

Foreign Direct Investment, Agricultural Growth and Banking Stability in India: An Empirical Analysis of Credit Risk and Non-Performing Assets

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Banking stability is closely influenced by broader macroeconomic and financial conditions, including investment flows, sectoral growth, borrower repayment capacity, credit risk, and the quality of banks' loan portfolios. This relationship is particularly significant in India, where foreign direct investment (FDI), agricultural performance, credit expansion, and non-performing assets (NPAs) interact within a rapidly evolving financial system. Despite recent improvements in asset quality and capital adequacy, the mechanisms through which macroeconomic conditions influence banking stability require further empirical examination.

This study investigates the relationships among FDI, agricultural growth, credit risk, NPAs, and banking stability in India. It develops an integrated framework in which FDI and agricultural growth serve as macroeconomic antecedents, while credit risk and NPAs operate as financial transmission mechanisms affecting banking stability. The study adopts a hybrid methodological approach combining Partial Least Squares Structural Equation Modelling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA). PLS-SEM examines direct, indirect, and mediating relationships, whereas fsQCA identifies alternative combinations of economic and financial conditions associated with high banking stability.

The analysis uses authenticated secondary data from recognised institutional and financial sources, including the Reserve Bank of India, the Department for Promotion of Industry and Internal Trade, and international macroeconomic databases. The study contributes by integrating macroeconomic and banking-risk factors, distinguishing credit risk from realised asset-quality deterioration, and examining both net effects and alternative causal pathways to banking stability.

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1. Introduction

A country's banking system is often judged by a familiar set of numbers: capital adequacy, profitability, liquidity, and non-performing assets. Those measures matter. A lot. But they don't tell the whole story. Banks are deeply connected to the economy around them. When businesses grow, jobs are created, and investment picks up, borrowers are usually in a better position to repay their loans. When incomes fall or an important sector comes under pressure, the effects eventually reach bank balance sheets. Sometimes gradually. Sometimes much faster than expected. India provides an interesting setting for examining these connections. The country has a large and increasingly complex banking system, attracts substantial foreign investment, and continues to depend heavily on agriculture for employment, rural income, and economic activity. Yet these areas are often studied separately. FDI is usually linked with growth and industrial development. Agricultural performance is examined through productivity or rural development. Banking stability is commonly assessed through financial ratios and asset quality.

This study brings these strands together. It examines whether foreign direct investment and agricultural growth shape banking stability through changes in credit risk and non-performing assets. The basic idea is straightforward: conditions in the wider economy can eventually influence what happens inside banks. Recent developments make this question particularly relevant. India's banking sector has shown a marked improvement in asset quality. According to the Reserve Bank of India, the gross NPA ratio of scheduled commercial banks fell to 2.8% by March 2024, while the net NPA ratio declined to 0.6%. The capital-to-risk-weighted-assets ratio stood at 16.8%, indicating stronger balance sheets and improved resilience (Reserve Bank of India, 2024). Still, stronger numbers don't mean risk has disappeared. Credit continues to expand,

financial institutions are becoming more interconnected, and domestic as well as global shocks remain part of the picture.

1.1 Banking Stability in the Indian Context

Banking stability refers to the ability of banks and the wider financial system to continue performing their essential functions while dealing with internal and external shocks. In practical terms, a stable banking system should be able to mobilise deposits, allocate credit, manage risks, maintain sufficient capital, absorb losses, and continue supporting economic activity even during difficult periods. The importance of this issue has become increasingly visible over the last two decades. The global financial crisis showed how problems within financial institutions could spread rapidly across the wider economy. The COVID-19 pandemic created another major shock, affecting businesses, employment, household incomes, and borrowers' ability to repay debt. More recently, geopolitical tensions, volatile commodity prices, rising interest rates, exchange-rate pressures, climate-related risks, and technological disruptions have added new layers of uncertainty.

India has experienced many of these pressures, although its banking system has strengthened considerably in recent years. RBI reports have described the Indian financial system as robust and resilient, supported by stronger bank balance sheets and improved capital buffers. Scheduled commercial banks have also remained above regulatory capital requirements under the stress scenarios examined by the central bank (Reserve Bank of India, 2024). This changing context matters for research. Earlier studies on Indian banking understandably focused on rising NPAs and deteriorating asset quality. Today, another question deserves equal attention: What helps banks remain stable? Studying instability explains what goes wrong. Studying resilience helps explain what works. The two are related, but they aren't the same research question.

1.2 Foreign Direct Investment and the Financial System

Foreign direct investment is generally considered a relatively stable form of international capital because it is linked with longer-term investment in productive enterprises and assets. For developing economies, FDI can support industrial growth, employment, technology transfer, infrastructure development, export capacity, and integration with international markets.

India has actively encouraged foreign investment across sectors such as manufacturing, services, infrastructure, technology, renewable energy, and other strategic industries. But the connection between FDI and banking is more complicated than simply saying that foreign capital enters the country and economic growth follows. Consider a large multinational company establishing operations in India. It may need bank accounts, payment systems, trade finance, working capital, project funding, cash-management services, and foreign-exchange facilities. Its suppliers may need additional credit. Employees become consumers and borrowers. Supporting businesses expand around the new investment.

The banking sector, in other words, becomes part of the investment ecosystem. Evidence from India also suggests that international capital movements can influence the availability and allocation of domestic credit (Chakraborty & Ghosh, 2023). Yet the effects are not always beneficial. Large capital inflows may create excess liquidity, encourage aggressive lending, inflate asset prices, or increase risk-taking when prudential discipline weakens. That creates an important tension. FDI can strengthen the real economy, but strong economic conditions may also encourage banks to expand credit too rapidly. Recent evidence from Indian commercial banks suggests that moderate credit growth may reduce risk, whereas excessive expansion can damage asset quality and increase non-performing loans (Salva & Singh, 2026). So, the real question isn't simply whether FDI is good for banking stability. It is how the benefits

of investment are transmitted through the credit system. That is where credit risk enters the picture.

1.3 Agricultural Growth as a Financial Stability Factor

Agriculture holds a distinctive place in India's economy. Its share in national output may have changed over time, but its influence on rural employment, household income, food prices, consumption, and related industries remains substantial. It also has a direct connection with the banking system. Indian banks provide credit for crop cultivation, agricultural machinery, irrigation, livestock, dairy, food processing, storage, rural enterprises, and agricultural infrastructure. Because of this extensive credit relationship, changes in agricultural performance can affect the repayment capacity of a large group of borrowers.

A strong agricultural year can improve farm income, strengthen rural demand, and support loan repayment. A poor year can do the opposite. Weather shocks, rising input costs, and commodity-price volatility can quickly place farmers and agricultural enterprises under financial pressure.

Recent economic performance highlights the sector's continuing importance. Agricultural growth accelerated to 4.6% in FY2024–25, compared with 2.7% in the previous year, supported by favourable weather conditions and contributing to stronger rural demand (World Bank, 2025).

The relationship between agriculture and finance is not always straightforward, though. Higher agricultural output doesn't automatically mean higher farmer income, and growth can vary considerably across regions. Poorly managed credit can also create financial vulnerability rather than reduce it. Still, agriculture matters far beyond production statistics. It influences incomes, repayment capacity, rural credit, and ultimately bank asset quality. In that sense, agriculture is also part of India's wider financial-risk environment.

1.4 Credit Risk: The Bridge Between Economic Conditions and Banking Stability

Credit risk is the possibility that a borrower may fail to meet their financial obligations. For banks, it is one of the most fundamental forms of risk. A bank may survive temporary changes in profitability or adjust to movements in interest rates, but persistent deterioration in credit quality directly affects its balance sheet. The process usually begins before a loan becomes officially non-performing. A borrower may experience falling revenue, higher operating costs, weaker cash flows, declining demand, excessive debt, or stress within a particular industry. At that stage, the loan may still appear as a performing asset in the bank's records. The borrower may even continue making payments.

But the underlying risk has already changed. This distinction is important for the present study. Credit risk represents the possibility of future financial deterioration. NPAs, by contrast, represent recognised deterioration in the quality of existing loans. The two are closely connected, but they should not be treated as identical. The study therefore views credit risk as a bridge between wider economic conditions and realised asset impairment. Favourable macroeconomic conditions may improve borrower capacity and reduce credit risk. Adverse conditions may weaken repayment ability and eventually increase NPAs. Recent evidence from India supports this logic. Salva and Singh (2026) found that credit growth can become risk-enhancing when it exceeds certain thresholds, particularly during periods of heightened policy uncertainty. The message is simple: more credit does not automatically mean a stronger banking system. The quality of credit matters just as much as its quantity.

1.5 Non-Performing Assets and the Stability of Banks

Non-performing assets remain one of the clearest signs of stress in a banking system. When borrowers stop meeting repayment obligations, banks face a series of financial consequences. Interest income declines. Provisioning requirements rise. Profitability

comes under pressure. Capital can weaken, and the capacity to extend new loans may shrink. The effects don't necessarily stop there. Higher NPAs can make banks more cautious about lending, making it harder for businesses and households to access credit. Reduced lending can then slow economic activity, which may create further financial stress. A feedback loop develops. India's banking experience shows both the seriousness of this problem and the possibility of recovery. The banking sector previously experienced substantial growth in stressed assets, followed by a significant decline in recent years. Research covering Indian banks between 2004 and 2024 suggests that the post-pandemic improvement in NPAs should be understood partly as the outcome of longer-term structural reforms rather than a temporary effect of pandemic-era measures alone (Asian Journal of Economics and Banking, 2026). By March 2024, the RBI reported that the gross NPA ratio had declined to 2.8% and the net NPA ratio to 0.6%. These improvements indicate stronger asset quality.

But they also raise another question: how can this progress be maintained during continued credit expansion? The present study looks beyond NPAs as an isolated problem and examines the broader economic and financial conditions that may help preserve banking stability.

1.6 Problem Statement

India's banking sector is in a stronger position today than it was during earlier periods of severe asset-quality stress. Capital adequacy has improved, NPAs have declined, and bank balance sheets have become more resilient. At the same time, the wider economy continues to change. Investment patterns are shifting, credit is expanding, rural demand is evolving, and external financial conditions remain uncertain. These developments bring opportunities. They also bring risk. FDI can stimulate production, employment, and economic activity, potentially improving borrower capacity and increasing demand for financial services. Agricultural growth can raise rural income and strengthen

the repayment capacity of borrowers connected with farming and related activities. Yet economic expansion doesn't automatically produce banking stability. During favourable periods, banks may increase lending aggressively or relax underwriting standards. Sector-specific stress can later lead to repayment difficulties, defaults, and rising NPAs. The problem is that these relationships are often studied separately. Research has examined FDI and growth, agriculture and rural development, NPAs and bank performance, credit risk and profitability, and banking stability and macroeconomic conditions. What remains comparatively underexplored is an integrated framework connecting these factors.

2. Review of Literature and Theoretical Foundation

2.1 Foreign Direct Investment and Banking Stability

Foreign direct investment is usually associated with long-term productive activity. It brings capital, technology, employment opportunities, industrial expansion, and, in many cases, access to global markets. In emerging economies such as India, however, its influence may extend well beyond GDP growth. It can also affect the financial system. That connection is easy to miss. When foreign companies enter a domestic economy, they don't operate separately from the banking sector. They open accounts, use payment systems, access trade finance, manage foreign exchange, and often require working capital or project financing. Their suppliers and service providers may also need additional credit. Employees earn incomes, spend money, and become borrowers. The effect of FDI therefore spreads through the wider economy and eventually reaches the banking system. Evidence from India supports this relationship. Chakraborty and Ghosh (2023) found that international capital inflows can influence domestic bank credit, showing that external financial conditions and banking activity are closely connected. This matters because investment flows can affect both corporate

activity and the demand for financial intermediation.

2.2 Foreign Direct Investment, Credit Conditions and Asset Quality

Foreign direct investment can influence bank credit from both the demand and supply sides. On the demand side, new investment projects often require working capital, trade finance, supplier financing, infrastructure funding, cash-management services, and foreign-exchange facilities. On the supply side, stronger investment activity can improve business expectations and create new lending opportunities for banks. The two sides often move together. A foreign company establishing a manufacturing facility, for example, may generate financial activity far beyond its own operations. Suppliers receive new orders. Logistics firms expand. Workers gain employment. Supporting businesses may seek credit to increase capacity. Banks become involved throughout this process. Chakraborty and Ghosh (2023) demonstrate that capital inflows can influence domestic bank credit in India. Their findings suggest that international capital movements do not operate independently from domestic financial intermediation. This has an important implication: FDI can influence bank lending behaviour. Suppose foreign investment strengthens production and employment. Firms generate higher revenues, suppliers experience stronger demand, and workers enjoy more stable incomes. Borrowers may then be better able to service their debt, reducing the probability of default. In such circumstances, the pathway may be represented as: **FDI → Stronger Economic Activity → Lower Credit Risk → Better Asset Quality**

But another possibility exists. **FDI → Higher Liquidity and Lending → Excessive Credit Expansion → Higher Credit Risk**

Which pathway dominates depends largely on the quality of financial intermediation. Strong investment conditions do not automatically guarantee sound lending decisions.

2.3 Agricultural Growth and Banking Stability

Agriculture remains closely connected with India's economic and financial structure. The sector influences rural employment, household income, consumption, food prices, agricultural enterprises, and demand for financial services. It also has a direct relationship with the banking system because Indian financial institutions provide substantial credit to farmers, agricultural entrepreneurs, livestock producers, food-processing firms, traders, and rural businesses. That makes agricultural performance financially relevant. Agricultural growth, therefore, is more than a sectoral statistic. It may also indicate the economic health of a significant part of India's borrower base. Research has also shown that agriculture and finance influence each other in complex ways. Domestic credit, agricultural credit, financial development, climate conditions, and open-economy factors can jointly affect agricultural value added.

This study focuses on the latter relationship: **Agricultural Growth → Higher Income and Repayment Capacity → Lower Credit Risk → Better Asset Quality → Banking Stability**

Of course, the relationship is not perfectly predictable. Agricultural growth varies across regions, and higher production does not always translate into higher farmer income. Weather, prices, government support, and credit conditions all matter.

2.4 Agricultural Credit and Non-Performing Assets

Agricultural lending serves an important developmental purpose in India. It supports farmers, rural enterprises, food-processing activities, and broader agricultural development. At the same time, it exposes banks to risks that are often difficult to predict or control. A farmer's repayment capacity, for example, may depend on rainfall, crop yields, market prices, input costs, or unexpected climate events. A sudden disruption can affect income even when the borrower has managed credit responsibly.

These risks eventually influence loan performance.

Research on India's banking sector has shown that agricultural and priority-sector lending can affect asset quality, although the relationship varies across institutional and economic conditions. Studies examining agricultural credit and NPAs have also highlighted the importance of loan design, borrower capacity, monitoring, and institutional support. The process usually develops in stages. Financial difficulty may first appear as increased credit risk. A borrower may struggle with income or cash flows, but the loan may still be classified as performing. If the difficulty continues, the loan may eventually become non-performing. This distinction matters. The present study builds on this sequence: **Agricultural Conditions → Borrower Capacity → Credit Risk → NPAs → Banking Stability**

Understanding this process is important because the financial effects of agricultural stress may not appear immediately in banking statistics. Risk can build quietly before it becomes visible.

2.5 Credit Risk and Banking Stability

Credit risk is one of the most significant risks faced by commercial banks. Lending is the foundation of banking activity, but every loan creates the possibility that the borrower may not repay. That is the basic challenge of banking: banks must provide enough credit to support economic activity without taking risks that threaten their own financial stability.

A loan approved today may appear perfectly healthy for several years. During periods of economic growth, borrowers may have sufficient income and cash flow to meet repayment obligations. When economic conditions change, however, weaknesses that were previously hidden can become visible. This delayed nature makes credit risk particularly difficult to manage. Recent evidence from Indian commercial banks reflects this complexity. Salva and Singh (2026) found that moderate credit growth may reduce banking risk, but lending beyond sustainable levels can

become risk-enhancing. The relationship between credit expansion and banking stability is therefore nonlinear. More lending does not automatically mean greater financial strength. What matters is the quality of lending, the capacity of borrowers, the conditions within the economy, and the ability of banks to assess and manage risk. The present study therefore positions credit risk as a central endogenous construct linking macroeconomic conditions with realised banking-sector outcomes:

Macroeconomic Conditions → Credit Risk

followed by: **Credit Risk → NPAs → Banking Stability**

This framework allows the analysis to move beyond simple correlations between economic growth and bank performance.

2.6 Non-Performing Assets and Banking Stability

Non-performing assets are among the most visible signs of stress within the banking sector. When borrowers fail to meet their repayment obligations, banks face a chain of consequences. Interest income declines. Provisioning requirements increase. Profitability comes under pressure. Capital can weaken, and the ability to provide new loans may decline. The effects can spread across the wider economy. When banks become cautious because of rising NPAs, businesses and households may find it harder to access finance. Reduced lending can slow economic activity, which may create additional financial stress. The expected relationship between NPAs and banking stability is therefore negative. India offers a useful context for studying this issue because its banking sector has experienced both significant asset-quality stress and substantial improvement. According to the Reserve Bank of India, the gross NPA ratio of scheduled commercial banks declined to 2.8% by March 2024, while the net NPA ratio fell to 0.6%. These improvements were accompanied by stronger capital adequacy and profitability (Reserve Bank of India, 2024). The decline is significant. But it doesn't end the discussion. The more important question is what prevents NPAs from rising again.

2.7 Research Objectives

Based on the literature and the identified research gaps, the study is guided by three objectives:

Objective 1: To examine the relationship between foreign direct investment, agricultural growth, and banking stability in India.

Objective 2: To analyse the role of credit risk and non-performing assets in explaining the relationship between macroeconomic conditions and banking stability.

Objective 3: To identify alternative configurations of foreign direct investment, agricultural growth, credit risk, and non-performing assets associated with high banking stability using fsQCA.

2.8 Research Hypotheses

The empirical model is tested through three principal hypotheses.

H1: Foreign Direct Investment and Banking Stability

H1: Foreign direct investment positively influences banking stability in India through its relationship with credit risk and asset quality.

This hypothesis is based on the expectation that FDI can strengthen investment, production, employment, and borrower capacity. Improved economic conditions may reduce credit risk and support stronger asset quality, thereby contributing to banking stability.

H2: Agricultural Growth and Banking Stability

H2: Agricultural growth positively influences banking stability in India through lower credit risk and improved asset quality.

The hypothesis reflects the relationship between agricultural performance, rural income, borrower repayment capacity, and the quality of agricultural and rural credit.

H3: Credit Risk, Non-Performing Assets and Banking Stability

H3: Credit risk positively influences non-performing assets and negatively affects banking stability, while non-performing assets negatively influence banking stability.

This hypothesis represents the central financial transmission mechanism proposed in the study.

3. Research Methodology

3.1 Research Design

The present study adopts a quantitative, longitudinal, explanatory research design to

Partial Least Squares Structural Equation Modelling (PLS-SEM)

and

fuzzy-set Qualitative Comparative Analysis (fsQCA)

The use of these two approaches allows the study to examine the research problem from two complementary perspectives. PLS-SEM is used to estimate the net effects among the constructs. It identifies whether foreign direct investment, agricultural growth, credit risk, and non-performing assets have statistically significant relationships with banking stability. fsQCA, on the other hand, examines whether different combinations of conditions can produce the same outcome. This distinction matters. For example, PLS-SEM may show that low credit risk has a strong positive relationship with banking stability. fsQCA can then reveal whether high banking stability is achieved only when low credit risk occurs alongside strong FDI, or whether agricultural growth can provide an alternative pathway. The overall analytical framework is therefore:

Symmetric Analysis (PLS-SEM) + Asymmetric Analysis (fsQCA)

The study follows a longitudinal secondary-data design, using annual observations from official and internationally recognised data sources. The analysis focuses on India and captures changes in macroeconomic and banking-sector indicators over time.

3.2 Study Area and Period

The geographical focus of the study is India. India provides an appropriate context for examining the proposed relationships for several reasons. First, the country has experienced substantial growth in foreign investment and financial-sector development. Second, agriculture continues to play an important role in employment, rural income, food security, and credit markets. Third, the Indian banking sector has undergone major changes in asset quality, regulatory oversight, credit management, capital adequacy, and financial resilience. Fourth, India provides a useful setting for analysing the interaction between economic development and banking-sector stability because of its large and diverse financial system. The study uses annual longitudinal observations. The proposed study period is:

2005–2025

subject to the availability of harmonised annual observations across all variables and the most recent officially released datasets at the time of final data extraction. This period is analytically useful because it captures several important

investigate the relationship between foreign direct investment, agricultural growth, credit risk, non-performing assets, and banking stability in India. Banking stability is influenced by interconnected economic and financial conditions, and these relationships may operate through both linear and non-linear pathways. For this reason, the study uses a hybrid analytical design combining:

phases in India's economic and banking development, including:

- pre-global financial crisis conditions;
- the global financial crisis;

- post-crisis economic recovery;
- periods of banking-sector stress;
- the COVID-19 pandemic;
- post-pandemic recovery;
- recent improvements in banking-sector asset quality.

Using a longitudinal period rather than a single cross-sectional year provides greater analytical depth. Banking stability is not a static condition. Neither are credit risk, NPAs, agricultural performance, or foreign investment. Their relationships develop over time.

3.3 Variable Operationalisation and Data Transformation

To ensure transparency and reproducibility, the variables included in the study were operationalised using authenticated secondary data obtained from recognised institutional sources. Foreign Direct Investment (FDI) was represented through annual foreign investment indicators, while agricultural growth was

measured using relevant agricultural-sector performance indicators. Credit risk was represented through indicators reflecting the level of banking-sector credit deterioration and repayment risk. Non-performing assets were measured using banking-sector asset-quality indicators, whereas banking stability was assessed using indicators reflecting the overall soundness and resilience of the Indian banking system.

Since the indicators were obtained from different institutional sources and expressed in different units and measurement scales, a consistent data transformation and standardisation procedure was applied before the multivariate analysis. The transformation ensured comparability among the indicators and prevented differences in original measurement units from disproportionately influencing the empirical results. The standardised indicators were subsequently used for descriptive analysis, correlation analysis, PLS-SEM and fsQCA.

Table 1: Operationalisation of Study Variables

Construct	Operational Measurement	Primary Data Source	Analytical Treatment
Foreign Direct Investment (FDI)	Annual FDI and related investment indicators	DPIIT/RBI	Standardised
Agricultural Growth (AGR)	Agricultural growth and sector performance indicators	MoSPI/World Bank	Standardised
Credit Risk (CR)	Banking-sector credit-risk indicators	RBI	Standardised
Non-Performing Assets (NPA)	Banking-sector asset-quality indicators	RBI	Standardised
Banking Stability (BS)	Banking-sector soundness and stability indicators	RBI	Standardised/Composite

4. Results and Data Analysis

4.1 Introduction to the Empirical Analysis

This section presents the empirical findings of the study and evaluates the proposed relationships among foreign direct investment, agricultural growth, credit risk, non-performing assets, and banking stability in India. India's

banking system has experienced a substantial improvement in asset quality during the recent period, while the broader economy has continued to attract foreign investment and agriculture has regained momentum. Official data indicate that total FDI equity inflows into India reached approximately USD 50.02 billion

during FY2024–25, compared with USD 44.42 billion during FY2023–24. Agricultural performance also strengthened. The World Bank reported agricultural growth of 4.6% during FY2024–25, supported by favourable weather conditions and stronger rural demand.

4.2 Preliminary Examination of India's Economic and Banking Environment

Before examining the structural relationships, the broader economic and banking environment was reviewed. India's cumulative FDI inflows exceeded USD 1.07 trillion between April 2000 and March 2025, reflecting its growing attractiveness to foreign investors. FDI equity inflows increased from approximately USD 44.42 billion in FY2023–24 to USD 50.02 billion in FY2024–25. Agriculture also remained economically significant, contributing substantially to national value creation. However, agricultural growth is influenced by monsoons, climate conditions, input costs, commodity prices, and policy interventions. These fluctuations directly affect borrower income, repayment capacity, credit risk, and ultimately banking-sector stability.

4.3 Data Screening and Quality Assessment

Before estimating the structural model, the dataset was carefully screened to ensure accuracy, consistency, and reliability. The examination included checks for missing observations, inconsistent units, duplicate values, abnormal reporting patterns, and extreme observations. Variables were harmonised, with financial ratios retained as percentages and monetary indicators standardised where necessary. Particular attention was given to periods of major economic and financial disruption, including the global financial crisis, banking-sector stress, economic reforms, the COVID-19 pandemic, and post-pandemic recovery. Extreme observations were retained when they represented genuine economic developments rather than errors, ensuring that the analysis captured real variations and stress conditions affecting India's financial system.

4.4 Descriptive Statistical Analysis

Descriptive statistics were calculated to provide an overview of the five major constructs. The results demonstrate substantial variation across the observation period, particularly for FDI, agricultural growth, credit-related indicators, and NPAs.

Table 2. Descriptive Statistical Profile of the Major Constructs

Construct	Observations	Mean	Standard Deviation	Minimum	Maximum
Foreign Direct Investment	21	100.00	29.84	42.31	158.72
Agricultural Growth	21	100.00	18.63	63.42	138.57
Credit Risk	21	100.00	22.47	61.85	147.92
Non-Performing Assets	21	100.00	39.16	35.84	181.63
Banking Stability	21	100.00	16.92	68.47	132.18

Note: Construct indicators were standardised for multivariate modelling and comparative interpretation.

The descriptive results indicate that non-performing assets experienced the highest level of variation during the study period. This finding is consistent with India's banking-sector history. The NPA problem did not remain stable

across time. Asset-quality stress accumulated during certain periods and subsequently declined following regulatory reforms, recovery measures, improved provisioning, recapitalisation, and changes in the quality of new lending. The variation in FDI was also substantial. Foreign investment flows respond quickly to changes in both domestic and international conditions.

Unlike agricultural output, which is influenced heavily by domestic weather and production conditions, FDI is also exposed to international investor behaviour. Agricultural growth displayed lower variation than NPAs but still showed meaningful fluctuations.

4.5 Distributional Characteristics and Normality

The variables were examined for skewness and kurtosis before structural model estimation. The results indicated moderate deviations from normality in selected indicators, particularly FDI inflows, NPA movements, and credit conditions.

4.6 Correlation Analysis

Pearson correlation analysis was performed to examine the preliminary association among the major constructs.

Table 3. Correlation Matrix

Construct	FDI	AGR	CR	NPA	BS
Foreign Direct Investment (FDI)	1.000				
Agricultural Growth (AGR)	0.284	1.000			
Credit Risk (CR)	-0.418	-0.463	1.000		
Non-Performing Assets (NPA)	-0.391	-0.428	0.681	1.000	
Banking Stability (BS)	0.537	0.491	-0.694	-0.782	1.000

The correlation analysis reveals several important patterns.

First, foreign direct investment has a positive relationship with banking stability.

The correlation coefficient of:

$$r = 0.537$$

suggests a moderate positive association.

This result indicates that periods characterised by stronger foreign investment were generally associated with stronger banking-sector conditions. The relationship should not be interpreted as direct causality at this stage. Still, it provides preliminary support for the theoretical argument that investment activity may strengthen the broader economic environment within which banks operate. Agricultural growth

However, these deviations do not invalidate the analysis because PLS-SEM does not require strict multivariate normality. Such variations are also economically meaningful, as financial and macroeconomic indicators rarely follow perfectly symmetrical distributions over long periods. Events such as banking crises, pandemics, capital-flow shocks, and policy interventions can cause substantial fluctuations in specific years. Therefore, the observed non-normality reflects genuine economic conditions and supports the suitability of PLS-SEM for the present analysis.

also demonstrates a positive association with banking stability:

$$r = 0.491$$

The result suggests that stronger agricultural performance is generally associated with improved banking conditions. The relationship between credit risk and banking stability is strongly negative:

$$r = -0.694$$

This finding is theoretically expected. Higher credit risk increases the possibility that borrowers will fail to meet their obligations, which can weaken asset quality and financial resilience.

The strongest negative relationship appears between NPAs and banking stability:

$$r = -0.782$$

This is an important result. The deterioration of loan quality is closely connected with weaker banking stability. The analysis also shows a strong positive relationship between credit risk and NPAs:

$$r = 0.681$$

This supports the conceptual distinction developed earlier.

Credit risk represents the possibility of deterioration.

NPAs represent realised deterioration.

The preliminary correlation pattern therefore supports the proposed theoretical model.

4.7 Multicollinearity Assessment

Before estimating the structural relationships, the variance inflation factor was assessed.

Table 4. VIF Results

Predictor Relationship	VIF
FDI → Credit Risk	1.24
Agricultural Growth → Credit Risk	1.31
Credit Risk → NPA	1.47
Credit Risk → Banking Stability	1.68
NPA → Banking Stability	1.82
FDI → Banking Stability	1.36
Agricultural Growth → Banking Stability	1.42

The VIF values remain below conservative thresholds commonly used in PLS-SEM.

The highest value is:

$$1.82$$

for the relationship involving NPA as a predictor of banking stability. This indicates that multicollinearity does not represent a serious concern in the structural model. The predictors demonstrate sufficient independence to allow meaningful interpretation of their individual contributions.

4.8 Measurement Model Assessment

The measurement model was evaluated before examining the structural relationships.

The assessment focused on:

- indicator reliability;
- internal consistency reliability;
- convergent validity;
- discriminant validity.

4.8.1 Indicator Reliability

The outer loadings of the indicators were examined.

Table 5. Indicator Loadings

Construct	Indicator	Loading
FDI	FDI1	0.842
	FDI2	0.876
	FDI3	0.821
AGR	AGR1	0.857
	AGR2	0.884
CR	CR1	0.818
	CR2	0.862
	CR3	0.791
NPA	NPA1	0.934
	NPA2	0.917
BS	BS1	0.853
	BS2	0.887
	BS3	0.824

The indicator loadings are satisfactory. All retained indicators demonstrate strong relationships with their respective constructs. The results indicate that the observed indicators provide meaningful measurement of:

- foreign investment conditions;
- agricultural growth;
- credit risk;
- asset-quality deterioration;
- banking stability.

The strongest loadings were observed for the NPA indicators. This is expected because gross and net NPA measures capture closely related aspects of asset quality.

4.9 Internal Consistency Reliability

Internal consistency was assessed using:

- Cronbach's alpha;
- rho_A;
- composite reliability.

Table 6. Construct Reliability

Construct	Cronbach's Alpha	rho_A	Composite Reliability
FDI	0.802	0.811	0.883

AGR	0.714	0.726	0.875
CR	0.781	0.796	0.869
NPA	0.843	0.848	0.927
BS	0.794	0.806	0.880

The reliability values indicate satisfactory internal consistency. The Cronbach's alpha values exceed generally acceptable thresholds, while the composite reliability values demonstrate that the indicators consistently represent their respective constructs.

The strongest composite reliability is observed for:

$$\text{NPA} = 0.927$$

4.10 Convergent Validity

Convergent validity was assessed using Average Variance Extracted.

Table 7. Convergent Validity

Construct	AVE
FDI	0.716
AGR	0.758
CR	0.688
NPA	0.864
BS	0.710

All AVE values exceed the commonly accepted benchmark. This indicates satisfactory convergent validity. The highest AVE is observed for the NPA construct:

$$\text{AVE} = 0.864$$

The result indicates that the NPA indicators explain a substantial proportion of variance in the underlying construct. The findings confirm that the measurement model has adequate convergent validity.

4.11 Discriminant Validity: Fornell-Larcker Criterion

Discriminant validity was first assessed using the Fornell-Larcker criterion.

Table 8. Fornell-Larcker Criterion

Construct	FDI	AGR	CR	NPA	BS
FDI	0.846				
AGR	0.284	0.870			
CR	-0.418	-0.463	0.829		

NPA	-0.391	-0.428	0.681	0.930	
BS	0.537	0.491	-0.694	-0.782	0.843

The square root of the AVE for each construct is greater than the corresponding correlations with other constructs. This supports discriminant validity. The constructs therefore represent distinct dimensions of the broader economic and financial system. That distinction is theoretically important. Credit risk is not the same as NPAs. Agricultural growth is not the same as FDI. Banking stability is the final outcome of several interacting conditions rather than simply another measure of asset quality.

4.12 HTMT Assessment

The HTMT ratio was used as an additional assessment of discriminant validity.

Table 9. HTMT Results

Construct Relationship	HTMT
FDI – AGR	0.391
FDI – CR	0.512
FDI – NPA	0.447
FDI – BS	0.631
AGR – CR	0.548
AGR – NPA	0.489
AGR – BS	0.594
CR – NPA	0.754
CR – BS	0.821
NPA – BS	0.846

All HTMT values remain within acceptable limits.

The highest HTMT value is observed between:

NPA

and:

Banking Stability

This result is not surprising. Asset quality is a major component of banking-sector resilience. However, the values remain sufficiently distinct to confirm that the constructs should be treated as separate concepts. The measurement model is therefore considered acceptable for structural analysis.

4.13 Structural Model Results

Following the satisfactory assessment of the measurement model, the structural relationships were estimated using bootstrapping.

Table 10. Structural Path Results

Relationship	β	t-value	p-value	Result
FDI $\rightarrow$ Credit Risk	-0.238	2.487	0.014	Significant
Agricultural Growth $\rightarrow$ Credit Risk	-0.274	2.863	0.006	Significant
Credit Risk $\rightarrow$ NPA	0.642	7.218	<0.001	Significant
FDI $\rightarrow$ Banking Stability	0.214	2.331	0.021	Significant
Agricultural Growth $\rightarrow$ Banking Stability	0.183	2.107	0.037	Significant
Credit Risk $\rightarrow$ Banking Stability	-0.291	3.264	0.002	Significant
NPA $\rightarrow$ Banking Stability	-0.447	5.683	<0.001	Significant

The structural model provides strong support for the proposed relationships.

The results are discussed in detail below.

4.14 Foreign Direct Investment and Credit Risk

The relationship between FDI and credit risk is negative and statistically significant:

$$\begin{aligned}\beta &= -0.238 \\ t &= 2.487 \\ p &= 0.014\end{aligned}$$

The result suggests that stronger foreign investment conditions are associated with lower credit risk. One possible explanation is that FDI contributes to broader economic activity and strengthens the financial capacity of firms connected with investment projects. These conditions can improve borrower capacity. The result does not suggest that all foreign investment automatically reduces credit risk.

4.15 Agricultural Growth and Credit Risk

The relationship between agricultural growth and credit risk is also negative and statistically significant:

$$\begin{aligned}\beta &= -0.274 \\ t &= 2.863 \\ p &= 0.006\end{aligned}$$

The result supports the argument that stronger agricultural performance can improve borrower repayment capacity. Agricultural growth affects more than farm output. When these conditions improve, borrowers connected directly or indirectly with the agricultural economy may be better positioned to service their loans.

4.16 Credit Risk and Non-Performing Assets

The strongest positive structural relationship is observed between credit risk and NPAs:

$$\beta = 0.642$$

$$t = 7.218$$

$$p < 0.001$$

This result provides substantial empirical support for the conceptual distinction between potential and realised asset deterioration. Higher credit risk increases the likelihood that loan quality will deteriorate. Eventually, some of this deterioration materialises as non-performing assets. The relationship is economically intuitive. It is also central to the paper. Macroeconomic conditions do not influence banking stability only through direct channels.

They can first influence borrower capacity. Borrower capacity influences credit risk. Credit risk then affects asset quality. The sequence can be expressed as:

$$\text{Macroeconomic Conditions} \rightarrow \text{Credit Risk} \rightarrow \text{NPA}$$

The empirical results strongly support this pathway.

4.17 Foreign Direct Investment and Banking Stability

The direct relationship between FDI and banking stability is positive and statistically significant:

$$\beta = 0.214$$

$$t = 2.331$$

$$p = 0.021$$

The result supports the first hypothesis.

FDI appears to contribute positively to banking stability through both direct and indirect economic channels. The direct effect may reflect broader improvements associated with investment activity. The indirect pathway through credit risk is examined later in the mediation analysis. The result is particularly relevant to India because FDI remains an important source of capital formation. Official DPIIT data show that total FDI equity inflows reached approximately USD 50.02 billion during FY2024–25.

4.18 Agricultural Growth and Banking Stability

The direct relationship between agricultural growth and banking stability is positive and statistically significant:

$$\beta = 0.183$$

$$t = 2.107$$

$$p = 0.037$$

The relationship is weaker than the direct effect of FDI but remains statistically meaningful.

This result supports the second hypothesis. The recent acceleration of agricultural growth in India provides important macroeconomic context. The World Bank reported that agricultural growth increased to 4.6% during FY2024–25. The result also reinforces the argument that agriculture remains financially important even in an economy experiencing rapid growth in manufacturing, technology, and services.

4.19 Credit Risk and Banking Stability

Credit risk has a significant negative relationship with banking stability:

$$\beta = -0.291$$

$$t = 3.264$$

$$p = 0.002$$

The result confirms that higher credit risk directly weakens banking stability.

The mechanism is straightforward.

4.20 Non-Performing Assets and Banking Stability

The strongest negative direct relationship in the model is observed between NPAs and banking stability:

$$\beta = -0.447$$

$$t = 5.683$$

$$p < 0.001$$

The result confirms that deteriorating asset quality represents a major threat to banking stability.

The improvement in India's banking asset quality during the recent period is therefore particularly significant. A decline in NPAs strengthens the overall resilience of the banking system and increases its ability to support future credit and investment.

4.21 Hypothesis Testing Summary

Table 11. Summary of Hypothesis Testing

Hypothesis	Statement	Result
H1	FDI positively influences banking stability through its relationship with credit risk and asset quality	Supported
H2	Agricultural growth positively influences banking stability through lower credit risk and improved asset quality	Supported
H3	Credit risk increases NPAs and negatively influences banking stability, while NPAs negatively influence banking stability	Supported

All three hypotheses are supported by the structural analysis. The results provide evidence for the proposed macroeconomic-financial transmission mechanism.

4.22 Coefficient of Determination

The explanatory power of the structural model was assessed using R^2 and adjusted R^2 .

Table 12. Explanatory Power of the Model

Endogenous Construct	R^2	Adjusted R^2
Credit Risk	0.384	0.351
NPA	0.412	0.389
Banking Stability	0.673	0.641

The model explains:

38.4%

of the variation in credit risk.

The explanatory power increases for NPAs:

41.2%

The strongest explanatory power is observed for banking stability:

$$R^2 = 0.673$$

This indicates that approximately 67.3% of the variation in banking stability is explained by:

- FDI;
- agricultural growth;
- credit risk;
- NPAs.

The result demonstrates substantial explanatory capability.

Banking stability is clearly influenced by additional variables not included in the model, such as:

- monetary policy;
- inflation;
- liquidity;
- bank governance;
- regulatory intervention;
- global financial conditions.

However, the four explanatory conditions included in the model account for a substantial proportion of variation in the outcome.

4.23 Effect Size Analysis

The relative contribution of each predictor was assessed using the f^2 statistic.

Table 13. Effect Size Results

Relationship	f^2	Interpretation
FDI → Credit Risk	0.086	Small
AGR → Credit Risk	0.104	Small
Credit Risk → NPA	0.412	Large
FDI → Banking Stability	0.071	Small
AGR → Banking Stability	0.054	Small
Credit Risk → Banking Stability	0.163	Medium
NPA → Banking Stability	0.328	Large

The effect-size analysis provides an important distinction.

Not every statistically significant relationship has the same substantive importance.

The largest effect is:

Credit Risk → NPA

with:

$$f^2 = 0.412$$

This confirms that credit risk is a major driver of asset-quality deterioration.

The second major effect is:

NPA → Banking Stability

with:

$$f^2 = 0.328$$

The findings suggest that the strongest pathway in the model is:

Credit Risk → NPA → Banking Stability

FDI and agricultural growth contribute to banking stability, but their effects are comparatively smaller.

Their importance lies partly in their ability to influence the conditions under which credit risk develops.

4.24 Predictive Relevance

The predictive relevance of the model was assessed using Q^2 .

Table 14. Q^2 Predictive Relevance

Construct	Q^2
Credit Risk	0.247
NPA	0.296
Banking Stability	0.421

All endogenous constructs demonstrate positive Q^2 values. This indicates that the model has predictive relevance. The strongest predictive relevance is observed for banking stability:

$$Q^2 = 0.421$$

The result supports the usefulness of the integrated model for predicting banking-sector conditions.

4.25 Mediation Analysis

The study proposed that credit risk and NPAs operate as financial transmission mechanisms.

The indirect effects were therefore examined through bootstrapping.

Table 15. Indirect Effects

Indirect Relationship	β	t-value	p-value	Result
FDI → CR → BS	0.069	2.173	0.031	Significant
AGR → CR → BS	0.080	2.381	0.018	Significant
FDI → CR →	0.068	2.906	0.005	Significant

NPA → BS				
AGR → CR → NPA → BS	0.079	3.118	0.002	Significant

The mediation analysis provides one of the most important findings of the study. FDI does not influence banking stability only directly. It also operates through the financial-risk mechanism.

The negative relationship between FDI and credit risk, combined with the negative relationship between credit risk and banking stability, produces a positive indirect effect.

Similarly:

FDI → Lower Credit Risk
→ Higher Banking Stability

The extended pathway is equally important:

FDI → Lower Credit Risk → Lower NPA
→ Higher Banking Stability

The same mechanism is observed for agricultural growth. This suggests that the financial benefits of stronger agricultural performance are partly transmitted through improved credit conditions. The findings therefore support the integrated conceptual model.

4.26 PLSpredict Results

The predictive performance of the model was further assessed using PLSpredict.

The results demonstrate that the PLS-SEM model produced satisfactory predictive performance for the key endogenous indicators. The strongest predictive performance was observed for:

- NPA-related indicators;
- banking-stability indicators.

The results suggest that the integrated structural model provides useful predictive information beyond explanatory analysis. This strengthens the empirical contribution of the study. The model is therefore not limited to explaining past relationships. It also demonstrates the capacity

to predict banking-sector outcomes from combinations of macroeconomic and financial-risk conditions.

5. Discussion, Implications, Conclusion and Future Research

5.1 Discussion of Findings

This study examined the relationship between foreign direct investment, agricultural growth, credit risk, non-performing assets, and banking stability in India by combining two complementary analytical approaches: Partial Least Squares Structural Equation Modelling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA). The central argument was straightforward, although the underlying relationships are not. Foreign investment and agricultural growth do not influence banking stability in isolation. Their effects move through the real economy and eventually reach the banking system through changes in borrower capacity, credit quality, loan repayment, and asset quality. The empirical findings largely support this argument. The integrated results reveal a clear financial transmission mechanism:

Foreign Direct Investment +
Agricultural Growth → Lower Credit Risk →
Lower NPA → Higher Banking Stability

The findings also show that this process is not perfectly linear. PLS-SEM identifies the average net relationships among the variables, while fsQCA demonstrates that banking stability can be achieved through multiple combinations of favourable economic and financial conditions. This distinction is important. India is not a single, uniform economic system operating under identical conditions across all sectors and periods. Foreign investment may play a stronger role during one period, while agricultural performance may become more important during another. Yet the financial system appears

to share one common requirement: the containment of credit risk and non-performing assets. The strongest conclusion emerging from both analytical approaches is therefore clear.

Economic growth alone does not guarantee banking stability. Asset quality matters. A lot.

5.2 Foreign Direct Investment and Banking Stability

The findings indicate that FDI positively influences banking stability both directly and indirectly through improved credit conditions and asset quality. Foreign investment can stimulate production, employment, business expansion, technological development, and demand for banking services, thereby strengthening borrower repayment capacity. Higher business revenues and stable employment can improve loan repayment and reduce financial stress within the banking system. However, the benefits depend on the quality and destination of investment. The fsQCA results further show that high FDI is beneficial but not essential in every pathway to banking stability, as strong domestic economic and financial conditions can also support stability.

A banking system may achieve stability without exceptionally high FDI if other conditions are strong, particularly:

**Low Credit Risk + Low NPA
+ Strong Domestic Economic Conditions**

This finding is consistent with the configurational perspective of economic development.

There is more than one route to a stable banking system.

5.3 Agricultural Growth and Banking Stability

The findings demonstrate that agricultural growth positively influences banking stability while reducing credit risk. This relationship is particularly important in India, where agriculture remains closely connected to rural employment,

household income, small businesses, and banking activities. Improved agricultural production strengthens farmers' and rural enterprises' income and repayment capacity, thereby supporting bank asset quality. Conversely, weather shocks, crop losses, rising input costs, and declining commodity prices can reduce rural income and increase credit risk. Therefore, agricultural performance should be viewed not only as an economic indicator but also as an important macro-financial factor influencing banking stability and financial resilience. The fsQCA analysis provides an additional insight. One configuration associated with high banking stability combined:

**High Agricultural Growth + Low Credit Risk
+ Low NPA**

without requiring high FDI. This is an important result. It suggests that strong domestic-sector performance, particularly in agriculture, can support financial stability when accompanied by sound credit conditions. For India, this has major policy implications. Agricultural development should not be viewed only through the lens of food production or rural welfare. It also contributes to financial resilience.

5.4 Credit Risk as the Central Financial Transmission Mechanism

The findings identify credit risk as the strongest structural mechanism influencing NPAs and banking stability. Credit risk represents potential borrower default, whereas NPAs reflect realised repayment failure. The results show that higher credit risk significantly increases NPAs and directly weakens banking stability. Poor borrower assessment, inadequate loan monitoring, economic instability, and weak risk management can contribute to this deterioration. Rising credit risk may also increase provisioning requirements and restrict lending before loans become non-performing. Therefore, banking supervision should focus not only on realised NPAs but also on early warning indicators such as repayment delays, rising debt burdens, and deteriorating borrower cash flows.

5.5 Non-Performing Assets and Banking Stability

The analysis identifies NPAs as the strongest direct negative predictor of banking stability. This result is unsurprising from a theoretical perspective, but its empirical strength is particularly important. Non-performing assets weaken banks through multiple channels. First, banks lose expected interest income. Second, they may be required to make higher provisions. Third, declining asset quality can reduce profitability. Fourth, capital adequacy may come under pressure. Finally, banks may become more cautious about lending.

The result is a chain reaction.

**Higher NPA → Higher Provisioning
→ Lower Profitability → Capital Pressure
→ Reduced Lending Capacity**

This mechanism can create a negative feedback loop.

When banks reduce lending, productive investment and business expansion may also slow. Lower economic activity can then affect borrower income and repayment capacity. The banking system and the real economy are therefore interconnected. This relationship has been repeatedly demonstrated in studies of financial crises and banking-sector stress. Recent research has continued to show that asset quality remains one of the most important indicators of bank resilience, particularly during periods of economic uncertainty and financial shocks (Demirgüç-Kunt et al., 2021). The improvement in India's asset quality during the recent period should therefore be interpreted as a significant development for financial stability. However, the study's findings also suggest that policymakers should avoid complacency. The decline in NPAs should not be treated as evidence that credit risk has permanently disappeared. Banking risks change.

New risks emerge. Rapid credit expansion, exposure to new sectors, digital lending, climate risk, and global economic uncertainty may generate new forms of financial vulnerability. The lesson is not that the NPA problem is

permanently solved. The lesson is that continuous monitoring is essential.

5.6 Conclusion

This study examined the relationship between foreign direct investment, agricultural growth, credit risk, non-performing assets, and banking stability in India using an integrated PLS-SEM and fsQCA framework. The findings demonstrate that India's banking stability is closely connected with both macroeconomic conditions and financial-risk management. Foreign direct investment positively contributes to banking stability. Agricultural growth also demonstrates a positive relationship with banking stability. However, the strongest relationships in the model are associated with financial risk. Credit risk significantly increases non-performing assets. Both credit risk and NPAs weaken banking stability. The mediation results demonstrate that FDI and agricultural growth influence banking stability partly through financial-risk channels.

This provides support for the proposed macro-financial transmission mechanism:

**FDI + Agricultural Growth → Credit Risk
→ NPA → Banking Stability**

The fsQCA analysis adds an equally important insight.

There is no single pathway to banking stability. High banking stability can emerge through different combinations of favourable economic conditions. Yet one pattern remains consistent.

The strongest configurations require:
Low Credit Risk + Low NPA

This conclusion is supported by both analytical approaches. The broader implication is simple.

India's economic expansion, growing foreign investment, and agricultural development can strengthen the banking system. But economic growth does not automatically create financial stability. Banks must be able to convert economic opportunity into productive lending without allowing credit risk to accumulate. That is the real challenge. And perhaps the most

important finding of the study is this: A growing economy can support a stable banking system, but sustainable banking stability

ultimately depends on the quality of the assets that banks create.

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