationary pressures, and less credit can affect economic growth.

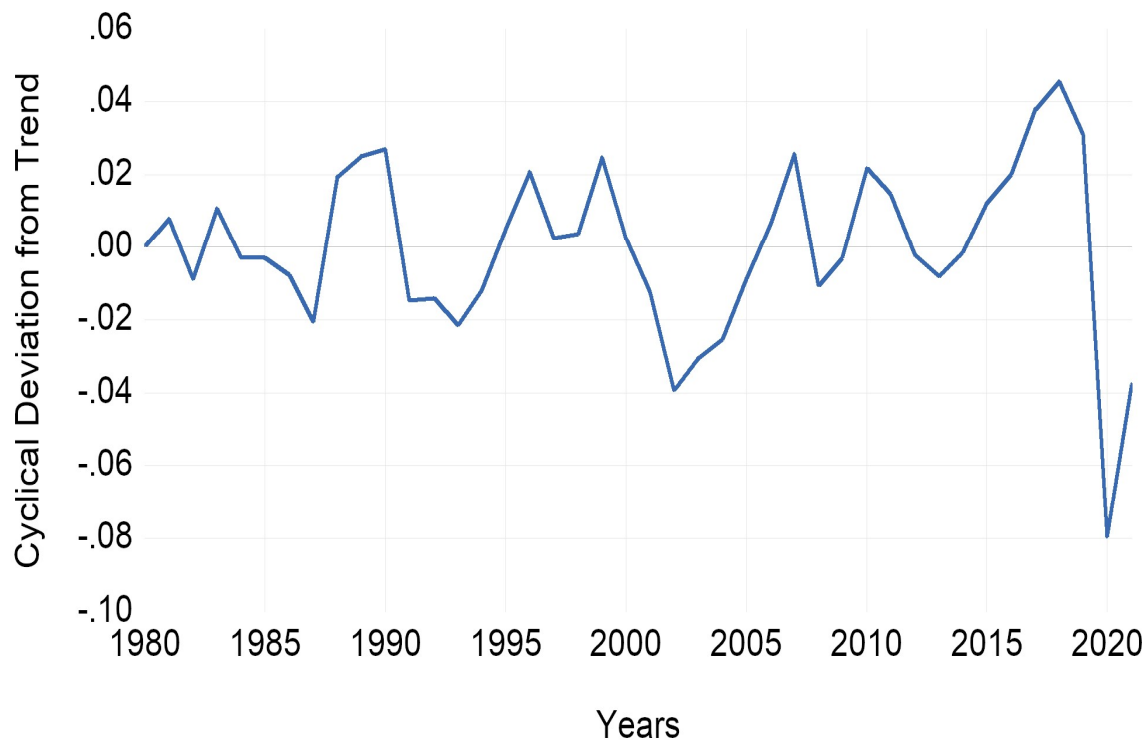


Figure 8.4 GDP cycles

Figure 8.4 depicts that over the sample period, GDP showed 9 peaks and 9 troughs, a complete business cycle, corresponding to 8 expansions from trough to peak and 9 contractions from peak to trough. According to the economic survey of 1998-99, the slowdown in GDP growth in 1998 was due to the decline in agricultural growth, contracting to -1.0% after 9.6% in 1996. Additionally, the longest cycles in GDP lasted over 8 years (peak to peak) between 2010 and 2018, with an average business cycle of 4.63 years. The most significant downturn in GDP occurred in 1991, attributed to the BOP crisis, when the Government of India faced challenges in servicing external debt due to a decline in foreign exchange reserves. The decrease in global economic growth between 2000 and 2005 can be linked to events such as terrorist attacks, the collapse of the dot-com bubble, fluctuating oil prices, and reduced investments. An expansion of 0.649 amplitude was observed between the years 2002 and 2007.

Additionally, agricultural production was impacted by drought in 2002-03, causing a decline in agricultural and allied output by 7%, thereby declining GDP from 5.8% in 2001-02 to 4%. The decline in 2008-09 was due to the global financial crisis, which caused high fluctuation in economic activity. The GDP growth declined to 7.9% in the first quarter of 2008-09 (Thomas), and yearly growth declined to 6.80% in 2008-09 from 9.30% in 2007-08 (Bajwa, 2012).

However, GDP experienced a phase of expansion in 2018-19, possibly due to the subsiding of the effects of demonetization and increased economic activity. In 2020, an exceptional event occurred due to COVID-19, causing the most severe contraction in GDP, with an amplitude of 0.1250 between 2019 and 2020, capturing the peak to contraction. The GDP growth rate declined to -7.7% from 6.1% in 2019-20 (Sinha, 2024).

Furthermore, the trough had a steeper slope than any of the identified peaks. This suggests that the change in GDP in a contraction phase tends to be sharper and more sudden, while recoveries are relatively more gradual.

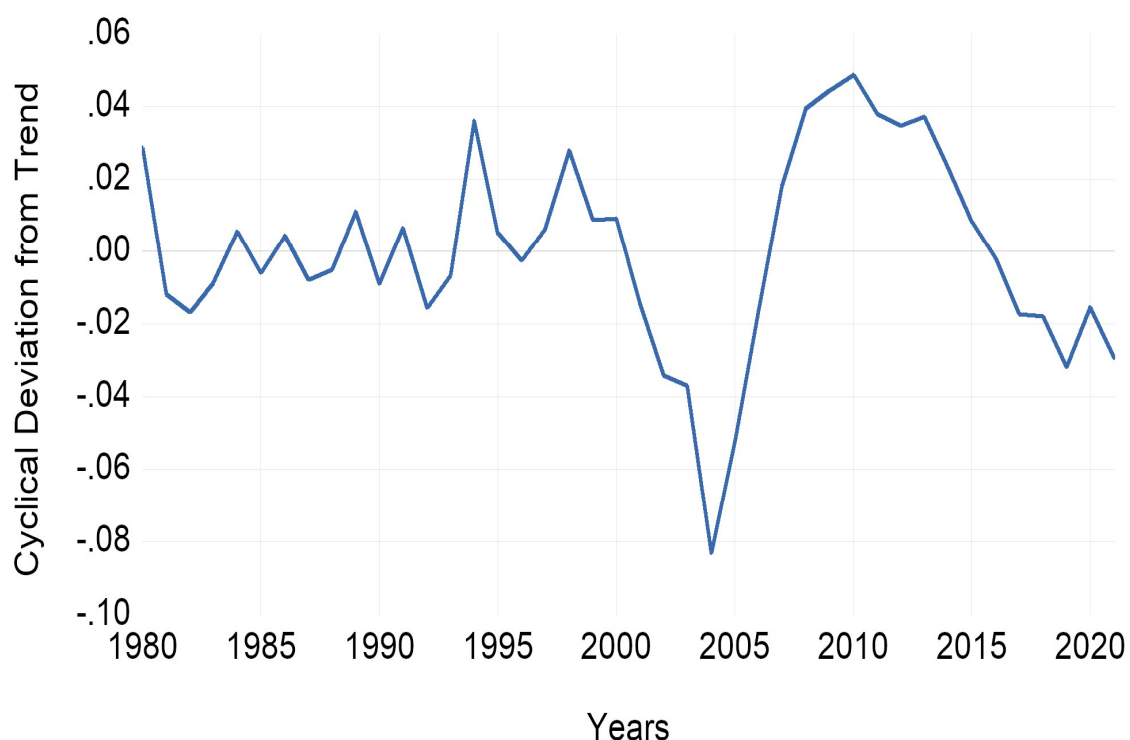


Figure 8.5 Broad money supply (M3) cycles

Figure 8.5 presents the fluctuations in the money market with 9 peaks and 8 troughs, along with 8 periods of expansion and 7 periods of contraction. From 1998 to 2010, there were significant fluctuations in the length of cycles, with the longest cycle (peak to peak) spanning 12 years. There was an increase in M3 due to economic liberalization in 1991, as the economy

opened up, leading to increased banking facilities and capital inflows. However, in 2004, there was a significant decline in M3, possibly due to changes in the government that may have impacted economic policies, including fiscal and monetary policy. This might have reflected the slow increase in M3, leading the HP filter to detect this as a cycle. The largest cycle, a contraction with an amplitude of 0.0923, was exhibited, while an expansion was observed between 2004 and 2010, with an amplitude of 0.132, contributed by the large capital inflows. The RBI took necessary measures between October 2008 and April 2009 to increase liquidity. The repo rate and reverse repo rate were reduced to 4.75% and 3.25%, respectively (Mohanty D. , 2009), maintaining the financial stability. From 2013 onwards, there was a persistent decline in M3, which might be due to inflationary pressures in the economy.

Additionally, growth in M3 was supported by deficit financing, contributing to its expansion. However, M3 declined during the period of demonetization in 2016, as a significant portion of currency became invalidated, and there was a temporary shortage of physical cash. Furthermore, COVID-19 led to a decline in M3, reducing money circulation and hoarding of money. It's worth noting that the contractions had a larger slope than the expansions, aligning with typical economic behavior, where downturns tend to be sharper and recoveries more gradual.

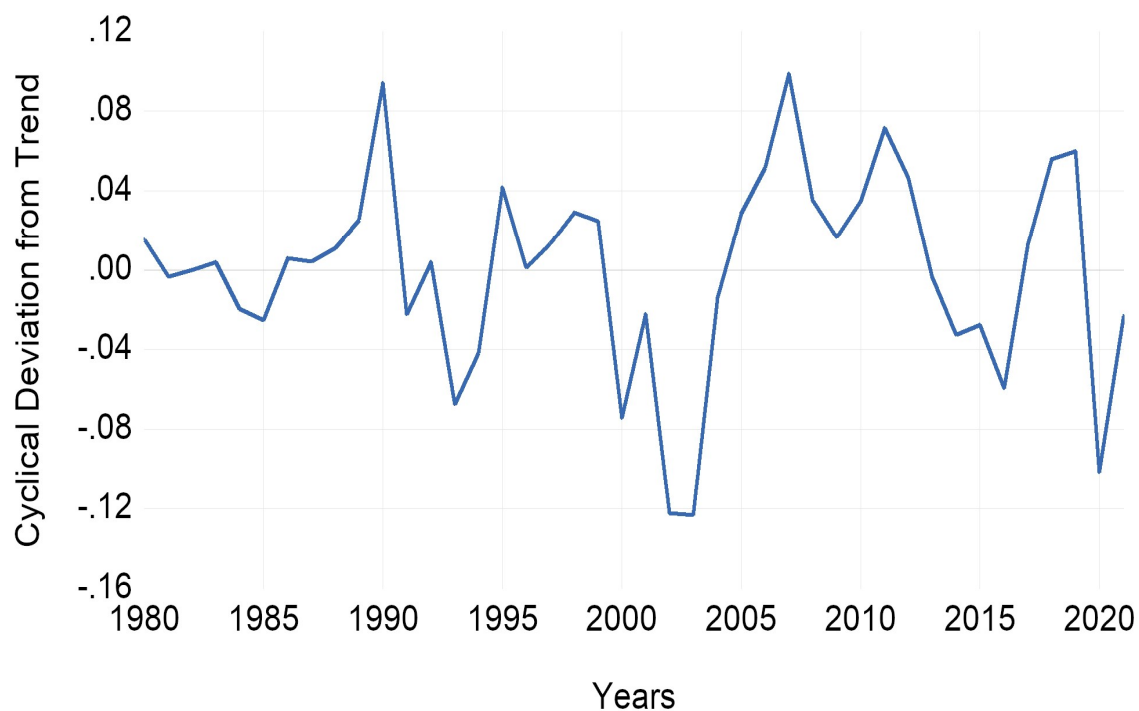


Figure 8.6 Gross fixed capital formation (GFCF) cycles

Gross Fixed Capital Formation (GFCF) in Figure 8.6 exhibited 10 peaks and 11 troughs in its cyclical pattern with 10 complete expansions and 10 contractions. Between 1983 and 1990, the longest cycle (peak to peak) was observed for 7 years, with an average cycle duration of 4.2 years. In the 1990s, there was a sharp decline in GFCF, possibly due to the BOP crisis. While there was a moderate growth observed between 1993 and 1995. The National Stock Exchange was established in 1992 to promote FDI in various sectors. Deregulation of interest rates also facilitated easy access to credit and capital, leading to a rise in GFCF.

However, there was a decline in GFCF between the years 1999 and 2003, which was likely caused by economic downturns, government policy shifts, and global domestic uncertainties. The largest cycle was observed between 2002 and 2007 with an amplitude of 0.2210, reflecting the most expansionary investment phase. However, it didn't last long; the investment declined due to the financial crisis. The Indian government implemented monetary and fiscal measures to counteract the effects of the global financial crisis, which had a positive influence on GFCF. Demonetization marked a sharp decline in GFCF, followed by a rebound, and similarly, COVID-19 also led to a sharp decline in GFCF, with a high amplitude of 0.1614 from 2019 to 2021. Furthermore, the peak exhibited a larger slope than any of the troughs identified, indicating a faster and steeper rise in GFCF compared to contractions.

8.4.2 Synchronization of GDP Cycles with Other Economic Indicators

For a better understanding of the interaction of the variables, the co-movement between the business (GDP) and credit (NFGBC) was evaluated by combining their cyclical components. The strong co-movement among these variables indicated the interdependencies between the real and the financial sectors and how these variables interact during the period of disruptions and crises. While the credit-to-GDP ratio and construction GDP were not taken into consideration due to the inherent overlap.

Furthermore, to analyze the factors that cause fluctuations in business cycles, the study combined the cyclical components of money and investment cycles with business cycles. Also, the lead-lag relationship was conducted to check the potential causality among the variables. Figure 8.7 presents a comprehensive cyclical pattern of financial cycles through credit and their interactions with business cycles, revealing a visible co-movement between business and financial cycles.

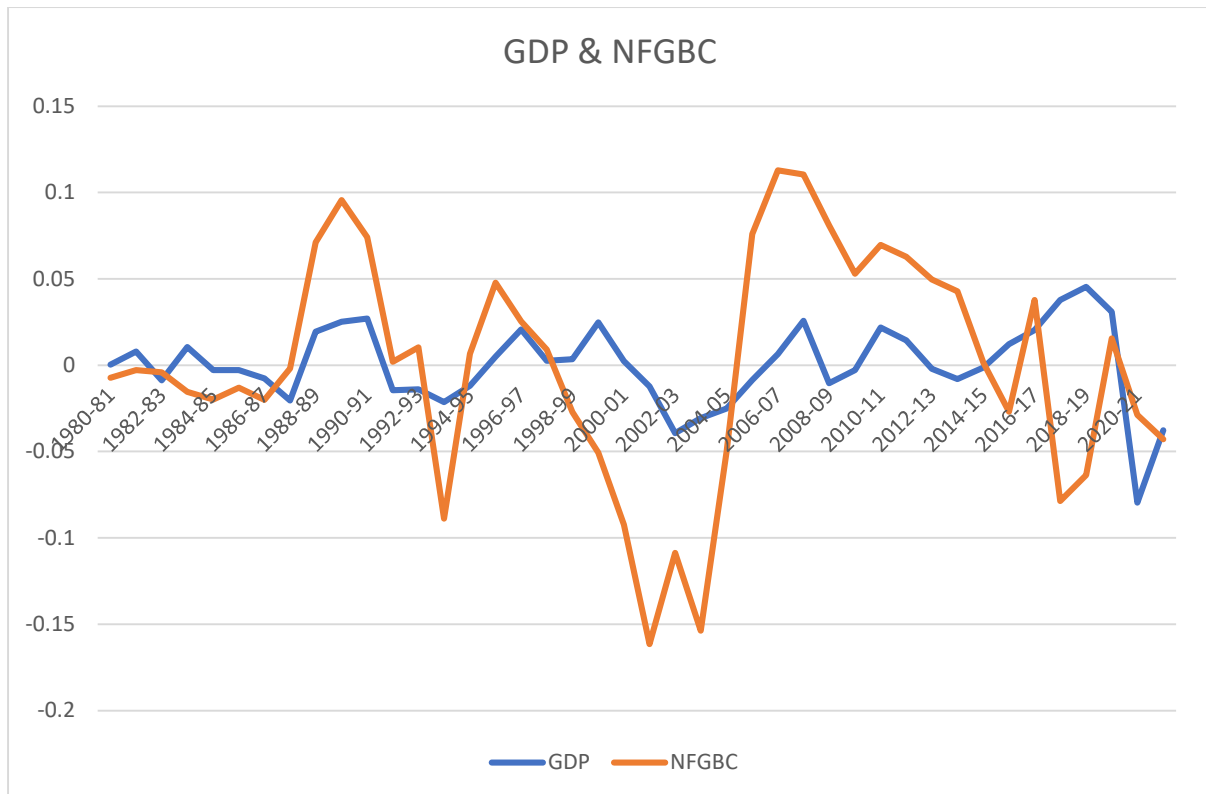


Figure 8.7 Co-movement between GDP & NFGBC cycles

The credit cycles were more pronounced and volatile than those of business cycles, supporting the results of (Behera & Sharma, 2022). NFGBC experienced a sharp downturn in 1994, indicating a period of slow growth. The business cycles showed the same signs and similar changes as the credit cycles, both exhibiting upturns in 1990 and similar downturns. The financial crisis led bank credit to decline to 17.5% from 23% in 2008-09. The recoveries in credit cycles caused an increase in economic growth during the period 2004- 2010, indicating that credit expansions influenced the real economic growth, indicating the interconnectedness between the two variables. The credit growth reached its highest in 2005, with a 20.5% increase in the credit growth rate, followed by a rise in GDP.

Interestingly, during the period of crisis, both the variables declined together, with credit cycles experiencing a sharper decline than business cycles. (Borio C. , 2012), one of the most influential works emphasized the role of credit and asset prices in economic fluctuations. He highlights how financial booms, particularly those driven by credit, often lead to economic expansions. Therefore, credit cycles precede economic growth in India.

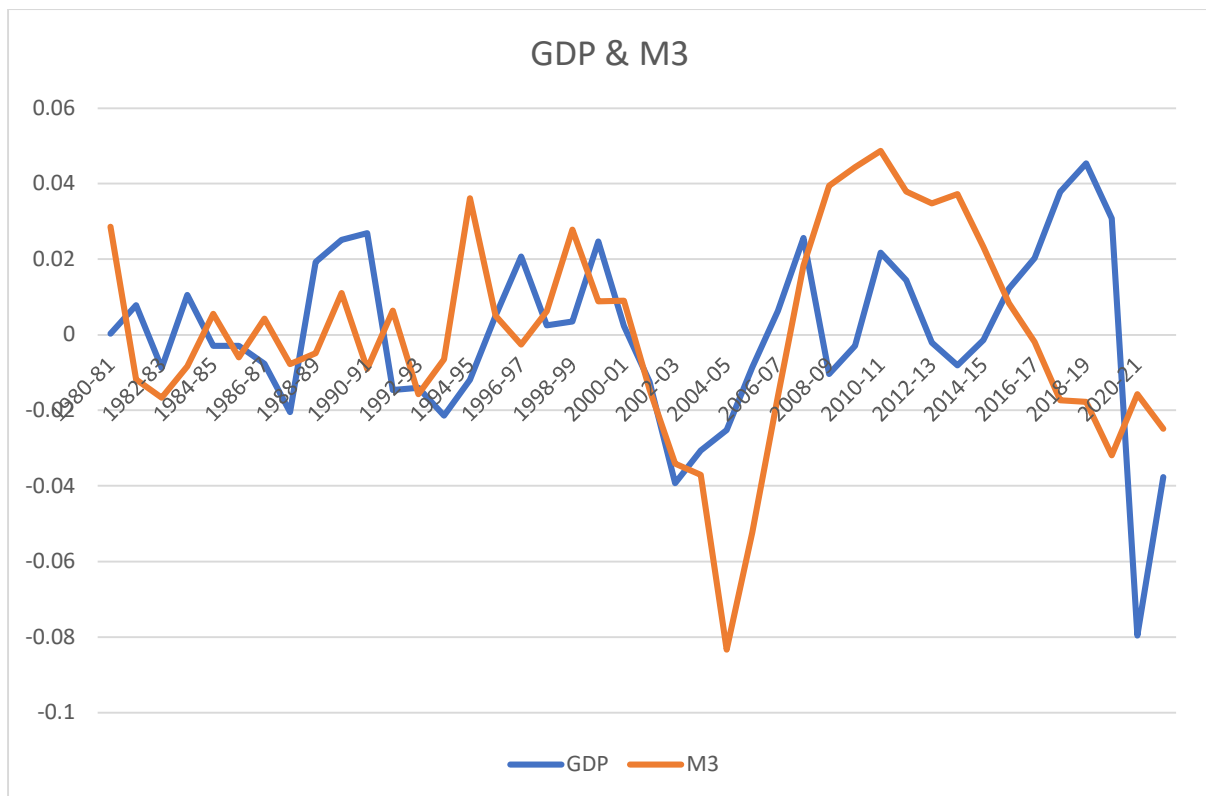


Figure 8.8 Co-movement between GDP & M3 cycles

The cyclical interactions displayed in Figure 8.8 present the relationship between money supply and output. In 1980, GDP increased while money cycles experienced a sharp downturn. Both cycles moved in a similar direction, indicating a strong relationship between the money market and real output; however, the fluctuations in the money market were pronounced.

A lead-lag relationship was observed. Before reforms in 1991, the GDP led changes in money supply; the relationship was reversed, and monetary expansion then started preceding economic growth. Moreover, both cycles were synchronized during the period of disruption; these variables act as procyclical (Saini, Ahmad, & Bekiros, 2021). The impact of the global financial crisis was more noticeable on GDP than on the money supply.

Additionally, a significant shift occurred due to demonetization, leading to a sudden decline in M3, which was followed by a decline in GDP attributed to the COVID outbreak, followed by a rise, while M3 continued to decline. Despite these differences, money supply remained an important indicator of growth, as reflected in the interconnectedness shown in the graph, as confirmed by (Goyal & Kumar, 2018).

Similarly, (Banerjee, Basu, & Ghate, 2020) found a positive and persistent influence of monetary shocks on output rather than the interest rate shocks. (Ghate, Pandey and Patnaik 2012) suggested that developed economies use counter-cyclical monetary policy, while developing countries, such as India, employ pro-cyclical policies, which amplify business cycles.

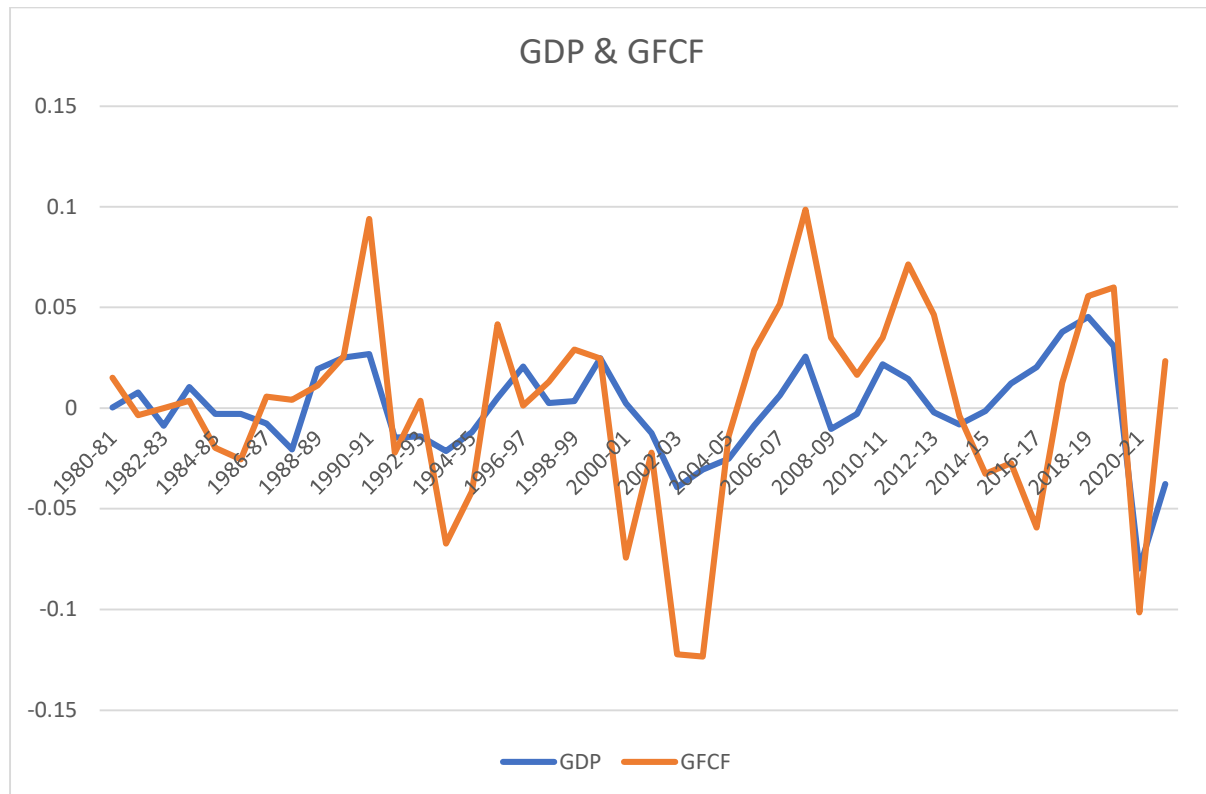


Figure 8.9 Co-movement between GDP & GFCF cycles

The cyclical co-movement showed a strong parallel movement between the business and investment cycles, reflected in Figure 8.9. During the period of upturns in investment cycles, business cycles were also rising, indicating a high interdependence. However, during periods of downturn like the 2008 crisis, investment cycles exhibited sharper contractions than those of business cycles, reflecting their procyclical nature. Also, the upturns were more pronounced than those of business cycles, reflecting its sensitivity to credit, interest rates and external shocks. According to the economic survey 2008-09, the growth in GFCF declined to 8.2% in 2008 from 12.9% in 2007. Moreover, both variables experienced continuous co-movements and a similar decline during the COVID-19 outbreak, followed by an upturn.

8.4.3 Cross-Correlation Results (Lead and Lag Relationship)

The lead-lag relationship was analyzed to capture the cross-correlation among the cyclical variables.

GDP and credit (NFGBC)

The lag column indicates that NFGBC leads GDP, where past values of NFGBC explain the current value of GDP, as shown in Table 8.7. Lead, on the other hand, indicates that GDP leads NFGBC. The results revealed at lag 0 that both variables moved in the same direction, suggesting a contemporaneous relationship between credit and GDP.

Table 8.7 Lead-Lag Relationship between GDP and NFGBC

GDP, NFGBC (-i)		GDP, NFGBC (+i)	
i	lag	i	lead
0	0.3490	0	0.3490
1	0.2996*	1	0.1585
2	0.2851	2	-0.1575
3	0.2299	3	-0.3511
4	0.0699	4	-0.3533

Note: Lead-lag correlations were computed up to 10 lags. Only the first few meaningful coefficients were shown.

* Denotes the peak coefficients

The lag values showed that NFGBC led GDP by approximately 1 to 3 years, with a highest coefficient of 0.2996 at lag 1. At lag 2 (0.2851) and 3 (0.2299), NFGBC continued to lead GDP, with the high positive coefficients. This suggests how financial dynamics or shifts predict economic activity. However, the lead column showed a significant contemporaneous relationship; after that, it declined and turned negative at lags 3 and 4. These findings suggest that credit drives economic growth, aligning with (Chauvet, 2001) view that financial cycles

play a significant role in driving fluctuations in economic output, especially during periods of economic instability.

GDP and broad money supply (M3)

The lag and lead columns in Table 8.8 show that M3 led GDP by about 1 year, with the highest coefficient at lag 1 (0.2726). This suggests that liquidity impacts economic growth after a short delay. Beyond this, no strong or significant relationship was observed between them. While GDP also led M3 by 1 year, indicating predictive power, the relationship remained positive, however weak, afterwards and even turned negative, showing that there were no strong cyclical co-movements between them after one year.

Table 8.8 Lead-Lag Relationship between GDP and M3

GDP, M3 (-i)		GDP, M3 (+i)	
i	lag	i	lead
0	0.2445	0	0.2445
1	0.2726*	1	0.2702
2	0.1595	2	0.1181
3	0.1058	3	0.0300
4	0.1042	4	-0.0822

Note: Lead-lag correlations were computed up to 10 lags. Only the first few meaningful coefficients were shown.

* Denotes the peak coefficients

GDP and gross fixed capital formation (GFCF)

A strong contemporaneous relationship was observed between GDP and GFCF, as shown in Table 8.9, indicating the immediate influence of GFCF movements on GDP. The lag column revealed that GFCF lead GDP by almost 1 year with a coefficient of 0.2107, after which the relationship became negative.

Table 8.9 Lead-Lag Relationship between GDP and GFCF

GDP, GFCF (-i)		GDP, GFCF (+i)	
i	lag	i	lead
0	0.6638	0	0.6638
1	0.2107	1	0.2940*
2	-0.0864	2	0.0085
3	-0.1449	3	-0.3237
4	-0.0035	4	-0.3706

Note: Lead-lag correlations were computed up to 10 lags. Only the first few meaningful coefficients were shown.

* Denotes the peak coefficients

The lead column showed that a peak coefficient was observed at lag 1 (0.2940); when GDP moved, the GFCF followed the same direction, suggesting GDP led GFCF by 1 year. Notably, after lag 1, an inverse relationship between them was observed, with the highest coefficient at lag 4 (-0.3706).

8.4.4 Structural Vector Autoregression (SVAR)

While correlation and lead-lag relationships provide insights into the co-movement between variables, they do not reveal the structural transmissions. Therefore, Structural Vector Autoregression, commonly known as SVAR, was used to investigate the structural dynamics among business cycles (GDP), credit cycles (NFGBC), and investment cycles (GFCF).

The SVAR model enables the identification of both contemporaneous and lagged relationships by imposing restrictions based on economic reasoning. The model assumes that bank credit responds to its own shocks, while investment responds to its own and credit shocks. Furthermore, GDP responds to shocks from both credit and investment.

Optimal Lag Length Criterion

Five criteria were used to determine the optimal lag length for the model: AIC, FPE, HQ, LR, and SC. Most of these criteria indicated 2 lags as the optimal lag length, as shown in Table 8.10.

Table 8.10 Lag length Criteria

Endogenous variables: NFGBC, GFCF and GDP

Exogenous variable—C

LAG	Log L	LR	FPE	AIC	SC	HQ
0	224.31	NA	2.36e-09	-11.349	-11.221	-11.303
1	245.304	37.675	1.28e-09	-11.964	-11.452*	-11.780*
2	256.591	18.521*	1.15e-09*	-12.081*	-11.185	-11.760
3	265.755	13.629	1.17e-09	-12.090*	-10.810	-11.630

* Indicates the lag order selected by the criterion.

Therefore, the 2-lag SVAR model was selected to capture the dynamics and relationship among the variables.

Short-run SVAR estimates

To capture the contemporaneous relationships among credit, investment, and GDP cycles, a short-run recursive model was estimated.

Estimated S-Matrix

Model: $e = Su$ where $E[uu'] = 1$

Structural VAR is just identified

$$S \begin{bmatrix} \text{variables} \\ NFGBC \\ GFCF \\ GDP \end{bmatrix} \left\{ \begin{array}{ccc} \varepsilon^{NFGBC_t} & \varepsilon^{GFCF_t} & \varepsilon^{GDP_t} \\ 0.0449 *** & 0 & 0 \\ 0.0233 *** & 0.0357 *** & 0 \\ 0.0051 * & 0.0105 *** & 0.0159 *** \end{array} \right\}$$

NFGBC was assumed to be only affected by itself, and was not affected by the shock from the other variables in the model. The shocks to NFGBC positively and significantly influenced investments, indicating that credit is a key driver of investments in India. Additionally,

investments positively and substantially responded to its shocks. Similarly, GDP positively responded to credit and investment shocks. Moreover, it also responded to its own shocks.

Long-run SVAR estimates

Model: $e = \Phi \cdot F_u$ where $E[uu'] = 1$

Structural VAR is just identified

$$F \begin{bmatrix} \text{variables} \\ NFGBC \\ GFCF \\ GDP \end{bmatrix} \begin{pmatrix} \varepsilon^{NFGBC_t} & \varepsilon^{GFCF_t} & \varepsilon^{GDP_t} \\ 0.1351 *** & 0 & 0 \\ 0.0753 *** & 0.0260 *** & 0 \\ 0.0080 ** & 0.0125 *** & 0.0135 *** \end{pmatrix}$$

The long-run SVAR results revealed that shocks to NFGBC had a positive influence on themselves, with a coefficient of 0.1351 and statistical significance at the 1% level. The credit shocks had a pronounced influence on investments and GDP, indicating that credit expansions lead to capital formation and output growth. While GFCF and GDP were positively influenced by their own structural shocks. GFCF retained a long-run effect on GDP, confirming investment-led growth.

Long-run Impulse Response Function

Structural IRF traces the dynamic response of one variable to a one-unit innovation in other variables. Figure 8.10 reveals that NFGBC resulted in an immediate positive impact from its own shocks in the short-run. Notably, investment shocks had a limited impact on credit. Similarly, GDP shocks had a small positive influence, which declined gradually, confirming that credit fluctuations are primarily self-driven and have a small and lagged influence on the investment and output shocks.

Similarly, GFCF initially positively responded to its own shocks, indicating investments are highly self-regulating. Investments positively reacted to credit shocks in the short-run, but the effect diminished as the horizon expanded. While GDP shocks had a very small impact on investments. This implies that investment is influenced by credit shocks in the short-run and is also self-driven.

Additionally, the impulse response of GDP exhibited a sudden influence of its own shocks and a decline afterwards. GDP declined due to investment shocks in the short-run, suggesting that

GDP was sensitive to investment shocks. Moreover, credit shocks had a small but positive influence on GDP, suggesting a delayed impact on output.

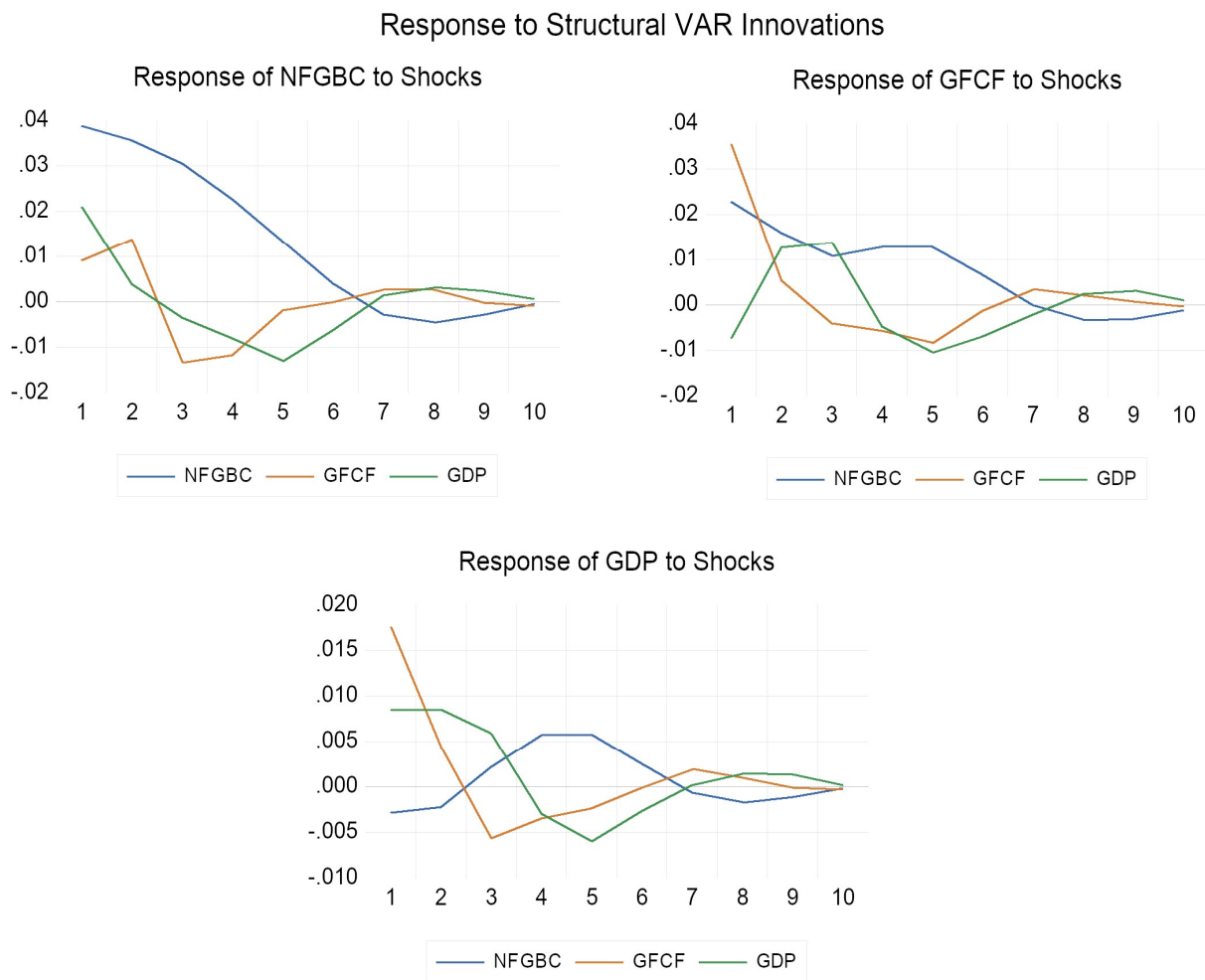


Figure 8.10 SVAR Impulse Response Function

Long-run Variance Decomposition

The SVAR variance decomposition presented in Figure 8.11 illustrates the importance of an innovation or a shock in determining variations in the variables. NFGBC played a prominent role in explaining its forecast error, accounting for 74% in the first period, 4% by GFCF, and 21% by GDP shocks. Although cyclical movements in credit were primarily self-driven, their share declined marginally. GDP and GFCF together accounted for the remaining proportion of nearly 10% and 13% respectively.

Investment variance was dominated by its own shocks, accounting for 68% in the initial period; however, it declined to 42% in the long-run. In contrast, credit share increased from 28% to

38%, highlighting investment cycles' sensitivity to fluctuations in credit. This finding implies that credit fuels investments and indirectly drives output growth.

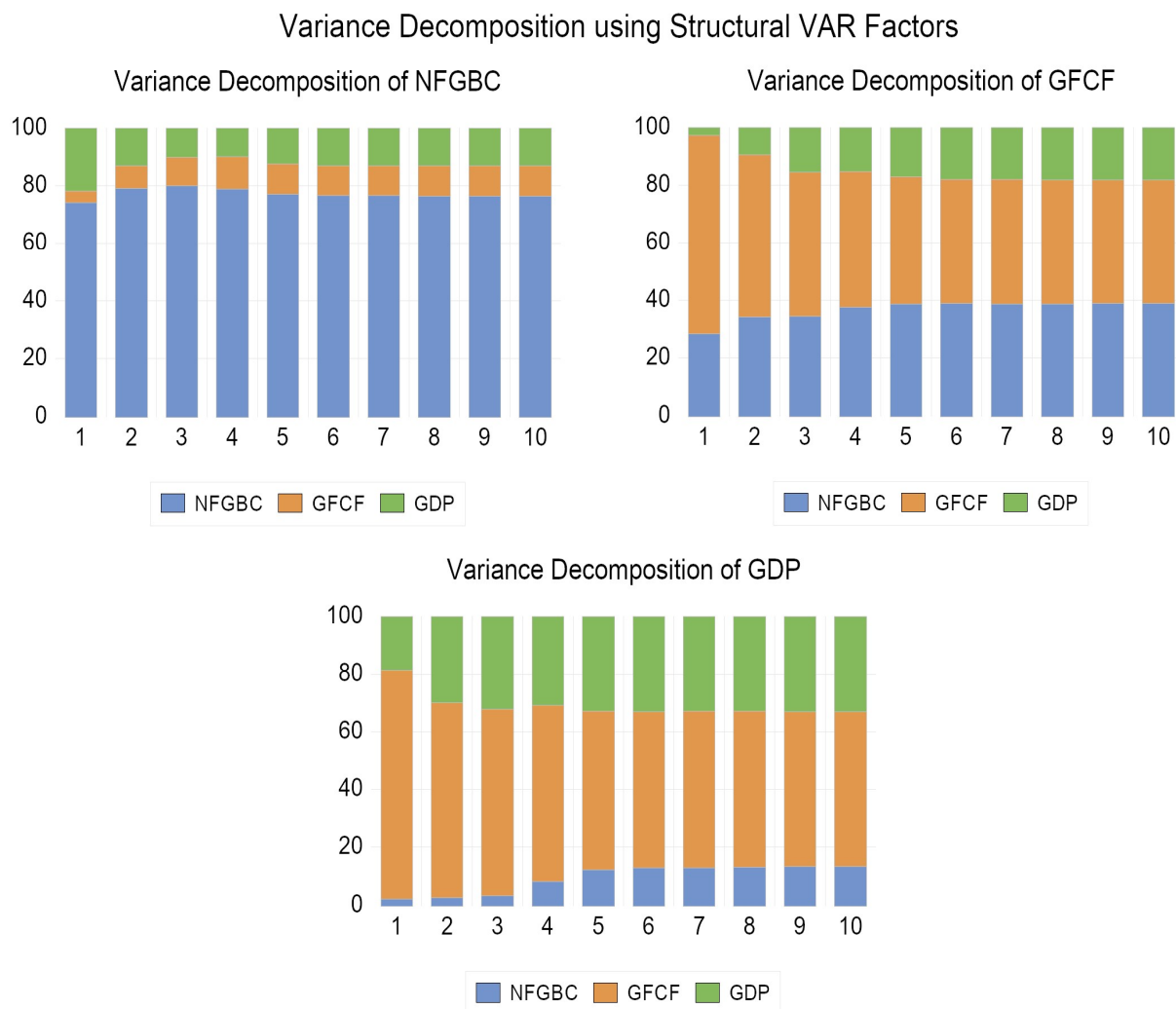


Figure 8.11 SVAR Variance Decomposition

Lastly, the variance decomposition of GDP showed that investments had a major explanatory power of 79% in the first period. GDP was primarily driven by investments over the years, but its share declined to 53%. The role of credit gradually increased from 2% to 13% over the long run, while GDP explained 18% to 32% of its own variations. This indicates that GDP fluctuations in India are largely influenced by investment volatility.

8.5 Conclusion

This study examined the cyclical components of various financial and macroeconomic indicators. Using annual data from 1980 to 2021, the Hodrick-Prescott filter was applied to

identify cycles. The financial market indicators, NFGBC, credit-to-GDP ratio, and construction GDP (house prices proxy), showed more pronounced cyclical fluctuations. The findings revealed that GDP had 9 peaks and 9 troughs, with the longest cycle lasting from 2010 to 2018, totaling 8 years. Similarly, NFGBC demonstrated 8 peaks and 8 troughs, with the longest cycle spanning from 2006 to 2016, lasting 10 years. The construction GDP displayed 7 peaks and 9 troughs, with the longest cycles of 17 years from 1990 to 2007. The credit-to-GDP ratio showed 7 peaks and 7 troughs, with the longest cycles from 2006 to 2016, lasting 10 years. Additionally, M3 exhibited 9 peaks and 8 troughs, with the longest cycles of 12 years from 1998 to 2010. Lastly, GFCF experienced 10 peaks and 11 troughs, with cycles lasting a total of 12 years from 1998 to 2010.

The findings indicate that both business and credit cycles closely followed each other. The correlation analysis also confirmed a positive and significant relationship between the variables. The credit market and GDP showed more frequent cyclical fluctuations, closely following each other with similar peaks and troughs. Moreover, the lead-lag relationship indicated that NFGBC leads GDP by approximately 1 to 3 years, with the highest coefficient at lag 1. However, the M3 and GDP cycles appeared to be procyclical, moving in the same direction during the 2008 crisis and the COVID-19 pandemic. Additionally, the lead-lag relationship demonstrated that M3 leads GDP by 1 year, with a bidirectional relationship where GDP also leads M3 by 1 year. A positive relationship was observed between GFCF and GDP, supported by regression statistics and correlation. This was further confirmed by the strong co-movements observed between them. These synchronizations indicate that fluctuations in financial markets and macroeconomic variables exhibit procyclical behavior, influencing economic growth.

The SVAR analysis revealed a strong link among the credit, investments and business cycle dynamics of the Indian economy. The impulse response function indicated that credit was the most influential mechanism linking capital formation and economic growth. The variance decomposition further validated that investment cycles were heavily driven by the credit shocks, while GDP cycles were influenced by investment up to 80%. Collectively, these findings indicate that credit fuels investments, which further amplify economic growth. Overall, these findings confirm that financial cycles are longer than business cycles, and the close interlinkage among financial and business dynamics highlights the central role of financial development in shaping economic growth.

Chapter IX

CONCLUSION

Based on the findings of the objectives, this chapter offers final remarks, summarizing the results and highlighting policy implications. It also discusses research gaps and future opportunities. The study has explored the multidimensional relationship between various indicators of financial development and economic growth in India from 1980 to 2021. Data were collected from sources such as the RBI database, MoSPI, and IMF.

This chapter is structured as follows: Section 9.1 outlines the main findings of the study, objective by objective. Section 9.2 reviews the objectives, explaining how they were achieved through the acceptance or rejection of hypotheses. Section 9.3 examines the theoretical and practical implications of the study, along with recommendations for policymakers to enhance economic growth using financial development indicators. Finally, Section 9.4 discusses the research limitations and potential areas for further exploration.

9.1 Major findings of the study

Based on **Objective 1 (O1)**, the following are the findings on the relationship between banking credit, agriculture credit and economic growth at the national and subnational levels.

National level analysis (1980-2021)

- (a) **Short-run ARDL results** indicated that GDP was influenced by its lagged variables, while NFGBC and lending rate were statistically insignificant. While agriculture credit was significant, at 10% implying a weak relationship.
- (b) **The long-run relationship** confirmed the significance of NFGBC in influencing GDP, while agricultural credit and lending rate remained insignificant. Moreover, the bound test also confirmed the presence of a long-run relationship, the f-statistic being significant at 5% level.
- (c) **ECM** suggested a 25% disequilibrium corrected in the annual year, moving towards the long-run equilibrium.
- (d) **Residual diagnostic tests** revealed that no autocorrelation was detected; however, there was a problem of heteroskedasticity, hence, White-Huber standard errors were used. The data were normally distributed, and the model was correctly specified. The

CUSUM test also confirmed the stability of the model. However, CUSUMQ showed some deviations reflecting structural breaks.

State-level analysis (2000-2021)

- (a) **Credit and GDP growth rates** indicated that these variables in all the regions move together, particularly during the period of shocks and crises.
- (b) **Dumitrescu-Hurlin panel causality test** revealed a bidirectional relationship between banking credit and GDP at the 1% level. Moreover, a unidirectional relationship was observed from GDP to lending rates. Lastly, banking credit caused the lending rate at the 1% significance level.
- (c) **The Panel ARDL test** exhibited that lending rates had no significant short-run impact on GDP, while banking credit negatively influenced state GDP. Additionally, the long-run test confirmed the positive relationship between banking credit and GDP, significant at the 1% level.
- (d) **ECM** suggested that any disequilibrium was corrected at the speed of 25%, significant at 1% level, confirming the long-run relationship between the variables.
- (e) **Residual diagnostic test** revealed that residuals were not normally distributed according to the Jarque-Bera test.

To meet **Objective 2 (O2)**, ARDL was employed to understand the dynamics between broad money supply and economic growth. Dummy variables were introduced due to instability captured in CUSUMQ associated with two major shocks: the 2008 financial crisis and COVID-19.

Aggregate period analysis (1980-2021)

- (a) **Short-run ARDL results** indicated that GDP was influenced by its lagged variables. While M3 was negative and insignificant, its lagged value was positive and significant at 10% implying a weak short-run influence on GDP. CPI had a negative and significant impact on GDP. However, interest rates did not show a significant impact on GDP.
- (b) **The long-run relationship** confirmed the important role of M3 in influencing GDP, with a high positive and statistically significant coefficient at the 1% level. Moreover, CPI had a strong negative and significant influence on GDP, while the interest rate remained negative but insignificant. Furthermore, a long-run relationship at the 5% level was confirmed by the Bound test f-statistic of 4.717, significant at the 5% level.

- (c) **ECM** indicated a speed of 19% at which deviations were corrected annually, confirming a long-run relationship among the variables.
- (d) **Residual diagnostic tests** revealed that no problem of autocorrelation and heteroskedasticity was detected in the model. Although the data were not normally distributed, the model was correctly specified. The CUSUM test confirmed the model's stability, while the CUSUMQ suggested some instability in the variance.

Short-run analysis during the crisis period (1980-2021)

- (a) **Short-run ARDL** confirmed a consistent relationship between M3 and GDP even during the periods of economic shocks. Moreover, the GDP lag term had a significant positive influence on the current GDP. While CPI remained negative and significant, interest rates remained insignificant. The dummy variable for the 2008 financial crisis had a significantly negative impact on GDP. Moreover, the dummy variable for COVID-19 had a more pronounced negative effect on GDP.
- (b) **ECM** indicated the slow speed of adjustment during the period of crisis, with 7.1% disequilibrium corrected during each period.

Furthermore, to achieve **Objective 3 (O3)**, a structural and cyclical analysis was performed to examine the complex dynamics between the stock market and economic growth at a high frequency, using monthly data from April 1996 to December 2021.

Linear analysis (April 1996 to December 2021)

- (a) **Short-run ARDL results** revealed that IIP was primarily influenced by its own lagged value until the third lag. Moreover, the total market capitalization was positive and statistically significant at the 1% level. While the contemporaneous impact of crude oil was insignificant, the lagged one showed a negative and significant impact. Moreover, the third lag became positive and significant at the 5% level. D1 for the dot com bubble busts and D2 for the global financial crisis remained insignificant; however, COVID-19 D3 showed a major contraction.
- (b) **The long-run relationship** confirmed the strong positive influence of the stock market on influencing IIP, with the coefficient statistically significant at the 1% level, while crude oil, D1, and D2 remained insignificant. The D3 had the most negative and significant long-run effect on IIP. Lastly, the bound test with a coefficient of 4.88 being statistically significant at the 5% level, confirmed the presence of a long-run relationship among the variables.

- (c) **ECM** indicated a 17.5% disequilibrium among the variables corrected annually, achieving the long-run equilibrium.
- (d) **Residual diagnostic tests** revealed that the model was free from the problem of autocorrelation and heteroskedasticity. The data were normally distributed, and the model was correctly specified. The CUSUM test and CUSUMQ also confirmed the stability of the model, adjusted for the structural shocks.

Non-linear threshold analysis (April 1996 to December 2021)

- (a) **The threshold analysis** revealed six regimes where the relationship between the stock market and IIP performed differently depending on the market size. A positive and highly significant relationship between the stock market and IIP at low and moderate levels of market capitalization. However, at a very high level, the effect became negative and statistically insignificant.

Lastly, to examine **Objective 4 (O4)**, if the financial cycles exist in India, the Hodrick-Prescott filter was carried out to extract the cyclical components from the different indicators of financial cycles and macroeconomic variables using annual data from 1980 to 2021.

Annual cyclical analysis (1980 to 2021)

- (a) **Characteristics of variables** NFGBC experienced 8 peaks and 8 troughs, with the longest cycle lasting 10 years. Similarly, construction GDP exhibited 7 peaks and 9 troughs, and the longest cycles lasted for 17 years. Credit-to-GDP experienced 7 peaks and 7 troughs, and the longest cycle lasted for 10 years. While M3's longest cycles spanned 12 years, the GFCF cycle lasted 7 years. Finally, GDP displayed 9 peaks and 9 troughs, and the longest cycle lasted 8 years with an average length of 4.63 years.
- (b) **Synchronization of variables** NFGBC and GDP cycles shared a co-movement, particularly during the period of crisis and financial stress. Similarly, M3 and GDP cycles displayed a strong interconnectedness. Lastly, GDP and GFCF cycles exhibited a strong correlation, suggesting that investments are a key driver of economic fluctuations.
- (c) **Lead-lag relationship** Credit cycles lead GDP cycles by 1-3 years, with the strongest lead at 1. While M3 and GDP cycles exhibited a bidirectional relationship, with each leading the other by approximately 1 year. However, GDP cycles lead GFCF cycles by 1 year.

Structural analysis (1980 to 2021)

- (a) **Long-run SVAR analysis** revealed a clear structural dynamics among the variables. Shocks to NFGBC strongly influenced investment, and investment shocks emerged as the primary driver of GDP fluctuations.
- (b) **The impulse response function** indicated that credit acts as a leading indicator and investment as a transmission channel.
- (c) **The variance decomposition** demonstrated that credit and investment play a crucial role in shaping macroeconomic fluctuations in India.

9.2 Revisiting the objectives

This section revisits the objectives and the findings of the study and examines whether they have been achieved, followed by the hypothesis testing. The study aimed to investigate the relationship between various indicators of financial development and economic growth during the period from 1980 to 2021.

Objective 1: To examine the relationship between the banking system credit and the real gross domestic product of India.

The first objective was to determine the relationship between banking credit and economic growth in India. To achieve this, the study utilized both the national level (1980-2021) and state level data (2001-2021) using the ARDL and Panel ARDL test. The findings suggest a linear relationship between bank credit and GDP at the aggregate and across all the states, implying that bank credit can be used as a catalyst for economic growth. The ARDL findings indicated that while the short-run relationship showed mixed evidence, it suggests that NFGBC influences GDP with a lag. Furthermore, agricultural credit affected GDP in the short run; no long-term relationship was observed. Similarly, the lending rate had no significant influence on GDP. The ECM and bound test also confirmed the long-run relationship between NFGBC and GDP. The robustness of the model was also confirmed by the residuals testing.

The state GDP growth and credit growth rate demonstrated that bank credit influenced GDP, particularly during the period of structural breaks across the regions. The Pedroni cointegration test provided strong evidence of the long-run relationship between bank credit by SCBs and GDP across 32 states. The long-run estimates also confirmed the presence of a positive and significant influence of bank credit on GDP. Interestingly, the lending rate had a positive impact

on state GDP. The ECM and bound test confirmed the existence of a long-run cointegrating relationship. Moreover, a bidirectional relationship between bank credit and GDP was observed. Residual testing indicated that the residuals were slightly skewed and not normally distributed. Therefore, the credit growth rate not only influences GDP but also acts as a stabilizer during a period of uncertainty.

Table 9.1 Hypotheses testing for Objective 1 of the study

Hypothesis	Findings	Result
There is no significant long-run relationship between non-food gross bank credit and GDP.	There was a positive and significant long-run relationship between NFGBC and GDP.	Rejected
Agricultural credit has no significant long-run impact on the GDP.	No relationship was found between agricultural credit and GDP.	Accepted
There is no significant relationship between lending rates and GDP.	Lending rate and GDP shared no relationship in both the short run and the long run.	Accepted
There is no co-movement between bank credit growth and GDP growth at the state level.	A similar movement was observed between the variables during the period of crisis.	Rejected
There is no significant long-run relationship between bank credit and GDP across Indian states.	There was a positive and significant long-run relationship between banking credit and states' GDP.	Rejected
Bank credit does not cause GDP in Indian states.	Bank credit Granger caused GDP at the 1% significance level.	Rejected

Objective 2: To determine the relationship between broad money supply (M3) and economic growth (GDP).

The second objective was to examine the relationship between M3 and GDP. The ARDL findings revealed that GDP lag had a positive and significant influence on GDP in the short-run. While M3 influenced GDP with a lag. CPI was found to be negatively affecting GDP in both the short-run and long-run. Interest rates remained insignificant across the sample.

However, the long-run estimates revealed a significant and high positive impact of M3 on GDP. The model was free from the problem of autocorrelation and heteroskedasticity; however, the residuals were not normally distributed. CUSUMQ showed the instability during the crisis period; to account for the effects of these shocks, dummies for 2008 and 2020 were introduced. The global financial crisis of 2008 and COVID-19 had a significant negative impact on the GDP. Moreover, the GDP-M3 nexus was positive and significant, while CPI negatively affected GDP, and the interest rate remained insignificant. Thereby, a sustained growth in M3 can serve as a fundamental driver of economic growth, highlighting its importance in sustainable economic growth.

Table 9.2 Hypotheses testing for Objective 2 of the study

Hypothesis	Findings	Result
There is no long-run relationship between M3 and GDP.	A positive and significant long-run relationship was found between them.	Rejected
The impact of M3 on GDP growth is not linear during the period of economic shocks and crises.	The impact of M3 remained significant even during the period of crisis and structural shocks.	Rejected
Inflation (CPI) has no significant effects on GDP.	CPI negatively influenced GDP in both short-run and long-run.	Rejected
Inflation (CPI) has no significant effects on GDP during structural instability.	CPI remained negative and significant during the period of shocks.	Rejected
Interest rates do not have a more direct impact on GDP across the sample.	No significant relationship was observed between them.	Accepted
The financial crisis of 2008 and has no short-run significant effects on GDP.	A negative and significant impact was observed on GDP.	Rejected
The COVID-19 pandemic has no short-run impact on GDP.	A negative and highly significant impact was observed of pandemic on GDP.	Rejected

Objective 3: To examine the relationship between the combined market capitalization of NSE and BSE and India's economic growth.

The third objective was to determine the impact of stock market indicators on economic growth. Monthly data were utilized from April 1996 to December 2021. The total market capitalization was computed by simply summing the BSE and NSE market capitalization. Dummy variables for the major events were introduced to capture the effects of economic disruptions. The short-run estimates using 3 lags revealed that lagged IIPs (proxied for GDP) had a positive influence on themselves.

Table 9.3 Hypotheses testing for Objective 3 of the study

Hypothesis	Findings	Result
There is no significant long-run relationship between combined stock market capitalization and industrial activity.	A positive and significant long-run relationship was observed between the stock market and IIP.	Rejected
Crude oil has no significant impact on Indias industrial activity.	No significant relationship was found between them.	Accepted
COVID-19 has no significant impact on the industrial activity.	A negative and large impact of COVID-19 on IIP was observed.	Rejected
There does not exist a nonlinear relationship between market capitalization and economic activity.	The threshold regression clearly showed regime-specific relationship between the stock market and IIP.	Rejected

Similarly, the stock market showed a highly positive and significant impact on IIP, indicating that the stock market leads industrial activity. While crude oil had mixed effects, D1(2001) and D2(2008) remained insignificant, and D3 (COVID-19) had a significant negative effect on IIP. The long-term estimates confirmed that the stock market positively influenced IIP, whereas D1, D2, and crude oil remained insignificant, and D3 had a prolonged negative impact. The negative coefficients reflected the extreme fluctuations in the early months caused by the pandemic in industrial activity. No autocorrelation or heteroskedasticity was detected; the model was stable according to both CUSUM and CUSUMQ tests. Additionally, threshold

regression reveals that during the low market capitalization, the relationship was strongest between the variables; however, as the market size expanded, the effect became statistically insignificant.

Objective 4: To examine the existence of financial cycles in India

The final objective was to determine whether financial cycles exist in India and their interaction with business cycles. The study used various financial and macroeconomic indicators to determine their cyclical characteristics with the help of the Hodrick-Prescott filter, using lambda 100. Indicators such as NFGBC, credit-to-GDP, construction GDP, M3, GFCF and GDP were used.

Table 9.4 Hypotheses testing for Objective 4 of the study

Hypothesis	Findings	Result
Financial cycles measured through NFGBC, credit-to-GDP ratio, and construction GDP do not exhibit cyclical components.	All the variables exhibited different cyclical components.	Rejected
The financial cycles do not differ significantly in duration or amplitude from business cycles.	Financial cycles tend to be longer and sharper than the business cycles, reflecting high volatility in financial markets.	Rejected
Credit cycles are not synchronized with business cycles.	Both the variables exhibited co-movement indicating relationship between them.	Rejected
Credit cycles do not lead business cycles.	Credit cycles led business cycles, indicating fluctuation in the credit market precedes economic output.	Rejected
There is no structural relationship among credit, investment and business cycle.	SVAR revealed a strong structural linkages among credit, investment and business cycles.	Rejected

The findings revealed that financial cycles tend to be longer and more pronounced than business cycles (GDP). Specifically, NFGBC and M3 cycles revealed cycles lasting up to 10-

12 years, while construction GDP experienced stronger and more prolonged fluctuations. Moreover, business cycles lasted for 8 years (peak to peak) with an average cycle of 4.63 years.

To examine their synchronization correlation, regression analyses were conducted. The cyclical components of NFGBC and GDP showed a strong interconnection, indicating that a recession in the credit market negatively impacts growth, and expansions can stimulate economic growth. This was further supported by the lead-lag relationship, with credit cycles leading up to 3 years. Similarly, M3 and GDP cycles exhibited a positive relationship, with M3 leading GDP by 1 year. Additionally, GFCF had a very strong impact on GDP, emphasizing its important role in stimulating economic growth. Furthermore, SVAR confirmed that fluctuations in credit and investment significantly influence GDP movements. Overall, financial cycles are present in India and are highly synchronized with business cycles. Productive investment serves as a crucial indicator of economic growth.

9.3 Theoretical implications of the study

The contribution of this thesis to the existing literature on the finance-growth nexus is that it examines all core development indicators, such as banking credit, money supply, and stock market development, and their impact on India's economic growth. In the existing literature, these variables are studied in isolation, overlooking others. Moreover, by combining linear and non-linear approaches, the findings offer several insights into the dynamic interactions between financial development and economic growth. The positive relationship aligns with two fundamental concepts: the Demand-following hypothesis, where economic expansion creates demand for financial services, and the supply-leading hypothesis, where growth of financial institutions stimulates economic growth. The significant positive relationship between banking credit and economic growth supports the supply-leading hypothesis, indicating that financial variables drive economic growth; increased financial services supply stimulates growth, aligning with the monetarist view of financial development as a catalyst for long-term growth. Moreover, a bidirectional relationship between bank credit and GDP indicates a demand-following hypothesis, suggesting that growth creates demand for financial services. This dual relationship indicates that the finance-growth nexus in India is not unidirectional but mutually reinforcing. Despite regional disparities in credit distribution, bank credit and GDP growth rates moved in tandem. This highlights the crucial role of bank credit in stabilizing India's long-term growth.

Second, the consistent positive impact of broad money supply on India's GDP suggests that monetary expansion promotes real economic growth. This supports the view that liquidity expansion stimulates investment and consumption. At the same time negative impact of inflation on economic growth supports the Monetarist view that inflation is a monetary phenomenon, and with the increase in money supply, inflation also rises, while a decrease in money supply leads to deflation. High inflation can erode purchasing power, discouraging investment and economic growth. These findings highlight the importance of balanced monetary transmission.

Furthermore, the significant relationship between the stock market and real economic activity (IIP) provides strong evidence of the stock market as an effective channel for mobilizing long-term capital for investments. This confirms the presence of the supply-leading hypothesis in capital markets, where financial development precedes real economic growth. Furthermore, the findings align with the financial liberalization theory, which suggests that, particularly post-reforms, the role of the capital market has significantly improved the capital flows and long-term financing, complementing banking services. Importantly, threshold regression highlights a non-linear relationship between the stock market and economic growth, depending on the size of markets, expansionary and contractionary phases.

Finally, another important contribution of this study lies in aligning the structural and cyclical finance-growth analysis. The application of the HP filter and synchronization of the cyclical components provides a comprehensive view of the interaction of financial fluctuations with real economic activity across different phases. The findings align with the financial cycle theory and NBER view, confirming that financial cycles are more pronounced and longer than business cycles. Moreover, the analysis demonstrates the nonlinear finance-growth relationship, which varies across the period of expansions and recessions. This highlights the importance of financial development in stimulating growth during the period of crisis and disruption. Together, these theoretical insights provide a better understanding of the transmission of financial development to economic growth.

9.4 Practical implications of the study

Based on the study's findings, several policy implications are suggested for policymakers and the government of India. The results confirm a long-term relationship between financial development and economic growth. Bank credit positively influences India's GDP; despite the

slowdown after 2012, it remained positive. This indicates that policymakers can leverage bank credit as a catalyst for economic growth. Increased credit creates new opportunities, encourages productive investment, and boosts employment, ultimately driving growth. There is a consistent decline in credit growth after 2012, due to a rise in NPAs and the twin balance sheet problem, evident from both the national level and state level analysis. Moreover, regional disparities in credit distribution across states are evident, as seen in the northeastern states. The northeastern states account for a relatively small share of GDP due to insufficient credit availability. This suggests that the government should focus on less developed regions and enhance financial inclusion in a state-specific manner to reduce inequalities.

The Modi government has introduced several credit schemes. Such as the Kisan Credit Card in 2012 for the credit requirements of Kisans, the Pradhan Mantri Jan Dhan Yojana was launched in 2014 to expand access to financial services, and the Micro Units Development and Refinance Agency Banks in 2015 to provide easy credit to MSMEs. In light of empirical evidence, the study reinforced the need to strengthen more and more such initiatives to promote growth for both rural and urban people.

Regarding the money supply, a positive and significant impact on GDP is observed, and this relationship remains steady even during periods of disruption, emphasizing its key role in stimulating economic growth. Policymakers should focus on maintaining liquidity conditions; expansionary monetary policy helps reduce unemployment. The importance of monetary policy has increased, particularly after the post-reform period. Additionally, CPI has a negative and significant impact on GDP, indicating the need to strike a balance between growth and inflation trade-offs. Uncontrolled monetary policy can lead to inflationary pressures in the economy. Furthermore, the negative effects of dummy variables suggest that monetary policy can serve as a countercyclical tool during shocks, complementing fiscal stimulus.

Before the 1990s economic reforms, the development and growth of India were mainly financed through the banking sector. However, after the 1991 reforms, the approach shifted to capital market-based financing, providing long-term finance to not only the government but to the corporate sector as well. The findings reveal that both the short-run and long-run coefficients are positive and significant, indicating an important role of the stock market in influencing industrial activity (IIP). This implies that policymakers can use the stock markets as an early sign of a slowdown in economic growth. Therefore, a domestic investment atmosphere should be created for private investors to increase capital. Therefore, SEBI and

RBI should monitor financial volatility and trends more closely and manage financial activities. In line with (Topcu & Gulal, 2020), particularly during times of crisis, it becomes imperative to intervene promptly and adopt an extensive policy to boost economic output. Digital platform, mobile trading and demat trading across rural areas should be strengthened to capture untapped savings and channelize them into productive investments. Policies such as long-term benefits against equity investment can encourage households to shift their savings into the capital market. Small companies should be encouraged to invest in less advanced sectors to avoid competition and market saturation.

In the light of rising digital financial platforms like UPI, mobile banking, and e-payments has substantially improved the financial payment system of India. These platforms have significantly reduced the transaction costs and improved payment efficiency. These digital platforms can be utilized to improve access to financial services. Hence, policymakers should promote digital infrastructure by expanding broadband and internet penetration. Also, by enhancing financial literacy and strengthening the cybersecurity framework.

Lastly, financial cycles lead business cycles in India, which implies that expansions in credit boost economic growth. RBI should strengthen the counter-cycle credit policies, like during the period of recessions, credit should be extended and tightened during the period of booms to manage fluctuations. Financial cycles are more pronounced than business cycles, highlighting the importance of macro prudential policies in curbing financial crises. An investment climate should be developed for both domestic and foreign investors. The counter capital buffer should be strengthened during periods of recessions, and excess capital should be released to capture the losses. Business cycles exhibit a significant positive correlation with investment cycles. Hence, the government should promote an environment for productive investment and infrastructural development. In conclusion, these findings provide a valuable insight into how financial development promotes India's economic growth. The policymakers should focus on expanding credit, money supply, investments and stabilizing the stock market while maintaining the inflation rate and promoting stability in the financial system, and efficiently allocate savings to promote long-term economic growth.

9.5 Limitations and Future Research Directions

This study has a few limitations, which provide directions for future research in the finance-growth nexus. The study overlooked other indicators of financial development, such as the

bond market, life and non-life insurance premiums, pension funds, and others. These indicators are important aspects of financial deepening, and excluding them may prevent a comprehensive understanding of the relationship. Additionally, the study is limited to India; including other countries would improve understanding of how the finance-growth nexus can be affected by global dynamics. Countries like the USA and China influence India's capital flow and trade. Future research could involve a panel study across emerging economies and advanced economies to compare how strongly financial markets influence real economic output. Moreover, the study relies solely on the ARDL methodology and annual data for most of the analysis, while the stock market uses monthly data. Higher frequency data could better capture short-term fluctuations. Future studies can extend this analysis to advanced time-varying, non-linear econometrics tools, capturing more realistic trends than standard linear models. Additionally, the study can be extended to sectoral analysis to explore how fluctuations in monetary and financial markets affect sectoral activities. Moreover, dummies were based on the most affected months and instability shown in CUSUMQ, rather than using structural break tests that could identify breaks endogenously. By employing the structural break test, studies can strengthen the crisis impacts and identify policy shifts more precisely. This study is based on the HP filter technique, which smooths out the fluctuations, due to which the coefficients appeared to be smaller. For future studies, methods like wavelet analysis and Hamilton can be used for a better understanding of the complex relationship between financial development and economic growth.

9.6 Summary

This thesis provides a comprehensive view of the finance-growth nexus in India by combining indicators like banking credit, money supply and stock market during the period 1980-2021. Based on the findings, it can be concluded that financial development promotes India's GDP, even during the period of disruption and shocks. The time series analysis confirms that credit, money supply and the stock market are the important drivers of economic growth. Furthermore, the identification of financial cycles interaction with business cycles highlights the importance of macroprudential policies.

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