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Impact of Fintech on Banking Services: A Study on Payment Apps

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Abstract

The rapid evolution of financial technology (Fintech) has significantly altered the banking landscape, with payment applications becoming a prominent innovation. This research investigates the impact of payment apps on traditional banking services, financial inclusion, consumer adoption patterns, and security concerns. It seeks to understand whether these digital platforms complement or replace conventional banking methods and identify the challenges and opportunities they present.
This research employs a descriptive quantitative approach to assess the adoption and impact of payment apps. Data were collected using a structured survey questionnaire targeting active users of digital payment platforms. The study utilized statistical tools, including Chi-square tests, to analyze the relationships between demographic factors, adoption behavior, and security concerns.

Findings reveal a high adoption rate of payment apps, particularly among younger users and business professionals, signaling a shift away from traditional banking methods. While digital payment solutions offer convenience and efficiency, concerns related to security, privacy, and technical issues remain barriers to widespread adoption. The study further highlights that traditional banks are being compelled to innovate and integrate Fintech solutions to remain competitive in the digital era.

Keywords:

Fintech, Payment Apps, Traditional Banking, Financial Inclusion, Digital Transactions, Consumer Behaviour, Security Concerns, Financial Technology

Introduction

Fintech, or financial technology, is driving a revolutionary change in the financial services sector. A wide range of technical advancements that are upending established banking models are together referred to as fintech. Payment apps, one of Fintech's most influential subsectors, are the subject of this study. Payment apps, which provide a quicker, more convenient, and frequently less expensive option than traditional payment methods, have completely changed how people and businesses send and receive money.
The emergence of fintech and payment apps has revolutionized the financial services industry by providing customers with easy, effective, and affordable ways to handle their money. Particularly popular are payment applications, which already have millions of users worldwide. However, concerns over payment apps' potential effects on conventional banking services have been raised by their growing popularity. Payment apps could destabilize the financial system if they replace traditional banking services, according to some studies, while others contend that they should be used in addition to them.

The purpose of this study is to look into how payment apps affect financial inclusion, security, privacy issues, and traditional banking services. This study aims to add to the continuing discussion over the

direction of banking and financial services by investigating the connections between payment apps and conventional banking services.

The rise of payment apps, in particular, has transformed the way people make transactions, pay bills, and transfer funds. With the increasing adoption of payment apps, traditional banks and financial institutions are facing unprecedented challenges and opportunities. The growth of payment apps has raised important questions about their impact on traditional banking services, financial inclusion, security, and privacy concerns. While payment apps offer convenience, efficiency, and cost savings, they also pose significant risks, including security breaches, data privacy concerns, and dependence on technology.

In addition to analysing the impact of payment apps on financial inclusion, security, privacy, and traditional banking services, this study explores potential responses by traditional banks and other financial institutions to the proliferation of payment apps. By analysing the relationships between payment apps and traditional banking services, this study seeks to contribute to the ongoing debate about the future of banking and financial services.

Background of the Study

Revolution of Financial Technology (Fintech)

The financial technology revolution has metamorphosed the financial landscape through technological advancements, changing consumer preferences and the need for innovation. Fintech start-ups have disrupted traditional banking services by providing digital solutions that are more convenient, efficient and low-cost.

Payment Apps

One of the most prominent aspects of fintech is payment apps, which are widely used. These applications enable users to transact online, pay their bills and move money across with just a mobile phone. Some popular examples include PayPal, Alipay, WeChat Pay and Google Pay.

Traditional Banking Services

Traditional banking services have been fundamental in monetary transactions such as cash, credit cards or online banking. However, payment apps come about as the new way people prefer making payments instead of using physical cash or bank transfer options.

Regulatory Environment

The regulatory environment for Fintech and Payment Apps is evolving. Governments and regulatory bodies are grappling with balancing innovation-and-risk equation while still maintaining consumer protection and stability in financial system.

Literature Review

Financial Inclusion

Financial inclusion is a significant aspect of payment apps, as they provide access to financial services for underserved populations. Kumar et al. (2020) found that payment apps have increased financial inclusion, especially among low-income households. Arner et al. (2019) also noted that payment apps have improved financial inclusion by reducing transaction costs and increasing access to financial services. These studies highlight the positive impact of payment apps on financial inclusion. Kumar et al. (2020) and Arner et al. (2019) provide evidence of the potential of payment apps to increase financial inclusion. This has implications for policymakers and financial institutions seeking to promote

financial inclusion. By increasing access to financial services, payment apps can help reduce poverty and improve economic outcomes. Overall, the literature suggests that payment apps have a positive impact on financial inclusion.

Adoption of Payment Apps

Adoption of payment apps is a critical aspect of their success. Chen et al. (2019) found that convenience, security, and ease of use are key factors influencing the adoption of payment apps. Kim et al. (2017) also noted that trust and perceived usefulness are significant predictors of payment app adoption. These studies highlight the importance of understanding the factors that influence payment app adoption. By identifying these factors, developers and marketers can design and promote payment apps that meet the needs of consumers. Chen et al. (2019) and Kim et al. (2017) provide insights into the factors that drive payment app adoption. This knowledge can be used to increase the adoption and usage of payment apps. Overall, the literature suggests that understanding the factors that influence payment app adoption is crucial for their success.

Impact on Traditional Banking Services

The impact of payment apps on traditional banking services is a significant area of research. Gomber et al. (2017) found that payment apps have disrupted traditional banking services, forcing banks to innovate and adapt. Chen et al. (2019) also noted that payment apps have changed the way people make transactions, reducing the need for physical bank branches. These studies highlight the significant impact of payment apps on traditional banking services. By disrupting traditional banking services, payment apps are forcing banks to innovate and adapt. Gomber et al. (2017) and Chen et al. (2019) provide evidence of the impact of payment apps on traditional banking services. This has implications for banks seeking to remain competitive in a rapidly changing financial landscape. Overall, the literature suggests that payment apps are transforming traditional banking services.

Security and Privacy Concerns

Security and privacy concerns are significant issues in the adoption and usage of payment apps. Kim et al. (2020) found that security concerns are a major barrier to the adoption of payment apps. Arner et al. (2019) also noted that privacy concerns are a significant issue in the usage of payment apps. These studies highlight the importance of addressing security and privacy concerns in payment apps. By addressing these concerns, developers and marketers can increase trust and confidence in payment apps. Kim et al. (2020) and Arner et al. (2019) provide insights into the security and privacy concerns surrounding payment apps. This knowledge can be used to design and promote payment apps that are secure and private. Overall, the literature suggests that addressing security and privacy concerns is crucial for the success of payment apps.

Lee and Shin (2018) investigated the impact of payment apps on customer behaviour and found that payment apps have increased customer satisfaction. This indicates that payment apps have improved the convenience and speed of financial transactions. The study found that payment apps have reduced the need for physical bank branches and have increased customer loyalty. Lee and Shin (2018, 2020) also noted that payment apps have increased competition in the banking industry. Overall, the study highlights the impact of payment apps on customer behaviour. The findings of the study suggest that payment apps have the potential to increase customer satisfaction and loyalty. The study provide evidence of the impact of payment apps on customer behaviour. The study's results have implications for banks seeking to improve customer satisfaction and loyalty.

Chakravorti and Kobor (2018) examined the impact of payment apps on financial inclusion in developing countries. The study describes that payment apps have increased access to financial services, especially among low-income households. The study found that payment apps have reduced transaction costs and increased financial literacy. It is also noted that payment apps have

improved the efficiency of financial transactions. Overall, the study highlights the positive impact of payment apps on financial inclusion in developing countries. The findings of the study suggest that payment apps have the potential to increase financial inclusion and improve transaction efficiency. This study provides evidence of the positive impact of payment apps on financial inclusion. The study's results have implications for policymakers and financial institutions seeking to promote financial inclusion in developing countries.

Benefits and Challenges

Gomber et al. (2017) highlighted the benefits of fintech, including increased efficiency and reduced costs. Kumar et al. (2020) noted that challenges persist, including regulatory uncertainty and infrastructure limitations.

Statement of the Problem and Objectives

The rapid advancement of financial technology has transformed banking services through the proliferation of payment apps, offering consumers convenient, efficient, and cost-effective alternatives to traditional banking methods. This disruptive innovation presents challenges and implications for both consumers and traditional banking institutions. This research aims to understand the impact of fintech on banking services, focusing on payment apps and their influence on consumer behaviour, trust in traditional banking systems, and the overall financial services industry. The adoption of payment apps and fintech services has increased considerably leading to significant changes in consumer behavior that may disrupt traditional banking. Nevertheless, it remains unclear if these apps are replacing or supplementing traditional banking services. Besides, their impact on financial inclusion as well as security and privacy concerns is unknown.
This study aims to address the following key questions:

- To what extent are payment apps substituting traditional banking services?
- How do payment apps impact financial inclusion and access to financial services?
- What are the security and privacy concerns associated with payment apps?
- How do banks respond to the rise of payment apps and fintech services?
- What are some implications of these trends for future banking including financial institutions?

Hypothesis

1. **Null Hypothesis (H0):**

   "The use of payment apps has no significant impact on the adoption of fintech in banking services for Age, Gender, Occupation and Education"

2. **Alternative Hypothesis (H1):**

   "The use of payment apps has a significant positive impact on the adoption of fintech in banking services for Age, Gender, Occupation and Education."

Research Methodology

This study has employed a Descriptive/Quantitative research design that looks into the impact of fintech on banking services specifically payment apps. The main goal is to describe the current state of payment apps in the banking industry and their effects on banking services. The

descriptive/quantitative design was chosen for this study because it: Allows an in-depth examination of the current state of payment apps and Facilitates collection of large-scale data and Enables use of statistical analysis to identify patterns and trends.
The questionnaire designed covers 4 parts namely A) Demographical details B) Frequency of Usage of Apps and Apps preferences C) Decision to use Payment apps D) Payment Apps Frequencies and challenges or Barriers while using payment apps (Multiple Response)

Table No.1: Questionnaire and its items

Q No	Statements	Measuring
1.	Age Groups	Demographic Details
2.	Gender	Demographic Details
3.	Occupation	Demographic Details
4.	Education level	Demographic Details
5.	Do you use payment apps?	Frequency of usage of apps and apps preferences
6.	If yes, which payment apps do you use? (Select all that apply)	Payment apps frequencies and challenges or barriers while using payment apps
7.	How often do you use payment apps?	Frequency of usage of apps and apps preferences
8.	Rate the importance of the following factors in your decision to use payment apps	Decision to use payment apps
9.	What challenges or barriers have you faced in using payment apps? (Select all that apply)	Payment apps frequencies and challenges or barriers while using payment apps
10.	How likely are you to recommend payment apps to others?	Frequency of usage of apps and apps preferences

From the Table 1, this study's sample comprises of 203 payment app users. The sample frame includes payment app users aged 18-60, residing in Belagavi, and actively using apps like Paytm, Google Pay, and PhonePe. Individual users meeting these criteria form the sampling unit. A convenience sampling method was employed, selecting respondents based on accessibility and willingness to participate. Key selection criteria include age, residency, and active payment app usage. A sample size of 196 was calculated using a formula considering a 95% confidence level, 50% variability, and 7% margin of error. However, the actual sample size is 203. Data collection was done through an online survey using Google Forms, featuring multiple-choice questions to gather relevant information.

Data Sources

This research utilizes both primary and secondary data sources. Primary data was collected through a survey distributed via Google Forms to payment app users, gathering insights into their usage patterns, satisfaction, security concerns, and preferences. Secondary data includes a review of existing literature on fintech, payment apps, and banking services, offering a theoretical foundation for the study. Additionally, industry reports and studies on payment app adoption and usage were analyzed to understand market trends, challenges, and growth projections. Combining these data sources allows for a comprehensive analysis of the factors driving payment app usage.

Data Analysis Tools and Results

The following data analysis tools were used to analyze and interpret the online survey data:

Survey Analysis Tools

Google Forms: Used for survey creation, data collection, and initial data analysis.

- Visual Tools like Pie charts and Bar charts were also used.
- Descriptive tools and Chi-square test

This study has several limitations that should be acknowledged. The sample size is relatively small, which may impact the generalizability of the findings. Additionally, the survey respondents self-selected, which could lead to biases and inaccuracies. Respondents may also provide socially desirable answers rather than honest ones. The study's focus on payment app users aged 18-60 limits its demographic scope. Furthermore, the cross-sectional design provides only a snapshot in time, without examining changes over time. The reliance on self-reported data also introduces potential biases and inaccuracies. The findings may not be generalizable to other countries or regions. Measurement errors are also possible, as the survey questions may not accurately capture the constructs of interest. The lack of a control group limits the study's ability to compare payment app users with non-users. Finally, the data analysis methods used may not be sufficient to capture complex relationships, highlighting the need for future research to address these limitations.

Table No.2: Analysis of Demographics factors

A. Demographics Details

Demographic Characteristics	Measures	Frequency	Percentage
Age Group	Under 18	2	1.0
	18-30	133	65.5
	31-40	3	1.5
	41-50	63	31.0
	51-60	2	1.0
Gender	Male	115	56.7
	Female	88	43.3
Occupation	Service	6	3.0
	Business	78	38.4
	Professional	23	11.3
	Student	77	37.9
	Others	10	4.9
Education Level	Pre-Graduation	18	8.9
	Graduation	122	60.1
	Post-Graduation	63	31.0

As per the table the demographic analysis reveals a predominantly young user base, with 65.5% of

users aged 18-30, indicating a strong appeal among young adults. Males slightly outnumber females, comprising 56.7% of users. Business professionals and students are the most prominent occupations, accounting for 40.2% and 39.7% of users, respectively. This suggests that the payment app is widely adopted among entrepreneurs, business owners, and students. In terms of education, graduates form the largest segment, making up 60.1% of users, followed by post-graduates at 31%. The app's user base is predominantly educated, with only 8.9% having pre-graduation education. Overall, the payment app's user demographics indicate a strong presence among young, educated, and professionally inclined individuals.

Table No.3: Analysis of frequency of usage of apps and recommendation of apps

B. **Frequency of Usage of Apps and recommendation of apps**

Questions	Measures	Frequency	Percentage
Do you use payment apps?	Yes	197	97.0
	No	6	3.0
How often do you use payment apps?	Daily	168	82.8
	Weekly	19	9.4
	Monthly	2	1.0
	Occasionally	7	3.4
	Rarely	3	1.5
How likely are you to recommend payment apps to others?	Very likely	46	22.7
	Unlikely	2	1.0
	Neutral	24	11.8
	Likely	124	61.1
	Very unlikely	6	3.0

As per the table 3 the survey reveals widespread adoption of payment apps, with 97.0% of respondents using them. Only 3.0% do not use payment apps, indicating their limited non-use. Most respondents (84.42%) use payment apps daily, while 9.55% use them weekly. The majority (61.1%) are "Likely" and 22.7% are "Very Likely" to recommend payment apps. This suggests strong user satisfaction and willingness to promote payment apps. Only 3.0% are "Very Unlikely" and 1.0% are "Unlikely" to recommend. The data highlights high reliance on payment apps for daily transactions. Overall, payment apps have become an integral part of daily life for most respondents. The survey indicates a high level of acceptance and trust in digital payment solutions.

Table No.4: Analysis of Decision to Use Payment apps

C. Decision to Use Payment apps

Questions	Measures	Frequency	Percentage
Rate the importance of the following factors in your decision to use payment apps			
Ease of use	Not Important	45	22.5
	Slightly Important	118	59.0
	Moderately Important	18	9.0
	Very Important	14	7.0
	Extremely Important	5	2.5
Security	Not Important	87	43.5
	Slightly Important	84	42.0
	Moderately Important	13	6.5
	Very Important	11	5.5
	Extremely Important	5	2.5
Speed of transaction	Not Important	40	20.0
	Slightly Important	136	68.0
	Moderately Important	13	6.5
	Very Important	8	4.0
	Extremely Important	3	1.5
Availability of Discounts/Offers	Not Important	90	45.0
	Slightly Important	57	28.5
	Moderately Important	17	8.5
	Very Important	21	10.5
	Extremely Important	15	7.5
User Interface	Not Important	42	21.0
	Slightly Important	115	57.5
	Moderately Important	16	8.0
	Very Important	21	10.5
	Extremely Important	6	3.0
Customer Support	Not Important	33	16.5
	Slightly Important	130	65.0
	Moderately Important	16	8.0
	Very Important	15	7.5
	Extremely Important	6	3.0
Recommendations from Friends/ Family	Not Important	95	47.5
	Slightly Important	53	26.5
	Moderately	22	11.0

	Important		
	Very Important	21	10.5
	Extremely Important	9	4.5
Integration with other services	Not Important	101	50.5
	Slightly Important	52	26.0
	Moderately Important	27	13.5
	Very Important	16	8.0
	Extremely Important	4	2.00

The Table no 4 highlights that discounts and offers (28.3%) are the top priority for users when choosing a payment app, followed by recommendations from friends and family (17%). Factors like ease of use and security (both 9.4%), along with user interface and customer support (both 11.3%), are also important. However, speed of transactions (5.7%) and integration with other services (7.5%) have less influence on users' decisions.

Table No.5: Analysis of Decision to Use Payment apps

D. Payment Apps Frequencies and Challenges or Barriers While using payment Apps (Multiple Response)

Question	Measures	Frequency	Percentage
If yes, which payment apps do you use?(select all that apply)	Google Pay	161	30.5
	PhonePe	180	34.1
	Paytm	93	17.6
	Amazon Pay	20	3.8
	BHIM	72	13.6
	Free Charge	2	0.4
What Challenges or Barriers have you faced in using Payment apps?	Technical Issue	164	60.5
	Limited Expectance at stores	24	8.9
	Lack of trust/Securities concerns	49	18.1
	Lack of knowledge how to use them	14	5.2
	Preference for cash transactions	20	7.4

As per the table no 5 the payment app market is dominated by PhonePe (34.1%) and Google Pay (30.5%), accounting for nearly two-thirds of users. Paytm (17.6%) and BHIM Pay (13.6%) follow, while Amazon Pay (3.8%) has a minor presence. The majority of users (60.5%) face technical issues, such as app malfunctions or connectivity problems. Security concerns (18.1%) are the second biggest challenge, indicating trust remains a key hurdle. Limited acceptance in stores (8.9%) and preference for cash transactions (7.4%) also affect usage. Furthermore, 5.2% of users lack knowledge on operating the apps. These findings highlight the need for improved user education and support. Additionally, addressing

technical issues and security concerns is crucial for increasing adoption. Overall, the survey provides valuable insights into the payment app market and user behavior.

Test of Hypothesis

Table No.6: Age vs. Usage of Payment Apps

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	65.467[a]	4	0.000
Likelihood Ratio	15.083	4	0.005
Linear-by-Linear Association	2.918	1	0.088
N of Valid Cases	203		

From Table No 6, the Chi-Square test shows a significant relationship between age group and the use of payment apps. Specifically, younger adults (18-30) form the largest group of users, with a clear decline in usage as age increases. The fact that the p-value is below 0.05 (p = 0.000) indicates that age plays a significant role in whether or not individuals use payment apps.

Table No.7: Gender vs. Usage of Payment Apps

Chi-Square Tests					
	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.369a	1	0.242		
Continuity Correction[b]	0.565	1	0.452		
Likelihood Ratio	1.362	1	0.243		
Fisher's Exact Test				0.406	0.225
Linear-by-Linear Association	1.362	1	0.243		
N of Valid Cases	203				

The Chi-Square test results suggest there is no significant relationship between gender and the usage of payment apps (p = 0.242). Both males and females are relatively equal in their usage, and gender is not a determining factor for adoption.

Table No.8: Occupation vs. Usage of Payment Apps

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.701[a]	8	0.219
Likelihood Ratio	5.527	8	0.700
Linear-by-Linear Association	0.009	1	0.923
N of Valid Cases	192		

The Chi-Square test shows no significant relationship between occupation and the use of payment apps (p = 0.219). Various professional groups, including students, business professionals, and service employees, use payment apps at similar rates. Occupation does not strongly influence payment app usage

Table No.9: Education Level vs. Usage of Payment Apps

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.613[a]	3	0.003
Likelihood Ratio	8.641	3	0.034
Linear-by-Linear Association	1.365	1	0.243
N of Valid Cases	200		

The Chi-Square test indicates a significant relationship between education level and the usage of payment apps (p = 0.003). Graduates and post-graduates are more likely to use payment apps compared to those with lower education levels. This suggests that education influences the adoption of digital payment technologies.

Findings and Conclusion

1. Demographic Usage Patterns: Payment app usage is dominated by young adults and middle-aged individuals, with 65.5% of users falling within the 18-30 age range, followed by 31% in the 41-50 age range. In terms of gender, males slightly outnumber females, accounting for 56.7% of users. The majority of users are business professionals and students, making up 40.2% and 39.7% of the user base, respectively. Interestingly, users with higher education levels are more likely to adopt payment apps, with 60.1% holding a graduate degree and 31% holding a postgraduate degree.

2. **App Preferences**: PhonePe (34.1%) and Google Pay (30.5%) are the most widely used payment apps, together accounting for nearly two-thirds of users. Other popular apps include Paytm (17.6%) and BHIM Pay (13.6%), while Amazon Pay and Free charge have a minor presence (Data Analysis).

3. **Frequency of Usage**: The majority of respondents (84.4%) use payment apps daily, indicating that these apps are a critical part of their routine. A smaller percentage uses them weekly (9.5%), and only a few use them monthly or rarely (Data Analysis).

4. **Factors Influencing Usage**: Discounts/Offers (28.3%) and recommendations from friends/family (17%) are the most important factors influencing the adoption of payment apps. Other notable factors include ease of use (9.4%), security (9.4%), and user interface (11.3%)(Data Analysis).

5. **Challenges in Usage**: Technical issues (60.5%) are the most common challenge faced by users, followed by security concerns (18.1%). Other barriers include limited acceptance at stores

In Conclusion, the research suggests that the establishment of fintech has modified the use of banking services, especially payment applications. Given the inclination and utility of a majority of the users most of them being the young adults and business people to make use of these apps in carrying out transactions, it is evident that the concept of banks is changing. Payment applications are providing much more cost effective and time proficient processes allowing customers to bypass using a physical banking unit for simple tasks like paying bills or transferring funds. This change is making people less dependent on traditional banking tools such as checks, and branch deposits, thus affecting conventional bank-customer interaction.

Moreover, the high level of trust and reliance on digital platforms is reshaping customer expectations from traditional banks. Banks are now being prompted to adopt digital solutions, partner with fintech companies, and improve their own digital offerings to stay competitive. In doing so, they can address the gap between customer demand for seamless, tech-enabled banking experiences and the traditional models of service delivery. The rise of payment apps also emphasizes the need for banks to innovate in areas such as mobile banking, customer service automation, and data security to remain relevant in the evolving financial ecosystem.

Recommendations

To enhance user experience, fintech companies should prioritize simple, intuitive interfaces catering to young adults and middle-aged individuals. Seamless onboarding, easy navigation, and customizable features are essential. Business professionals, making up 40.2% of users, require advanced features like invoicing and accounting integration. Daily transactions should be supported with features like QR code payments and loyalty rewards. Security concerns must be addressed through advanced encryption, fraud detection, and biometric authentication. Collaboration with traditional banks can provide integrated services, expanding reach. Traditional banks should adopt fintech-like digital interfaces, enhancing customer satisfaction and reducing operational costs by focusing on these areas, fintech companies can improve user engagement, increase adoption, and build trust among users.

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A Study of Factors affecting the Investment pattern of Individuals with special reference to Investors in Belagavi City

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Abstract

Investment behaviour is shaped as much by circumstance and psychology as by pure financial calculation, and this study set out to understand how a group of individual investors in Belagavi actually go about deciding where to invest their money. A structured questionnaire was administered to 107 respondents who are either active investors or otherwise participate in financial markets, covering their demographic background, the instruments they currently hold, and psychological drivers such as risk tolerance, loss aversion, and reliance on advice. Chi-square tests were used to check whether age, income, and educational qualification are associated with an investor's self-reported knowledge of different financial instruments. The results describe a fairly young, moderately risk-averse investor base that still leans heavily on Fixed Deposits even as interest in equity and mutual funds grows, and one that mostly prefers taking advice over deciding on its own. Age, income, and qualification were each found to be significantly associated with investor knowledge of specific instruments, which suggests that financial literacy is unevenly spread across this population and that more targeted investor education could meaningfully improve decision-making.

Keywords: investment behaviour, behavioural finance, risk tolerance, financial literacy, investor psychology

Introduction

India has long been described as a saving-oriented economy, where households plan their spending around income and accumulated savings rather than around a wider set of investment options. Recognising this, policymakers have repeatedly pushed for greater awareness of modern investment avenues among retail investors. SEBI set up the National Institute of Securities Markets (NISM) in 2005 specifically to educate and train market stakeholders and to support research in the capital markets space, and it later ran the Securities Market Awareness Campaign to build investor understanding more broadly. Despite these efforts, participation remains thin: a 2019 survey found that only about 2.5 percent of the Indian population invests in the stock market and just 1.5 percent in mutual funds, which is part of why AMFI's "Mutual Fund Sahi Hai" campaign was launched to widen the reach of these avenues.

Investment is best understood as a core part of financial planning, the process by which individuals commit resources to asset classes such as equities, bonds, real estate, or mutual funds in the hope of generating future returns. Making sense of how people actually invest, and why they invest the way they do, is useful not only academically but practically, since it feeds directly into how financial products are designed and how investor education is delivered.

The decisions people make about their money are rarely driven by a single factor. Economic variables such as interest rates, inflation, and prevailing market trends interact with personal characteristics like risk tolerance, financial literacy, and income level, while external forces including technology, regulation, and global events add further pressure on individual choices. This study looks at this mix of factors as it plays out among a sample of individual investors in Belagavi, with the aim of identifying patterns that could be useful to policymakers, financial advisors, and product designers seeking to encourage more informed participation in financial markets.

Objectives of the Study

- To analyse the investment patterns of individuals and identify the most popular investment vehicles across different age and income groups.
- To examine the factors that influence investment decisions, with particular attention to risk tolerance, financial literacy, and demographic characteristics.
- To explore the psychological and social factors that shape individual investment decisions and behaviour.

Review of Literature

Investment Patterns and Demographic Segmentation

A fair amount of research has looked at how investment choices shift with age. Younger investors, especially those in their twenties and thirties, tend to gravitate toward riskier instruments such as stocks and equity mutual funds, largely because a longer time horizon lets them absorb short-term volatility (Barberis & Thaler, 2003). As investors approach retirement, this appetite for risk typically declines, with older investors favouring safer, income-generating options such as bonds, fixed deposits, or annuities (Finke et al., 2011); Bodie (1992) similarly documents this shift from risk-seeking to risk-averse behaviour with age. Lusardi and Mitchell (2011, 2014) add a useful qualification here, showing that risk tolerance among younger investors also depends heavily on financial literacy and educational background, with more financially literate young adults tending to build more diversified portfolios even early in life.

Income has its own independent effect on investment behaviour. Higher-income individuals are more likely to hold diversified portfolios spanning equities, real estate, and international markets (Goetzmann & Kumar, 2008), and are also more likely to venture into alternative assets such as private equity or venture capital (Cheng, 2018). Lower-income individuals, by contrast, are often constrained to safer and more liquid instruments such as savings accounts, government bonds, or low-risk mutual funds (Lusardi & Mitchell, 2011). In developing economies specifically, higher income tends to correlate with greater participation in formal financial markets and a stronger capacity for long-term investing (Klapper et al., 2012).

Factors Influencing Investment Decisions

Risk tolerance is perhaps the most extensively studied psychological driver of investment behaviour. It is usually measured through structured questionnaires or scenario-based assessments, and research consistently finds that it varies by age, financial circumstance, and personality (Grable & Lytton, 1999): younger people generally show higher risk tolerance, while those near or in retirement show markedly less (Finke et al., 2011). Guiso et al. (2002) find that socio-economic factors also matter here, with higher education and income levels associated with a greater willingness to take on risk, a pattern echoed by Bodie et al. (1992), who link comfort with financial markets to greater willingness to pursue higher, riskier returns.

Financial literacy is another recurring theme. Lusardi and Mitchell (2014) found that individuals with higher financial literacy are more likely to diversify their portfolios, steer clear of high-fee products, and plan more effectively for retirement, whereas those with lower literacy tend to underinvest or hold concentrated, less optimal portfolios (Van Rooij et al., 2012). Financial education programmes appear to help close this gap:

Cole et al. (2011) found that such programmes can meaningfully improve participation in long-term savings and investment, and Lusardi and Mitchell (2011) link financial literacy directly to better retirement planning and greater use of tax-advantaged instruments.

Demographic traits beyond age and income also shape investment choices. Barber and Odean (2001) found that men tend to display more confidence and risk tolerance in their investment decisions than women, while Miller and Noulas (2013) note that more highly educated individuals are more likely to self-direct their investing and diversify. Family circumstances matter too: married individuals and those with children often lean toward safer, longer-horizon investments to protect their family's financial future (Moffitt, 1992), while single individuals without dependents tend to show more risk-seeking behaviour (Haliassos & Bertaut, 1995).

Psychological and Social Factors in Investment Behaviour

Behavioural finance has identified a number of biases that distort otherwise rational investment decisions. Overconfidence is a well-documented example, where investors overestimate their own ability to forecast market movements, often leading to excessive trading and underestimation of risk (Odean, 1998). Loss aversion is another central bias: Kahneman and Tversky (1979) showed that people feel the pain of a loss more sharply than the pleasure of an equivalent gain, and Shefrin and Statman (1985) found that this tends to make investors hold on to losing positions longer than is rational, in the hope of eventually recovering their losses.

Social dynamics play a role too. Herd behaviour, the tendency to follow the actions of a larger group, has long been documented in financial markets and is often blamed for asset bubbles and panic-driven selling during periods of instability (Bikhchandani et al., 1992). This effect has arguably intensified with social media, where individuals increasingly base investment decisions on trending advice or influencer opinions without fully grasping the underlying risk (Venturelli & Croce, 2020). Cultural context matters as well: Guiso et al. (2002) note that in more collectivist societies, an individual's investment decisions are often shaped by family dynamics rather than made in isolation.

Finally, professional advice has its own complicated relationship with investor outcomes. Hackethal et al. (2012) found that financial advisors can help investors overcome emotional biases and take a more objective, long-term view of their portfolios. At the same time, Baker and Nofsinger (2010) caution that reliance on advisors introduces its own bias, since investors often trust expert opinion more readily than the evidence warrants.

Research Methodology

Research Design

This study follows a quantitative, empirical research design, allowing for the systematic collection, analysis, and interpretation of data on investor psychology and decision-making among the sampled population.

Sample Design

The population for the study consists of individuals interested in investing in stock markets and financial securities in Belagavi city. The sample frame was drawn from people actively participating in financial markets, whether through stocks, bonds, or other instruments. Given the practical constraints of the study, a convenience sampling method was used, with respondents selected based on their accessibility and their relevance to the research questions.

The sample size was arrived at using a standard formula that accounts for confidence level, margin of error, and population size, as shown below.

Parameter	Value
Margin of error	7%
Confidence level	93%
Population size	7,00,000
Response distribution	50%
Sample size	107

Source: raosoft.com sample size calculator.

Data Sources and Analysis Tools

Primary data was collected through a structured online survey distributed to the selected sample of investors, covering demographic information, investment behaviour, and psychological factors such as risk tolerance, overconfidence, loss aversion, and herd behaviour. Google Forms was used for survey creation, data collection, and initial analysis; SPSS was used for the chi-square hypothesis testing; and frequency tables and pie charts were used to visualise the data.

Hypotheses

The following hypotheses were tested using the chi-square test of independence:

- H1a: Age is significantly associated with an investor's knowledge of mutual funds.
- H1b: Age is significantly associated with an investor's knowledge of bonds and debentures.
- H1c: Age is significantly associated with an investor's knowledge of government schemes (PPF, NSC).
- H1d: Age is significantly associated with an investor's knowledge of real estate.
- H2: Educational qualification is significantly associated with an investor's knowledge of bonds and debentures.
- H3: Annual income is significantly associated with an investor's knowledge of mutual funds.

In each case, the null hypothesis (H0) states that no such association exists.

Data Analysis and Interpretation

Demographic Profile of Respondents

Of the 107 respondents, 80 (74.8%) were male and 27 (25.2%) were female, indicating a sample weighted considerably toward male investors. The age distribution skewed young: 82 respondents (76.6%) fell in the 20-30 bracket, with much smaller shares below 20 (1.9%), between 30-40 (9.3%), between 40-50 (5.6%), and 50 and above (6.5%). In terms of qualification, 51 respondents (47.7%) were undergraduates and 48 (44.9%) were postgraduates, with only 8 (7.5%) below graduate level, suggesting a well-educated sample overall.

Demographic Variable	Category	Frequency	Percent
Gender	Male	80	74.8%
	Female	27	25.2%
Age	Below 20	2	1.9%
	20-30	82	76.6%
	30-40	10	9.3%
	40-50	6	5.6%
	50 and above	7	6.5%
Qualification	Below Graduation	8	7.5%
	Under Graduate	51	47.7%
	Post Graduate	48	44.9%
Occupation	Business	20	18.7%
	Professional	29	27.1%
	Services	10	9.3%
	Student	48	44.9%
Annual Income	Less than ₹2.5L	58	54.2%
	₹2.5L - ₹5L	27	25.2%
	₹5L - ₹10L	14	13.1%
	Above ₹10L	8	7.5%

Occupationally, students made up the largest group (44.9%), followed by professionals (27.1%) and business owners (18.7%), which fits with the young age profile of the sample. Income levels were correspondingly modest: over half the respondents (54.2%) earned less than ₹2.5 lakh annually, and only 7.5% earned above ₹10 lakh. Read together, these figures describe a sample dominated by young, relatively early-career individuals, many still in education or in the early stages of their working lives — a group whose investment choices are likely still forming rather than fully settled.

Investment Experience and Holdings

Investment experience among respondents was relatively limited: 47.7% had been investing for less than one year and 35.5% for between one and three years, while only 8.4% had more than seven years of experience. This is consistent with the sample's youth and suggests that most respondents are still fairly early in their investing journey.

Duration of Investing	Frequency	Percent
Less than 1 year	50	46.7%
1-3 years	38	35.5%
4-7 years	10	9.3%
More than 7 years	9	8.4%

Fixed Deposits were the most commonly held instrument (33.3%), followed by Stocks (28.2%) and Mutual Funds (25.0%), while Gold (6.4%), ETFs (5.8%), and Bonds (1.3%) made up smaller shares of the portfolio. This points to a fairly cautious portfolio mix overall — a continued reliance on the safety of Fixed Deposits even as equity and mutual fund investing gain ground, likely reflecting both the sample's youth and the well-documented Indian preference for guaranteed-return instruments.

When asked how they knew about various instruments, respondents reported the greatest familiarity with Bonds/Debentures (23.1% of responses) and Real Estate (21.3%), followed by Government Schemes such as PPF and NSC (16.9%), Equity (14.4%), and Commodities such as Gold and Silver (13.8%); Mutual Funds (6.3%) and Fixed Deposits (4.4%) were comparatively less recognised as distinct instruments in this framing, even though Fixed Deposits were the most widely held product — an inconsistency that may simply reflect how familiar and unremarkable Fixed Deposits feel to most respondents, rather than genuine unfamiliarity with the product.

Decision-Making, Goals, and Risk Behaviour

A clear majority of respondents (62.6%) said they prefer to take advice when making investment decisions, compared to 37.4% who prefer deciding independently. This lines up with the literature on financial advisors discussed earlier, and suggests that most investors in this sample still see themselves as needing external guidance rather than acting purely on their own judgement.

Short-term gain was the most commonly cited investment goal (44.1%), followed by education (25.0%), income tax reduction (14.0%), retirement (8.8%), and home purchases (8.1%). The dominance of short-term thinking, especially among a sample this young, hints at either limited long-term planning horizons or simply a stage-of-life effect, where retirement and home purchases are not yet pressing concerns.

On return expectations, 49.5% of respondents described their expectations as moderate, 23.4% as low, 22.4% as high, 2.8% as very high, and 0.9% as very low — a fairly conservative distribution overall, with very few investors expecting outsized returns.

Risk aversion showed up clearly in responses to a hypothetical choice between a guaranteed 5% return and a riskier option offering a potential 10% return with a chance of a 5% loss: 59.8% chose the guaranteed return, while 40.2% were willing to take on the risk. On loss aversion specifically, half the sample (50.5%) said they sometimes hold on to losing investments hoping for a recovery, while 14.0% said they do so very often and 11.2% said always — together suggesting that a meaningful share of investors, well over a third, are prone to this bias at least some of the time.

Hypothesis Testing (Chi-Square)

Chi-square tests of independence were run to examine whether age, qualification, and income are associated with investor knowledge of specific instruments. The results are summarised below.

Hypothesis	Variables Tested	χ^2 Value	df	p-value	Result
H1a	Age × Mutual Fund knowledge	33.726	16	.006	Significant
H1b	Age × Bonds/Debentures knowledge	37.553	16	.002	Significant
H1c	Age × Govt. Schemes knowledge	38.106	16	.001	Significant
H1d	Age × Real Estate knowledge	34.483	16	.005	Significant
H2	Qualification × Bonds/Debentures knowledge	24.439	8	.002	Significant
H3	Annual Income × Mutual Fund knowledge	23.070	12	.027	Significant

In every case, the p-value fell below the 0.05 threshold, so the null hypothesis of no association is rejected across all six tests. Age turned out to be significantly associated with knowledge of mutual funds, bonds and debentures, government schemes, and real estate alike, indicating that an investor's stage of life shapes not just their appetite for risk but also which instruments they understand well. Similarly, both educational qualification and income level were significantly linked to investor knowledge — qualification to knowledge of bonds and debentures, and income to knowledge of mutual funds — reinforcing the broader literature finding that financial literacy tracks fairly closely with socio-economic standing rather than being evenly distributed across the investor population.

Key Findings

- The sample is young and male-skewed, with over three-quarters of respondents between 20 and 30 years old and roughly three-quarters male.
- Most respondents are relatively new to investing, with close to half having less than a year of experience in financial markets.
- Fixed Deposits remain the most widely held instrument, ahead of Stocks and Mutual Funds, pointing to a continued preference for capital safety over higher potential returns.
- A majority of investors prefer taking advice over deciding independently, reflecting continued reliance on external guidance.
- Short-term gain is the leading investment goal, ahead of education, tax planning, retirement, and home purchase, which may partly reflect the sample's youth.

- Return expectations are largely moderate, and when faced with a risk-return trade-off, a clear majority chooses the safer, guaranteed option over the riskier one with higher potential upside.
- A meaningful proportion of respondents show signs of loss aversion, holding on to losing investments at least some of the time in the hope of recovery.
- Age, educational qualification, and income are all significantly associated with investor knowledge of specific financial instruments, confirming that financial literacy varies systematically across demographic groups rather than being randomly distributed.

Recommendations

- Education and awareness programmes: Targeted workshops, webinars, and online resources can help both novice and experienced investors better understand market dynamics, risk assessment, and investment strategy.
- Integration of behavioural finance into advisory services: Financial advisors who understand common biases such as overconfidence and loss aversion are better positioned to guide clients toward more rational decisions.
- Clearer disclosure practices: Simplifying the language and format used to describe investment products would help investors better understand risks and benefits before committing funds.
- Greater use of technology and analytics: Tools such as robo-advisors and real-time sentiment analysis can help investors navigate volatile markets with more personalised, timely insight.
- A shift toward long-term investment strategies: Products that reward patience, such as retirement accounts and index funds, should be actively promoted alongside investor education on the value of long-term horizons.
- Behavioural nudges: Default settings in retirement plans, for instance, could be designed to encourage higher contribution rates or more diversified portfolios.
- Investor communities and peer support: Spaces where investors can share experiences may help reduce isolation during downturns and encourage more disciplined behaviour.
- Regular feedback mechanisms: Systematic feedback from investors can help shape better-suited products and policy over time.
- Stronger investor protections: Regulatory frameworks that guard against predatory practices and ensure fair access to information can build the confidence needed to draw more individuals into formal investing.

Limitations of the Study

This study, like most work grounded in behavioural finance, is limited by the inherently subjective nature of investor behaviour, which makes it difficult to establish universally applicable principles. Behavioural factors are also notoriously hard to quantify and predict, which limits how confidently the findings here can be used to forecast future market movements. Unlike more traditional economic theories, behavioural finance does not offer a single testable model, so findings such as these should be read as descriptive rather than predictive. There is also a risk that models fitting this particular dataset well may not generalise cleanly to other populations or time periods, and the study does not fully capture the wide individual variation in investor behaviour that a larger, more heterogeneous sample might reveal. Finally, the use of convenience sampling and a modest sample size of 107 respondents, drawn from a single city, limits how far these findings can be generalised to the broader investing population.

Conclusion

This study set out to understand how a group of individual investors in Belagavi make investment decisions, and the picture that emerges is of a young, cautious, advice-seeking investor base still finding its footing in

financial markets. Fixed Deposits continue to dominate portfolios even as interest in equities and mutual funds grows, return expectations remain largely moderate, and a clear majority still favours certainty over higher potential returns when given the choice. At the same time, the significant associations found between age, income, qualification, and instrument-specific knowledge confirm what much of the existing literature has already suggested: financial literacy is not evenly spread across the population, and where an investor sits on these demographic markers has a real bearing on what they understand and, ultimately, on what they choose to invest in. Closing these gaps through more targeted, life-stage-appropriate financial education, combined with clearer product disclosure and better use of behavioural nudges, could go a long way toward helping individuals make more informed and confident investment decisions.

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Appendix: Questionnaire

Section 1: Demographic Information

- Gender: Male / Female
- Age: Below 20 / 20-30 / 30-40 / 40-50 / 50 and above
- Qualification: Below Graduation / Under Graduate / Post Graduate
- Occupation: Business / Professional / Services / Student
- Annual Income: Less than ₹2.5L / ₹2.5L-5L / ₹5L-10L / Above ₹10L

Section 2: Investment Behaviour

- How long have you been investing in financial markets? Less than 1 year / 1-3 years / 4-7 years / More than 7 years
- What types of investments do you currently hold? Stocks / Bonds / Mutual Funds / ETFs / Fixed Deposits / Gold
- Rate your knowledge of the following instruments (No Knowledge to Expert Knowledge): Equity, Mutual Funds, Bonds/Debentures, Fixed Deposits, Government Schemes (PPF, NSC), Real Estate, Commodities
- How do you prefer to make investment decisions? Independently / Take advice
- What is your primary investment goal? Short-term gain / Retirement / Education / Income tax reduction / Home purchase

Section 3: Psychological Factors

- What are your expected returns from investment? Very low / Low / Moderate / High / Very high expectations
- Given two investment options, one with a guaranteed return of 5% and another with a potential return of 10% but also a risk of losing 5%, which would you choose?
- Are you more likely to hold onto losing investments, hoping that they will recover? Never / Rarely / Sometimes / Very often / Always

Investor's Behavior Analysis: An Empirical Study with special reference to Belagavi

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Abstract

The study reveals the psychological and emotional variables influencing investment decisions. Despite the rationality assumed by traditional finance, irrational tendencies such as herd mentality, loss aversion, and overconfidence are frequently seen in real-world behavior, which can result in market oddities like bubbles or crashes. The analysis of investor behavior reveals that younger individuals, particularly students and those with moderate income levels are increasingly participating in the stock market. Most investors are cautious, preferring growth and blue-chip stocks while allocating a smaller portion of their savings. Their primary goal is long-term wealth creation, supported by a moderate risk tolerance and rational decision-making practices. However, the tendency to panic sell during market downturns highlights emotional challenges in volatile situations.

Keywords: *Capital Market, Investment Avenues, Investor Types, Risk Tolerance, Investor Behavior*

Introduction

Investment decisions are influenced by various factors. Research in behavioral finance has demonstrated that emotions, cognitive biases, and social influences frequently play a considerable part in investing decisions, which were previously thought to be driven only by logical economic calculations. These characteristics cause investors to act in ways that are not entirely reasonable, like following the crowd, reacting to news, or avoiding losses at all costs. Price bubbles and crashes are examples of market inefficiencies that might result from such behaviors.

An investor's decision-making process is influenced by both general market trends and volatility as well as individual considerations like age, experience, and financial objectives. Emotional responses to these elements may result in panic selling or speculative purchasing. Understanding these behaviors provides valuable insights for financial professionals, enabling them to help clients make better investment decisions, manage risk, and improve strategies. This discipline provides a greater understanding of the psychological components of decision-making and contradicts the notion that investors are always logical.

Need for the study

The study reveals the psychological and emotional variables influencing investment decisions. Despite the rationality assumed by traditional finance, irrational tendencies such as herd mentality, loss aversion, and overconfidence are frequently seen in real-world behavior, which can result in market oddities like bubbles or crashes. Financial professionals and investors can better manage risks and make wise decisions by being aware of these tendencies. Analyzing these behaviors helps advisors create better strategies and helps authorities prevent market manipulation, which ultimately improves risk management and financial decision-making as financial markets grow more complicated, particularly with the development of individual investors and social media.

Objective of the study

- To investigate how demographic characteristics (income, gender, and age) affect investing decisions.
- To understand how news and market changes affect investor sentiment and behavior.
- To identify distinct investor types and their behavioral patterns.
- To assess investor risk tolerance levels.
- To evaluate the effect of market volatility on investor behavior.
- To analyze investor confidence in the stock market within Belagavi city.

Literature Review

1. K. Parimalakanthi and M. Ashok Kumar (2015) looks at a number of factors related to the behavior and preferences of individual investors in India, such as the main forms of investments, the impact of family on decisions, the motivations behind purchasing insurance, and the degree of financial literacy among diverse groups. It also emphasizes how well-liked bank deposits and gold investments are. The study highlights the significance of raising household savings in India's expanding economy, the influence of demographics on investment choices, and the necessity of trustworthy information to make wise selections. All things considered, it offers a thorough summary of the elements influencing the tastes and actions of Indian investors.

2. V.Seetha and NITHYA.T.V (2016) focused on the value of investing, the fallacy that investing is gambling, and the financial system's effects on the economy. It also looks at how the capital market in India is regulated, what makes up the market, and how commodities and derivatives are developing. Along with the goals of the study, it also covers the household sector's contribution to domestic savings and the things to think about before investing.

3. U M Gopal Krishna, Aliya Sultana, T Naraya Reddy (2019 study investigated the idea of investing by looking at the advantages of mutual funds and public interest in the stock market. The function of real assets in investment portfolios was also examined, and a statistical analysis of the factors influencing investors' preferences for various investment possibilities was carried out.

4. Balasubramanian and S. Umamageswari (2020) focused on developing regulations that support the stable expansion and development of security markets, it is essential to comprehend the attitudes and preferences of investors. This review examines the ways in which a number of variables, including income, career, education, age, gender, and age, affect investor behavior. It highlights how crucial investor awareness and beliefs are to promoting financial expansion and the general operation of the capital market. The study emphasizes how individual investors are crucial in supplying funds for company growth and how their actions affect market performance and business success.

5. R.Karthika, S.Kayalvizhi and S.Prasanna (2023), the study focused on challenges investors face in selecting suitable investment options, the changing attitudes of investors over time, the effect of demographic characteristics and information sources on investor awareness and risk avoidance, and aims to provide an overview of the investment opportunities offered by various financial institutions. It also aims to understand investor preferences, goals, and attitudes towards investment methods.

6. Abhijeet Chandra, Ravinder Kumar (2012) considered a survey of over 350 individual investors in India highlights key insights into their decision-making. First, investors rely on heuristics, using price as an anchor and displaying overconfidence in their judgments. Second, their behavior is strongly influenced by representativeness, and they engage in mental accounting by grouping gains and losses. Third, while they consider fundamentals, they tend to discount complex information initially, favoring data that can be easily integrated into their decision-making. Finally, there is an asymmetric distribution and usage of information among investors, which significantly impacts their investment behavior.

7. Shalini Kalra Sahi, Ashok Pratap Arora (2012) paper seeks to categorize investors into behavioral groups based on their biases, understand their investment preferences, and explore the implications for financial service providers. Through exploratory research and in-depth interviews, an inventory of 97 biases was developed and refined. Data from 377 respondents helped identify eight key biases, which were then analyzed using cluster analysis. The findings revealed distinct segments of investors, providing valuable insights for financial service providers.

8. Sakshi Garg, Smita Mishra (2020) focused on analyzing investor behavior in the stock market, exploring their investment preferences, and assessing the market's growth potential. Using a Descriptive Research

Design, the study employed questionnaires and surveyed 90 actual and potential investors from Share Khan Pvt. Ltd., using simple random sampling. The research examines stockholders as real company owners, despite their lower priority for dividends.

9. Haritha PH, Abdul Rishad (2020) addresses a research gap by exploring the role of irrational investor sentiment in driving stock market volatility. An irrational sentiment index was created using principal component analysis and monthly data. To assess the impact of this index on volatility, the study applied GARCH and Granger causality models. The results show that irrational sentiment is a major contributor to excessive market volatility. Additionally, the study highlights how market inefficiencies can increase both returns and volatility. These insights are valuable for retail investors and portfolio managers aiming to maximize profits.

10. Rajdeep Kumar Raut (2020), tests the theory of planned behavior (TPB) by examining how individual investors' investing decisions are influenced by their prior performance and level of financial knowledge. A self-administered questionnaire was used to gather data from four Indian states using convenience and snowball sampling. The data was examined using structural equation modeling, or SEM. The findings demonstrated that whereas prior conduct did not directly affect investment intention, it did have a large indirect impact through investor attitudes. Thirty-six percent of the variation in investment intention was explained by the model. Furthermore, Indian investors were heavily impacted by societal pressure, which may be lessened with increased financial awareness.

11. Raghavendra KS, Meryn R George (2022) focused on investment involves using savings for activities that yield additional profits, with options like stocks, bonds, bank deposits, insurance, and real estate. Due to increased awareness, more people are shifting from savings to investments for future benefits. Historically, Indians favored gold, real estate, and fixed deposits, but liberalization in the 1990s introduced new options like mutual funds and stocks. The 2008 financial crisis led to a return to safer investments. The study explores factors influencing investment behavior, such as age, gender, income, education, and occupation. The methodology involved a survey with 178 respondents, receiving 159 valid responses, analyzed using percentage and Garrett's ranking techniques.

12. Bhavik U Swadia (2017) focused on the investment habits, goals, and savings growth of middle-class investors in Ahmadabad. The study's goal is to determine the factors, specifically, the age group and income of the household head that influence their investing choices. It also examines the ways in which these factors affect the selection of investment opportunities. The study highlights the untapped potential of the middle class, a topic that has gained increasing attention from politicians, market experts, and economists. Using judgment sampling, a survey was carried out with a sample size of 100 respondents. Primary data was obtained through direct communication, observation, and questionnaire distribution, whilst secondary data was obtained from government sources. Data analysis was done to understand absence rates and the causes of them.

13. Mubarak and Ramesh Olekar (2020), the study employed a sample of 487 investors from Karnataka cities, including Bangalore, Gulbarga, Hubli, and Mysore. A descriptive research design and convenience sampling were used, and data was collected through a structured questionnaire. The analysis was done using frequency distribution, percentage analysis, and chi-square tests. The results show that 70% of investors prefer equity, mutual funds, and derivatives, seeking capital appreciation, safety, and risk hedging. The study concludes that young investors prefer profitable, safe instruments like futures and options because they are transparent and knowledgeable.

14. Arup Kumar Sarkar, Tarak Nath Sahu (2018), study examined the investment behavior of individual stock market investors to ascertain if the three independent variables—demographic characteristics, awareness, and perceived risk attitude—have any bearing on the single dependent variable, investing behavior. The study collected primary data from 400 randomly selected individual stock market investors from various districts in West Bengal using a standardized questionnaire with a five-point Likert scale. The survey indicates that individual investors are reasonably aware and that their financial knowledge is superior to their social learning. The main factor influencing perceived risk attitude is affect rather than cognition. The data indicates that risk perceptions, awareness, and demographic characteristics have a significant impact on the investment behavior of individual stock market investors.

15. Haritha PH, Rashmi Uchil (2020), focused on a conceptual framework that takes into account herding, market, and awareness aspects that impact IS and DM is proposed by this study, which also looks at the relationship between factors that influence investor sentiment (IS) and investment decision-making (DM). 875 individual investors were given a questionnaire survey utilizing convenience sampling to collect data, and structural equation modeling was used to evaluate the connections between market effect, herd

behavior, media, social interaction, and advocate referral. The study found that, in comparison to media, social interaction, and advocate recommendations, the internet has the least influence on investor attitude, whereas market effect and herding have a substantial impact.

Research Gap

- Investor behavior during high market volatility.
- Stock market investment allocation & strategies are underexplored
- Decision-making process & information sources are understudied
- Frequency of Investment Monitoring Is Missing.
- Behavioral biases across different demographics.
- Emotional and sentimental factors in investment decisions.

Research methodology

The study examines how a sample group of employed, self-employed, retired, and student people in the Belagavi metropolitan region perceive investment opportunities. The study's data collection was based on the responses of 317 members to the questionnaire. The primary data was gathered using a standardized questionnaire. Secondary data is gathered from a variety of sources, including books, journals, articles, company documents, and other sources. The investors in Belagavi city are the exclusive focus of this study. Simple random sampling and convenience sampling are the methods employed. Convenience sampling, which chooses research subjects based on accessibility, frequently results in a non-representative sample. Simple random sampling, on the other hand, guarantees that every individual in the population has an equal chance of being included, leading to findings that are unbiased and broadly applicable. Descriptive analysis and percentage analysis were among the tools used for analysis and interpretation. This approach is very helpful for summarizing demographic data, survey results, and a clear picture of a dataset's features.

Limitation of the study

- Only Belagavi is included in this study.
- Changing market conditions.
- Few respondents were hesitating to provide in depth details.
- The responses provided by the respondents may not be accurate.

Formulation of Hypothesis

Table 1: Relationship between Age & Risk Tolerance

Age	Risk Tolerance				
	High Risk	Moderate Risk	Low Risk	Risk Avoider	**Total**
Below 20	8	13	15	9	**45**
21 – 30	38	92	56	19	**205**
31 – 40	2	14	10	1	**27**
41 – 50	2	8	12	1	**23**
51 and Above	0	6	5	6	**17**
Total	**50**	**133**	**98**	**36**	**317**

Table 1 shows the relationship between the age groups & the risk tolerance of the various age groups.

Table 2: Chi Square Test for age & risk tolerance

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)

Pearson Chi-Square	28.416[a]	12	.005
Likelihood Ratio	28.312	12	.005
Linear-by-Linear Association	3.904	1	.048
N of Valid Cases	317		
a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is 1.93.			

- **H0:** Age and risk tolerance level in investments are independent (there is no association between age and risk tolerance level).
- **H1:** Age and risk tolerance level in investments are not independent (there is an association between age and risk tolerance level).

Interpretation: From Table No 2**,** Age and investment risk tolerance were shown to be significantly correlated by the Chi-Square test ($p = 0.005$, $\chi^2 = 28.416$, $df = 12$). The null hypothesis is rejected when the p-value is less than 0.05. According to the study, people's preferred risk tolerance levels vary depending on their age, with younger and older people having varying levels of willingness to take on investing risks.

Table 3: Relationship between Gender & Risk Tolerance

Gender	**Risk Tolerance**				
	High Risk	Moderate Risk	Low Risk	Risk Avoider	**Total**
Male	30	80	50	17	177
Female	20	53	48	19	140
Total	50	133	98	36	317

Table 3 above gives the details of relationship between the gender & the risk tolerance level of the genders.

Table 4: Chi Square Test between Gender & the risk tolerance level

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.360[a]	3	.339
Likelihood Ratio	3.357	3	.340
Linear-by-Linear Association	2.772	1	.096
N of Valid Cases	317		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.90.			

- **H_0:** Gender and investment risk tolerance do not significantly correlate.
- **H_1:** Gender and investment risk tolerance are significantly correlated.

Decision: We reject the alternative hypothesis (H_1) and accept the null hypothesis (H_0) since the p-value (0.339) is higher than the significance level (0.05).

Interpretation: From Table No 4**,** The findings suggest that gender has no bearing on risk levels because there is no discernible correlation between gender and investment risk tolerance. Reliable results are ensured by meeting test assumptions, which include all predicted cell counts exceeding 5 and a minimum expected count of 15.90.

Table 5: Relationship between Educational qualification & risk tolerance

Education	Risk Tolerance				
	High Risk	Moderate Risk	Low Risk	Risk Avoider	**Total**
High School	5	6	6	2	19
Undergraduate	22	70	46	22	160
Post Graduate	20	55	43	11	129
Professional Qualification	3	2	3	1	9
Total	50	133	98	36	317

Table 6: Chi Square test between Education & risk tolerance

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.214[a]	9	.615
Likelihood Ratio	6.830	9	.655
Linear-by-Linear Association	.192	1	.661
N of Valid Cases	317		
a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is 1.02.			

- **H_0:** There is no significant association between educational qualification and risk tolerance level in investments.
- **H_1:** There is a significant association between educational qualification and risk tolerance level in investments.

Decision: We reject the alternative hypothesis (H_1) and accept the null hypothesis (H_0) since the p-value (0.615) is higher than the significance level (0.05).

Interpretation: From Table No 6**,** The results indicate that there is no statistically significant relationship between an investor's educational background and their level of risk tolerance. This suggests that the participants' educational background has little bearing on their risk tolerance levels.

Table 7: Relationship between the Occupation & the risk tolerance

Occupation	Risk Tolerance				
	High Risk	Moderate Risk	Low Risk	Risk Avoider	**Total**
Student	30	64	51	19	164
Employed	13	53	37	12	115
Self Employed	7	11	8	1	27
Retired	0	5	2	4	11
Total	50	133	98	36	317

Table 7 above shows the relationship between the occupation of the respondents & their risk tolerance level.

Table 8: Chi Square Test between the occupation of the respondents & their risk tolerance level

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.656[a]	9	.101
Likelihood Ratio	14.576	9	.103
Linear-by-Linear Association	.376	1	.540
N of Valid Cases	317		
a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is 1.25.			

- **H_0:** There is no significant association between occupation and risk tolerance level in investments.
- **H_1:** There is a significant association between occupation and risk tolerance level in investments.

Decision: The null hypothesis (H_0) is accepted and the alternative hypothesis (H_1) is rejected since the p-value (0.101) is higher than the significance level (0.05).
Interpretation: The findings show no statistically significant relationship between an individual's degree of investment risk tolerance and their occupation. This suggests that the study participants' work had little effect on their risk tolerance levels.

Table 9: Relationship between the Income Level & the risk tolerance

Income Level	Risk Tolerance				
	High Risk	Moderate Risk	Low Risk	Risk Avoider	**Total**
Below ₹ 5 Lakhs	43	86	65	26	220
₹ 5 Lakhs - ₹ 10 Lakhs	4	35	26	6	71
₹ 11 Lakhs - ₹ 20 Lakhs	2	10	6	2	20
Above ₹ 21 Lakhs	1	2	1	2	6
Total	**50**	**133**	**98**	**36**	**317**

Table 9 shows the relationship between the income level of the respondents & their risk taking ability

Table 10: Chi Square Test between Income level & the risk tolerance

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.229[a]	9	.153
Likelihood Ratio	13.847	9	.128
Linear-by-Linear Association	1.457	1	.227
N of Valid Cases	317		
a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .68.			

 H_0: There is no significant relationship between income level and risk tolerance level in investments.
 H_1: There is a significant relationship between income level and risk tolerance level in investments.
Decision: Here, at p = 0.153 the relationship between income level & the risk tolerance level is insignificant, so we **reject the null hypothesis.**
Interpretation: People's risk tolerance for investments is not greatly impacted by income inequalities because risk patterns are similar for all wealth levels. Financial advisors should base their assessment of risk tolerance on more important factors, such as personal objectives, financial literacy, and psychological characteristics.

Data Analysis

Descriptive Analysis:

Table 11: Frequency distribution of Age of the respondents

Age	Frequency	Percent	Cumulative Percent
Below 20	45	14.2	14.2
21-30	205	64.7	78.9
31-40	27	8.5	87.4
41-50	23	7.3	94.6
51 and above	17	5.4	100.0
Total	317	100.0	

Interpretation: The table above shows the age distribution of the respondents. The majority of responders (64.7%) are young adults between the ages of 21 and 30, with 14.2% being under 20. Just 5.4% of people are 51 years of age or older, compared to 15.8% of those in the middle-aged category (ages 31 to 50). According to the total data, 78.9% of the population is under 30, indicating a largely young population.

Table 12: Frequency distribution of Gender

Gender	Frequency	Percent	Cumulative Percent
Male	177	55.8	55.8
Female	140	44.2	100.0
Total	317	100.0	

Interpretation: The table above shows that of the 317 individuals in the sample, 140 are female (44.2%) and 177 are male (55.7%), indicating a slight male preponderance. Overall, however, the mix of genders is well balanced.
Table 13: Qualification of the Respondents

Educational Qualification	Frequency	Percent	Cumulative Percent
High school	19	6.0	6.0

Undergraduate	160	50.5	56.5
Postgraduate	129	40.7	97.2
Professional qualification	9	2.8	100.0
Total	317	100.0	

Interpretation: The above table shows that the 50.5% of the 317 individuals in the sample have undergraduate degrees, 40.7% have postgraduate degrees, 6.0% have high school diplomas, and 2.8% have professional credentials. This suggests that the majority of the sample is made up of highly educated people.

Table 14: Occupation of the respondents

Occupation	Frequency	Percent	Cumulative Percent
Student	164	51.7	51.7
Employed	115	36.3	88.0
Self-employed	27	8.5	96.5
Retired	11	3.5	100.0
Total	317	100.0	

Interpretation: The above table shows that of the 317 people in the sample, 51.7% are students, 36.3% are employed, 8.5% are self-employed, and 3.5% are retired. The preponderance of students points to a youthful population as well as a sizable working population.

Table 15: Income wise distribution of the respondents

Income Level	Frequency	Percent	Cumulative Percent
Below ₹5 Lakhs	220	69.4	69.4
₹5 Lakhs - ₹10 Lakhs	71	22.4	91.8
₹11 Lakhs - ₹20 Lakhs	20	6.3	98.1
Above ₹21 Lakhs	6	1.9	100.0
Total	317	100.0	

Interpretation: The table above shows that of the 317 people, 69.4% make less than ₹5 lakhs, 22.4% make between ₹5 and 10 lakhs, 6.3% make between ₹11 and 20 lakhs, and 1.9% make more than ₹21 lakhs. According to the data, the majority of people are in lower income bands; while very few are in higher ones.

Table 16: Investment duration of the respondents

Investment Duration	Frequency	Percent	Cumulative Percent
Less than 1 year	168	53.0	53.0
1-3 years	113	35.6	88.6
4-6 years	31	9.8	98.4
7-10 years	2	.6	99.1
More than 10 years	3	.9	100.0
Total	317	100.0	

Interpretation: The above graph shows that 53% of investors have less than a year of experience, and 35.6% have one to three years, indicating an inexperienced base. Only 1.5% has over seven years, and 0.9% over a decade, highlighting limited long-term stock market experience.

Table 17: Amount of savings invested

Parentage of Savings Invested	Frequency	Percent	Cumulative Percent
Less than 10%	148	46.7	46.7
10-30%	128	40.4	87.1
31-50%	36	11.4	98.4
51-70%	2	.6	99.1
More than 70%	3	.9	100.0
Total	317	100.0	

Interpretation: The above table depicts that out of the 317 people, 46.7% put less than 10% of their funds into the stock market, 40.4% put between 10% and 30%, and only 1.5% put more than 50%. This indicates a cautious stance, as the majority limits their exposure to the stock market.

Table 18: Types of Stock invested

Types of Stock	Responses		Percent of Cases
	N	Percent	
Blue-chip stocks	110	25.8%	35.1%
Growth stocks	195	45.8%	62.3%
Dividend-paying stocks	22	5.2%	7.0%
Penny stocks	12	2.8%	3.8%
Index funds or ETFs	31	7.3%	9.9%
A mix of different types	56	13.1%	17.9%

Interpretation: The table above shows that the Growth stocks are the most popular, impacting 62.3% of cases and being preferred by 45.8% of respondents, according to 426 responses, indicating a concentration on capital appreciation. Reliability is in high demand, as seen by the 25.8% preference and 35.1% influence of blue-chip stocks. Diversification influences 17.9% of cases and appeals to 13.1% of responders. Index funds/ETFs (7.3%), penny stocks (2.8%), and dividend-paying stocks (5.2%) are less common options, affecting 7.0%, 9.9%, and 3.8% of cases, respectively. This shows most investors favor growth and blue-chip stocks, while some opt for diversity or niche options.

Table 19: Reasons for the Investment

Goals	Frequency	Percent	Cumulative Percent
Long-term wealth creation	170	53.6	53.6
Saving for retirement	36	11.4	65.0
Short-term gains	94	29.7	94.6
Tax-saving purposes	13	4.1	98.7
Speculative investing	4	1.3	100.0
Total	317	100.0	

Interpretation: The table 18 shows that of the 317 respondents, 53.6% prioritize long-term wealth accumulation, focusing on steady financial growth, while 29.7% seek short-term gains for quick returns. 11.4% focus on retirement savings, with smaller percentages allocated to tax savings (4.1%) and speculative investing (1.3%). This reflects a balance between immediate profits and long-term financial planning.

Table 20: Preferred Investment Sector

Sectors	Frequency	Percent	Cumulative Percent
Power	90	28.4	28.4
IT	79	24.9	53.3

Banking	92	29.0	82.3
Automobile	21	6.6	89.0
FMCG	35	11.0	100.0
Total	317	100.0	

Interpretation: The table above shows that the most popular sector among the 317 respondents is "3" (29.0%), followed by "1" (28.4%) and "2" (24.9%). With 6.6% and 11.0% of preferences, respectively, categories "4" and "5" are less popular, suggesting a more balanced emphasis on the top three industries.

Table 21: Factors influencing the investment

	Responses		Percent of Cases
	N	Percent	
Company's financial health	184	35.9%	58.6%
Industry trends	144	28.1%	45.9%
Technical analysis	57	11.1%	18.2%
Recommendations from friends/family	25	4.9%	8.0%
Analyst reports or news	25	4.9%	8.0%
Past performance	77	15.0%	24.5%

Interpretation: The above table shows that the company's financial health has the greatest influence on investment decisions, influencing 35.9% of responses and 58.6% of situations. With 28.1% of responses, industry trends impact 45.9% of people. External advice, technical analysis, and past success are less significant. This indicates a logical approach to decision-making since it shows that investors place a higher value on fundamental elements like industry trends and financial health than on outside judgment or technical research.

Table 22: Level of Risk Tolerance

Level	Frequency	Percent	Cumulative Percent
High-risk	50	15.8	15.8
Moderate risk	133	42.0	57.7
Low-risk	98	30.9	88.6
Risk avoider	36	11.4	100.0
Total	317	100.0	

Interpretation: The table shows that, 30.9% of people favor low-risk investments, suggesting a propensity for safety, while 42.0% of people have a moderate risk tolerance. A inclination toward cautious or balanced investment methods is suggested by the fact that just 15.8% are willing to take significant risks and 11.4% shun risk.

Table 23: Duration of Investment Monitoring

Duration	Frequency	Percent	Cumulative Percent
Daily	43	13.6	13.6
Weekly	41	12.9	26.5
Monthly	124	39.1	65.6
Only when needed	93	29.3	95.0
I don't monitor them	16	5.0	100.0
Total	317	100.0	

Interpretation: The above table depicts that 29.3% of people check their investments as needed, and 39.1% of people do so periodically. Only 5.0% do not monitor their investments, suggesting a desire for less regular monitoring, while a smaller fraction track them daily (13.6%) or weekly (12.9%).

Table 24: Decision Based on Emotions

Duration	Frequency	Percent	Cumulative Percent
Always	42	13.2	13.2
Occasionally	61	19.2	32.5
Rarely	155	48.9	81.4
Never	59	18.6	100.0
Total	317	100.0	

Interpretation: According to the data shown in the table no 23, the majority of people (48.9%) hardly ever base their financial decisions on their feelings, yet 19.2% do so periodically. Generally speaking, investors take a logical approach to investing, with only 13.2% making emotionally charged judgments "always," and 18.6% never doing so.

Table 25: Behavior during the market Crash

	Frequency	Percent	Cumulative Percent
Yes	174	54.9	54.9
No	143	45.1	100.0
Total	317	100.0	

Interpretation: According to the table, 45.1% of respondents said they had never sold investments in panic during market crashes, but 54.9% had. This suggests that while the majority of respondents respond emotionally to market downturns, a sizable portion refrain from making snap decisions, indicating a more measured or long-term strategy.

Table 26: Feeling about the Stock Market

Feelings	Frequency	Percent	Cumulative Percent
Confident and optimistic	133	42.0	42.0
Cautious, but hopeful	150	47.3	89.3
Anxious and uncertain	30	9.5	98.7
Pessimistic and avoid investing	4	1.3	100.0
Total	317	100.0	

Interpretation: The table above shows that of the 317 respondents, 47.3% are cautious yet hopeful, and 42.0% are confident and enthusiastic about the stock market. The majority of people has a balanced or optimistic view, as evidenced by the fact that only 1.3% are gloomy and avoid investing, while 9.5% are anxious.

Table 26: One Sample t Test

	Test Value = 3				
	t	df	Significance	Mean Difference	95% Confidence Interval of the Difference

			One-Sided p	Two-Sided p		Lower	Upper
Confident about my investment decisions	7.369	316	<.001	<.001	.473	.35	.60
Follow stock market news and trends regularly before making any investment decisions	7.401	316	<.001	<.001	.457	.34	.58
Prefer to invest in stock of well established companies rather than emergence startups	6.856	316	<.001	<.001	.375	.27	.48
Avoid investing in volatile stocks	4.699	316	<.001	<.001	.278	.16	.39
Diversified investment portfolio in the stock market	7.074	316	<.001	<.001	.410	.30	.52
Satisfied with the return on my investment	7.313	316	<.001	<.001	.397	.29	.50
Satisfied with the amount of knowledge I have about stock market	3.630	316	<.001	<.001	.205	.09	.32
Stock market Is an effective way for me to build my wealth	14.205	316	<.001	<.001	1.025	.88	1.17
Hold on to loosing investment because I hope they will recover	11.210	316	<.001	<.001	.751	.62	.88

Interpretation

The results are statistically significant, with p-values < 0.001, indicating strong opposition to the null hypothesis. Respondents generally agree with statements on monitoring stock market news, preferring established firms, feeling confident in investment decisions, and avoiding volatile stocks. They also express satisfaction with returns and value diversification. Interestingly, they tend to hold onto losing assets in hopes of a recovery and see the stock market as a useful wealth-building tool. Despite some behavioral biases, the findings reflect a positive, confident, and strategic approach to investing.

Findings

1. Most respondents (64.7%) are aged 21-30, showing high participation from younger individuals.
2. Male investors (55.8%) slightly outnumber females (44.2%), indicating near-balanced participation.
3. Over 90% have at least an undergraduate degree, with 40.7% being postgraduates.
4. Students (51.7%) are the largest group, followed by employed individuals (36.3%).
5. Most investors (69.4%) earn below ₹5 lakhs annually, showing inclusivity of lower-income groups.
6. Over half (53.0%) have less than one year of stock market experience, showing many are beginners.
7. Nearly half (46.7%) invest less than 10% of their savings, reflecting caution.
8. Growth stocks (45.8%) are most popular, followed by blue-chip stocks (25.8%).
9. Long-term wealth creation (53.6%) is the primary goal, followed by short-term gains (29.7%).
10. Most respondents (42.0%) have moderate risk tolerance, with 15.8% being high-risk takers.
11. Monthly monitoring (39.1%) is most common, showing a balanced approach.

12. Nearly half (48.9%) rarely make emotional investment decisions.
13. Over half (54.9%) have sold during market crashes, indicating emotional responses.
14. Most (47.3%) feel cautious but hopeful about the stock market.
15. Respondents feel confident in their investment decisions and portfolio diversification.
16. Many are satisfied with their stock market knowledge but see room for growth.

Conclusion

The analysis of investor behavior reveals that younger individuals, particularly students and those with moderate income levels are increasingly participating in the stock market. Most investors are cautious, preferring growth and blue-chip stocks while allocating a smaller portion of their savings. Their primary goal is long-term wealth creation, supported by a moderate risk tolerance and rational decision-making practices. However, the tendency to panic sell during market downturns highlights emotional challenges in volatile situations.

While respondents exhibit confidence in their investment decisions and demonstrate regular portfolio monitoring, the data suggests room for improvement in financial literacy and emotional resilience. Enhancing investor education and promoting strategies for long-term stability can further empower investors, helping them navigate the stock market with greater confidence and effectiveness.

Recommendations

- Conduct workshops or provide resources on stock market basics, risk management, and long-term strategies to enhance investor knowledge.
- Encourage investors to diversify their portfolios across sectors and assets to balance risk and improve returns effectively.
- Offer guidance to investors handle emotions during market volatility and avoid impulsive decisions.
- Recommend the use of apps or platforms for tracking portfolios, accessing market insights, and assessing risks in real-time.
- Develop tailored programs focusing on investment fundamentals, gradual risk-taking, and confidence building for beginners.

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Analysis of earning quality of State Bank of India

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Abstract

The research focuses on the earnings quality of one of the public sector banks, State Bank of India (SBI), for a period of 11 years (2012–2023) by studying important financial measures such as Interest Income to Total Income, Net Interest Margin (NIM) to Total Assets, Return on Equity (ROE), and Operating Profit to Total Assets. The study attempts to examine the bank's profitability, efficiency, and sustainability of profits because of the increasing complexity of banking revenues and the requirement for financial stability. According to the results, interest income accounts for a significant amount of SBI's overall revenue (83.17%–90.06%), suggesting an extensive dependence on core banking functions. Asset growth has exceeded interest income efficiency, according to the NIM to Total Assets ratio. The ROE varied greatly, falling precipitously to -2.98% in 2017–18 before rising to 15.33% in 2022–23, indicating increased profitability. Consistent operating efficiency was shown by the Operating Profit to Total Assets ratio, which was stable between 1.46% and 1.98%. Interest income is significant for generating revenue, as evidenced by a hypothesis test that found it substantially adds to overall income ($t=5.29 > t\text{-critical}=1.83$). According to the report, SBI could raise shareholder returns through improved capital management, optimise asset utilisation to raise NIM, and diversify its revenue streams to reduce interest rate risks. The study emphasises that maintaining long-term financial stability requires equitable growth among core and non-core revenue sources. Even while SBI has excellent operational stability, significant increases in cost effectiveness and asset profitability might boost the company's earnings quality even further. The results give regulators, investors, and bank management important information for evaluating the sustainability and performance of the Indian banking industry.

Key Words: *Earnings, assets, interest, operating profit, total income, financial performance.*

Introduction

The banking sector is one of India's most intricate and rapidly expanding industries, which is the backbone of the Indian economy. Over the past few years, the banking sector in India has shown noticeable competitiveness, growth, efficiency, profitability, and soundness, making it one of the healthiest sectors in the world. Profitability being one measure used to evaluate an organisation's financial soundness, each business entity is evaluated based on its earnings. All companies are evaluated based on their revenues. Earnings are one of the most useful metrics for assessing the financial performance of financial institutions. However, earnings quality is equally important in the context of banks. One crucial factor that establishes a bank's capacity to generate steady profits in the future is the quality of earnings. In reality, earnings assess the bank's financial soundness as well as its ability to maintain quality, sustainability, and future profit growth. The claim that a bank's non-core businesses, such as interest and dividends on assets, treasury operations, and corporate consulting services, account for a major portion of its revenue makes the parameter more evident. Thus, profits as well as the earnings quality must be considered in relation to sustainability, competitiveness, healthy growth, revenue from core operations, etc for the banking industry. The reliability of a company's

earnings for evaluating its present and future performance is measured by the quality of earnings. Earnings quality is the capacity of declared earnings on the surface of financial statements to predict a company's future earnings and assure sustainability. It is a criterion for evaluating how "repeatable, controllable, and bankable" a company's earnings are, among other things. It has been interpreted in several ways as the extent to which earnings represent underlying economic impacts, such as improved cash flow projections, conservatism, or predictability.

Need for the study

Indian banks play a crucial role in the economy and should be evaluated based on more than just profit levels. It becomes important to examine the quality of earnings as it directly impacts the sustainability and reliability of future performance. High-quality earnings are marked by transparency, consistency, and fewer accounting errors, offering a clearer and more accurate reflection of a financial soundness. As banking revenues grow more complex, assessing the quality of earnings helps regulators, investors, and policymakers distinguish between lasting growth and short-term profits. This ensures the industry remains competitive and strong in an evolving economic environment hence, this study was chosen.

Literature Review

Kundu and Sharma (2015) conducted a study to assess the earning quality of several selected commercial banks in India. The study used both descriptive and exploratory research methods. Secondary data were collected over ten years to carry out the research. The findings showed that among the nationalised banks, the interest income as a proportion of total income was the highest, whereas Bank of Baroda had the lowest. It was also found that for a group of nationalised banks, there was no significant difference between interest income and non-interest income. To address the economic challenges, the report suggested that commercial banks should improve their operational efficiency and focus more on increasing both interest and non-interest income.

Gupta and Sikarwar (2005) used the CAMEL model variables to analyze the financial performance of Indian banks in order to ascertain if the average performance of new private sector and public sector banks over the research period, which ran from 2003–04 to 2007–08. Five banks from each sector were selected as a sample for the study. The study infers that there was no difference between new private sector and public sector banks in terms of capital adequacy and liquidity. In contrast, new private sector banks outperformed public sector banks in terms of earning quality, asset quality, and management quality.
Aloysius (2014) looked into three important areas like operational performance, profitability, and revenue sources to evaluate and differentiate the revenue quality of the largest eight banks, six public sector banks, and two new private sector banks. In terms of overall earnings quality, HDFC Bank Ltd. and State Bank of Travancore ranked first and second, respectively. The new private sector banks' performance differed significantly from the public sector banks'. HDFC Bank Ltd. Excelled in terms of profitability and earnings sources, while Canara Bank was the top performer in operational performance.

Oluoch and Gichaiya (2015) studied the earnings consistency of commercial banks of Kenyan from 2001 to 2012. They found that commercial banks' profits were not short-term or low quality. The results showed that large commercial banks had higher resilience compared to smaller ones. The study also found that the high quality of financial reporting by Kenyan commercial banks meant that investors could rely on the profit data provided by these banks.

Gadia (2015) selected five nationalised banks from the public sector and five from the private sector for the study. The research used secondary data over five years. The F-Test One-Way ANOVA was used as a statistical tool, while ratio analysis served as an accounting technique to evaluate the chosen banks' performance. The findings highlights that the net interest margin (NIM) relative to total assets and the interest income relative to total income of the selected banks showed different earning qualities during the period of study. It was concluded that the earning quality of the chosen banks varied significantly during the research period.

Shawtari, et. al., (2015) stated that cost effectiveness is a key factor in the banking sector. When interest rates were low, bank profits tend to rise. To reduce interest costs, banks need to engage a dependable

third party. An increase in the efficiency ratio, which is the ratio of operating expenses to operating income, shows that a bank or company is unable to harness its operating expenses effectively. A lower BOPO ratio, on the other hand, indicates that the company can more effectively manage its operational costs.. This suggests that efficiency is reflected in strong performance, which could encourage bank management to lower total profits to balance earnings. When performance is weaker, however, bank managers may reduce their DLLP.

Alhasan, et. al., (2023) examined how earning quality affects the efficiency of Nigerian deposit money banks. It employed secondary data to observe how variables changed over ten years, using a panel regression technique to measure efficiency. The findings from data envelopment analysis (DEA) showed that the efficiency of Nigerian deposit money banks is positively and significantly linked to the quality of earnings. The research suggests that management can ensure sustainability and secure going concern by strictly following accounting standards and implementing internal control monitoring."

Goals of the study

This study has the following objectives:

1. To study the Operating Profit to Capital Employed ratio of State Bank of India.
2. To analyse the ROA of State Bank of India.

Hypothesis

H_{01} - The interest income of State Bank of India is not significant as compared to its total income.

Research Design

A research study's plan, also known as its research design, outlines the steps and techniques needed to finish the study. In this study, secondary data spanning 11 years (2012–2013) have been collected from various sources, such as the internet, the State Bank of India's annual reports, and other relevant publications. In order to evaluate the elements impacting the Bank's Earning Quality, the study's objectives have been outlined and examined in detail. Additionally, the Student's t-test has been used to test the hypotheses developed for the study. This guarantees the study's methodical and controlled approach to evaluating the State Bank of India's earning quality.

Limitations

Accordingly, the current study is limited to secondary data and availability of data. The study period covered is 2012-13 to 2022-23

- The audit determines the data dependability.
- The lack of facts and literature.
- Secondary data serves as its foundation.
- It has covered a limited time period from 2012-13 to 2022-23.
- We have included only one bank in our analysis, State Bank of India.

Earning Quality Analysis

This aspect assesses how accurate the financial reports are and how clear and consistent the sources of income are. Low earnings quality indicates that the earnings may be unstable or risky, On the other hand, solid and consistent earnings are suggested by high earnings quality. To evaluate the earnings quality of the State Bank of India, certain ratios need to be calculated.

- INTEREST INCOME TO TOTAL INCOME RATIO
- NET INTEREST MARGIN TO TOTAL ASSETS RATIO

- RETURN ON EQUITY RATIO
- OPERATING PROFIT TO TOTAL ASSETS RATIO

Interest Income to Total Income Ratio

This ratio highlights the significance of interest-related activities such as lending and investing in generating the bank's total revenue. A higher ratio indicates that a larger portion of the bank's income is generated from interest-based sources, showing a stronger dependence on these revenue streams. However, a lower ratio indicates a smaller share of income coming from interest sources, suggesting a more diversified revenue model that may include income from non-interest activities such as fees, commissions, and other related income streams.

$$\text{Total Income Ratio} = \frac{\text{Interest Income To}}{\text{Total Income}} \times 100$$

Ratio of Interest Income to Total Income

(Rs. in Crores)

YEARS	INTEREST INCOME (Rs.)	TOTAL INCOME (Rs.)	RATIO
2k12 – 13	119657	135691	88.18
2k13 – 14	136350	154903	88.02
2k14 – 15	152397	174972	87.09
2k15 – 16	163998	191843	85.48
2k16 – 17	175518	210979	83.19
2k17 – 18	220499	265100	83.17
2k18 – 19	242868	279643	86.84
2k19 – 20	257323	302545	85.05
2k20 – 21	265150	308647	85.90
2k21 – 22	275457	316021	87.16
2k22 – 23	332103	368718	90.06
Mean	**212847.27**	**246278.36**	**86.37**
Average annual growth%	**177.54**	**171.73**	**2.13**

(Source: Annual Reports of State Bank of India 2012-13 to 2022-23)

The interest income to total income ratio shows how much of a bank's total income comes from interest. This ratio has remained fairly steady, usually ranging between the mid-to-high 80s. There were some noticeable changes, with a small drop during the years 2012-13 to 2016-17. This might have been due to fluctuations in interest charges or a shift in where the bank gets their income from. From 2017-18 onward, the ratio started to slowly rise again, showing a steady improvement. The biggest increase happened in the year 2022-23, reached 90.06%, which means a large part of the bank's income comes from interest. Overall, the pattern shows that income generated by interest has been a major part of the bank's revenue throughout the period under review.

Net Interest Margin to Total Assets Ratio

After deducting interest costs, this ratio, which is shown as a percentage of total assets, shows how profitable the bank's interest-bearing assets are. A greater ratio indicates that the bank is effectively producing a larger return on its assets that bear interest relative to its whole asset base, demonstrating high profitability and efficient use of assets. Conversely, a smaller proportion may indicate that the bank's total asset holdings are more lucrative than its interest-related operations. It might indicate inefficiencies or difficulties in controlling interest rate risk and making money.

$$\text{Net Interest Margin To Total Asset Ratio} = \frac{\text{Net Interest Margin}}{\text{Total Assets}} \times 100$$

Ratio of Net Interest Margin to Total Assets

(Rs. in Crores)

YEARS	NET INTEREST MARGIN (Rs.)	TOTAL ASSETS (Rs.)	RATIO
2k12 – 13	44332	1566211	2.83
2k13 – 14	49282	1792748	2.74
2k14 – 15	55016	2048080	2.68
2k15 – 16	57195	2357617	2.42
2k16 – 17	61860	2705966	2.28
2k17 – 18	74854	3454752	2.16
2k18 – 19	88349	3680914	2.40
2k19 – 20	98085	3951394	2.48
2k20 – 21	110710	4534430	2.44
2k21 – 22	120708	4987597	2.42
2k22 – 23	144841	5516978	2.62
Mean	**82293.81**	**3326971.55**	**2.49**
Average annual growth%	**226.71**	**252.24**	**-7.42**

(Source: Annual Reports of State Bank of India 2012-13 to 2022-23)

An essential metric that illustrates how well a bank produces net interest income in relation to its total assets is the net interest margin (NIM) to total assets ratio. Over time, this ratio has experienced some changes but has generally stayed within a reasonable range. Between 2012-13 and 2016-17, the ratio slowly decreased, which may suggest difficulties in keeping profits stable during periods of changing economic conditions. Starting from 2017-18, this trend began to reverse, with the ratio becoming more stable and even improving a little. In particular, during 2022-23, the ratio rose significantly, reaching 2.62, which demonstrates that, the bank became more efficient at earning net interest income in contrast to its total assets.

Return on Equity Ratio

This ratio demonstrates how efficiently the bank uses shareholder equity to generate earnings. An increased return on equity (ROE) suggests strong profitability and efficient use of capital, as the bank is produce more profit for each unit of shareholder equity. In contrast, a lower ROE may signal reduced profitability or inefficient use of shareholder equity, it can raise questions about the bank's managerial efficacy and financial performance. Overall, the ROE ratio gives insight into the bank's ability to produce

profits for its shareholders.

$$\text{Return On Equity Ratio} = \frac{\text{Net Income}}{\text{Share Holders. Eq}} \times 100$$

Ratio of Return on Equity

(Rs. in Crores)

YEARS	NET INCOME (Rs.)	SHARE HOLDERS. EQ	RATIO
2k12 – 13	14104	98883	14.26
2k13 – 14	10891	118282	9.20
2k14 – 15	13102	128438	10.20
2k15 – 16	9951	144274	6.89
2k16 – 17	10484	188086	5.57
2k17 – 18	-6547	219128	-2.98
2k18 – 19	862	220913	0.39
2k19 – 20	14488	232007	6.24
2k20 – 21	20410	253875	8.03
2k21 – 22	31675	280088	11.30
2k22 – 23	50232	327608	15.33
Mean	**15422.90**	**201052.90**	**7.67**
Average annual growth%	**256.15**	**231.30**	**7.50**

(Source: Annual Reports of State Bank of India 2012-13 to 2022-23)

A bank's profitability in relation to the equity held by its shareholders is shown by the return on equity (ROE) ratio. Over time, this ratio has changed, showing how the bank's profits and shareholder equity have varied. Between 2012-13 and 2016-17, the ROE steadily decreased, which means the bank was making less profit compared to its shareholders' equity. In the year 2017-18, the ROE turned negative, meaning the bank lost money contrast to shareholder equity, which might have been caused by different factors that affected its profitability. However, starting from 2018-19, the ROE improved noticeably, with big increases in 2021-22 and 2022-23, reached 11.30% and 15.33%, respectively. These increases suggest that the bank became more profitable with regard to its shareholders' equity, which could be due to effective strategies or positive market trends.

Operating Profit to Total Assets Ratio

This ratio demonstrates the profitability of the bank's primary operations, without including other income or costs not related to daily operations, compared to its total assets. A higher ratio means the bank is doing a better job of making profits from its main activities in regards to the size of its assets. Conversely, a smaller ratio might mean the bank is not making as much profit from its primary operations in contrast to its total

assets, which could point to problems in controlling costs or earning income efficiently.

$$\text{Operating Profit To Total Assets Ratio} = \frac{\text{Operating Profit}}{\text{Total Assets}} \times 100$$

Ratio of Operation Profit to Total Assets

(Rs. in Crores)

YEARS	OPERATING PROFIT(Rs.)	TOTAL ASSETS (Rs.)	RATIO
2k12 – 13	31081	1566211	1.98
2k13 – 14	32109	1792748	1.79
2k14 – 15	38913	2048080	1.89
2k15 – 16	43257	2357617	1.83
2k16 – 17	50847	2705966	1.87
2k17 – 18	54074	3454752	1.56
2k18 – 19	53875	3680914	1.46
2k19 – 20	61916	3951394	1.56
2k20 – 21	70014	4534430	1.54
2k21 – 22	75292	4987597	1.50
2k22 – 23	83712	5516978	1.51
Mean	**54099.09**	**3326971.54**	**1.68**
Average annual growth%	**169.33**	**252.24**	**-23.73**

(Source: Annual Reports of State Bank of India 2012-13 to 2022-23)

The ratio of operating profit to total assets shows how effectively a bank produces operational profits in relation to its overall assets. Over time, this proportion has followed a fairly steady pattern, with small changes within a limited range. Between 2012-13 and 2016-17, the ratio stayed about the same, it implies that the bank maintained a consistent ability to produce operating profits contrast to its assets. Overall, there was a minor drop in the ratio between 2016-17 and 2017-18, which may have indicated a short-term decline in efficiency. Starting from 2018-19, the ratio became stable again, remaining around 1.50 to 1.56, showing that this bank continued to utilise its assets efficiently to generate operating profits.

Hypothesis Testing

Null hypothesis r = 0.87

$$\mathbf{t} = \frac{r*\sqrt{n}-2}{\sqrt{1}-r^2}$$

$t = 5.29$

Calculated value = 5.29

Table value 0.05 = 1.83

Hence calculated value (t) > table value (t.05) = 5.29 >1.83

Observation

Because the computed value of t is higher than the critical value, the study's null hypothesis is rejected, and State Bank of India's interest income represents a major portion of the bank's overall revenue.

Findings and Suggestions

- Interest income accounts for the majority of the bank's revenue, as indicated by the ratio of interest income to total income. The lowest recorded value was 83.73%, while the highest was 90.6%. This is a positive sign for the bank, as it indicates a low portion of non-performing assets, as interest income has been consistently earned and total income has increased mainly due to interest. However, this can also expose the bank to risks related to variations in credit risk and interest rates. The bank should continue to increase its loans and advances, as these will help raise interest income and contribute to an increment in total income. A rise in loans, however, also brings a risk of default and fluctuations in interest rates.
- Over time, the Net Interest Margin (NIM) to Total Assets ratio has usually declined, from 2.83% in 2012–13 to 2.62% in 2022–2023., even though NIM has increased. This suggests that while NIM has improved, the growth in total assets has been faster. To improve profitability and NIM without relying heavily on asset growth, the bank should consider reviewing innovative asset management techniques to guaranty more effective use of resources. Improving the margin-to-asset ratio could lead to better future profitability.
- The Return on Equity (ROE) ratio has been steadily declining, indicating the bank's inability to maintain shareholders' equity and leading to reduced profits. A higher ROE is generally beneficial for both the bank and its equity shareholders. However, as the bank started to improve its management efficiency, profits began to rise. These improvements indicate better profitability and favourable market conditions. It is suggested that the State Bank of India should focus more on using shareholders' funds effectively and work towards increasing profits from equity to attract more shareholders. The bank should invest funds in a way that minimises losses and keep a close watch on non-performing assets that may lead to financial losses.
- The ratio of operating profit to total assets has been adequate. as the ratio is above 1, indicates that the bank is properly using its assets to maintain operating profits through its core operations. It is recommended that the bank continue to maintain this position by reducing operating expenses and striving to enhance operating profits for the future.

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Asset Quality and Equity-Market Monitoring in Indian Public-Sector Banks: Evidence from FY2016-FY2025

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Abstract

This study examines whether equity prices monitor disclosed bank risk in banks under majority government ownership. Using a balanced panel of 12 listed Indian public-sector banks and annual financial and price data for FY2016-FY2025, it relates price returns in the following financial year to lagged changes in capital adequacy, gross non-performing assets (GNPA), the cost-to-income ratio, return on average assets, and liquidity. Annual log price returns are constructed from corporate-action-adjusted financial-year-end prices and exclude cash dividends. The preferred two-way fixed-effects model uses 96 bank-year observations and controls for bank size, loan growth, deposit growth, book capitalisation, and post-amalgamation periods. A one-standard-deviation increase in lagged GNPA change (about 2.94 percentage points) is associated with an annual log return lower by 0.1078 log points. The coefficient is statistically significant under bank-clustered inference ($p = 0.007$), an enumerated 4,096-pattern bank-cluster sign-randomisation test ($p = 0.011$), a 9,999-replication within-year permutation placebo ($p = 0.028$), and Benjamini-Hochberg adjustment across the five CAMEL coefficients (adjusted $p = 0.036$). It is not significant when standard errors are clustered by year ($p = 0.168$) or jointly by bank and year ($p = 0.111$), and its magnitude declines when influential return years are excluded. Quantile point estimates are more negative in the lower tail, although bank-block bootstrap intervals include zero. The findings therefore support a qualified, time-sensitive association, not a causal conclusion. Because every sampled bank is government-owned, the design cannot identify the effect of state ownership or implicit public support.

Keywords: asset quality; equity-market monitoring; public-sector banks; non-performing assets; panel data; India

Introduction

Government ownership makes equity-market monitoring theoretically ambiguous. State support can reduce expected creditor losses and stabilise funding, but it does not necessarily protect listed shareholders from dilution, restricted distributions, recapitalisation conditions, or weaker residual cash flows. This study examines the pricing, or monitoring, component of market discipline: whether equity returns covary with

disclosed bank risk. It does not test the influence component, which concerns whether market signals change managerial behaviour.

Asset quality provides a direct test of market monitoring. Non-performing assets reduce interest income, increase expected provisions, absorb capital, and create uncertainty about future loss recognition. In a privately owned bank, these channels would generally reduce equity value. In a government-owned bank, anticipated recapitalisation or regulatory forbearance may weaken the response, but support for institutional continuity does not guarantee a particular shareholder payoff. Government support is therefore a theoretical motivation for the analysis, not a variable measured in the study.

Indian public-sector banks provide an informative but institutionally specific setting. The sample comprises the 12 listed public-sector banks that remained separately observable over the estimation window. The period covers stressed-asset recognition and resolution, recapitalisation, large-scale amalgamations, the COVID-19 shock, and a later improvement in system-level asset quality. These events created substantial variation in bank fundamentals and investor uncertainty. They also produced common policy and macroeconomic shocks that pooled regressions would not adequately separate from bank-specific information.

Much of the CAMEL literature evaluates bank soundness or accounting performance rather than equity pricing. Studies of bank share prices often use price levels, contemporaneous ratios, overlapping indicators, and conventional standard errors. These choices can introduce non-stationarity, ambiguous information timing, multiple-testing problems, and unreliable inference in short panels. They also make bank-specific information difficult to distinguish from common annual market movements.

This paper asks a narrower question: is deterioration in asset quality associated with lower returns in the following financial year for listed public-sector banks after other CAMEL changes and common year conditions are controlled? The analysis focuses on a theory-led asset-quality mechanism, reconstructs price returns and key ratio definitions, applies two-way fixed effects and small-panel diagnostics, and reports dependence-sensitive, influence, and distributional evidence, including results that do not confirm the main association. The leave-one-out PSB return is used as a sector-demeaned transformation, not as an independent market-factor test.

The central estimate is economically material but inference-dependent. In the fully controlled mean regression, a one-standard-deviation increase in lagged GNPA change is associated with an annual log return lower by 0.1078 log points. The coefficient is significant under bank-clustered, enumerated bank-cluster, permutation, and false-discovery-rate procedures and is stable across the reported outlier treatments. It is not significant under year or two-way clustering, loses significance when merger-affected banks are excluded, and is sensitive to several individual return years. Quantile point estimates are more negative in the lower tail, but cluster-block intervals include zero.

These findings do not show whether sovereign backing weakens or preserves market discipline relative to private banks. Within the sampled public-sector banks, changes in GNPA are associated with subsequent price returns under several, but not all, reasonable inference procedures. The result is an in-sample association; it is neither a causal estimate nor an out-of-sample forecasting claim.

The remainder of the paper proceeds as follows. Section 2 describes the institutional setting. Section 3 develops the theoretical framework and hypotheses. Section 4 explains the data and empirical strategy. Section 5 presents the results. Section 6 discusses implications. Section 7 concludes.

Institutional Setting

Public ownership, listing and market discipline

Indian public-sector banks are commercial banks in which the central government retains majority ownership while minority shares trade publicly. This structure combines policy and political influences with market valuation. Government control may weaken some external governance channels without making equity-price information irrelevant (Laeven & Levine, 2009).

International evidence documents differences between state-owned and private banks in lending behaviour, performance, political responsiveness, and risk (Cornett et al., 2010; Dinç, 2005; Iannotta et al., 2007, 2013; Micco et al., 2007; Sapienza, 2004). Safety nets and bailout expectations may reduce creditors' incentives to monitor risk (Dam & Koetter, 2012; Demirgüç-Kunt & Huizinga, 2004; Gropp et al., 2011). Equity investors, however, remain exposed to weaker earnings, dilution, and opportunity costs. Stock

returns can therefore contain evidence of the market-monitoring component of discipline for residual claimants.

Stressed assets, recapitalisation and amalgamation

The sample period follows the regulatory asset-quality review that intensified recognition of stressed loans and spans a broad decline in reported non-performing assets. It also includes government capital support and the consolidation of several public-sector banks. Bank of Baroda absorbed Vijaya Bank and Dena Bank from April 2019. Canara Bank, Indian Bank, Punjab National Bank, and Union Bank of India absorbed other public-sector banks from April 2020. These transactions changed balance-sheet scale, inherited asset-quality profiles, and operating structures (Government of India, 2019, 2020; Reserve Bank of India, 2025).

The empirical design addresses this setting in three ways. Year fixed effects absorb policy and macroeconomic shocks common to the sampled banks. A post-amalgamation indicator captures the main timing of structural changes in affected banks. A separate robustness test excludes every merger-affected bank. These procedures cannot reconstruct pro forma pre-merger financial statements, but they reduce the likelihood that consolidation mechanically drives the principal result.

Why the setting has broader relevance

The institutional question is not unique to India, although the present design does not estimate a cross-country or ownership effect. Many economies have listed banks with public backing. The broader issue is whether safety nets redistribute risk sensitivity across claimants. The Indian sample provides a case study of how equity prices behave in such institutions.

Theory, Literature and Hypotheses

Market discipline under public support

Market discipline has two commonly distinguished components: monitoring and influence. Monitoring requires investors to observe and price risk; influence requires the resulting price signal to change bank behaviour. Evidence from subordinated debt and other claims suggests that market prices can contain useful risk information, although disclosure, safety nets, and expected intervention affect their sensitivity (Flannery, 1998; Flannery & Sorescu, 1996; Goyal, 2005; Nier & Baumann, 2006; Sironi, 2003). Basel Pillar 3 likewise treats disclosure and market discipline as complements to capital regulation (Basel Committee on Banking Supervision, 2015). This paper tests monitoring, not influence.

Government guarantees complicate monitoring. When investors expect the state to prevent default, liability spreads may become less sensitive to risk, while political incentives may affect intervention and lending (Brown & Dinç, 2005; Dinç, 2005). Support for continuity, however, does not assure a particular equity payoff. Recapitalisation may dilute shareholders, regulatory intervention may restrict dividends, and impaired assets may reduce residual franchise value. These mechanisms motivate the analysis, but the sample contains neither a direct measure of expected government support nor counterfactual variation in that support.

Asset quality as a value-relevant signal

Loan quality is central to bank valuation because accounting earnings and regulatory capital depend on the recognition and provisioning of credit losses. Loan-loss disclosures can convey information about expected future losses, although managerial discretion and economic conditions affect their interpretation (Beatty & Liao, 2014; Bushman & Williams, 2012; Hegde & Kozlowski, 2021; Wahlen, 1994). Gross NPA is a relatively direct measure because it records the share of gross advances classified as non-performing before accumulated provisions are considered.

An increase in GNPA may reduce expected net interest income, raise credit costs, constrain loan growth, and increase the likelihood of capital support. Research on NPL dynamics links market structure to changes in NPL ratios (Karadima & Louri, 2020), while evidence from NPL sales shows that investors respond to resolution transactions (Pirgaip & Uysal, 2023). In India, bank accounting and regulatory variables have

been linked to share prices (Sharma et al., 2023), and market power has been linked to market-based default risk (Khan & Ahmad, 2022).

State contingency and distributional asymmetry

The return response to deteriorating asset quality may vary across market conditions. When uncertainty, recognition risk, or expected losses are high, a given increase in GNPA may be associated with a larger downward revision in returns. Mean regressions can conceal this heterogeneity. Quantile regression is therefore used as an exploratory extension, although the short panel and fixed effects make distributional inference uncertain (Koenker & Bassett, 1978; Koenker, 2004).

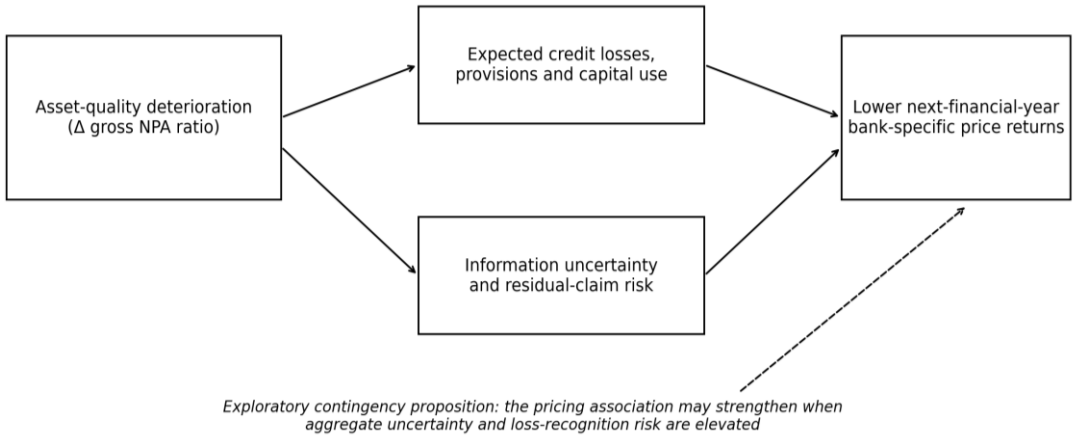


Figure 1. Conceptual mechanism linking asset-quality deterioration to equity-market monitoring

Hypotheses

H1. An increase in the gross non-performing asset ratio is associated with lower raw and PSB-demeaned price returns in the following financial year.

P1 (exploratory). The negative association between GNPA and returns is more pronounced at lower conditional quantiles of the PSB-demeaned return distribution.

The remaining CAMEL changes—capital adequacy, cost efficiency, profitability, and liquidity—are retained as theoretically motivated covariates rather than central hypotheses. Their expected associations are ambiguous in state-owned banks: capital may reflect recapitalisation or balance-sheet contraction, efficiency may reflect restructuring, and liquidity may provide resilience while imposing opportunity costs (Acharya & Naqvi, 2012; Beltratti & Stulz, 2012; Berger & Bouwman, 2009; Liang & Wei, 2012; Thota & Subrahmanyam, 2020).

Data and Empirical Strategy

Sample and sources

The sample contains the 12 listed public-sector banks for which continuous price and annual financial data are available in the research archive for FY2016-FY2025. The adjusted price panel contains 29,696 bank-day observations. Lagging the annual changes and controls yields a balanced estimation sample of 96 bank-years covering return years FY2018-FY2025. The bank-year is the unit of analysis.

Table 1. Sample banks

Code	Bank
BOBB	Bank of Baroda
BOIB	Bank of India
BOMB	Bank of Maharashtra
CANB	Canara Bank

Code	Bank
CBIB	Central Bank of India
INDB	Indian Bank
IOBB	Indian Overseas Bank
PNBB	Punjab National Bank
PSBB	Punjab & Sind Bank
SBIB	State Bank of India
UBIB	Union Bank of India
UCOB	UCO Bank

Annual financial-statement line items were assembled from publicly available historical statements and checked through formula reconstruction and basic accounting-consistency tests. Daily NSE prices were adjusted for documented stock splits and rights issues recorded in the archive's corporate-action register. Because part of the financial dataset comes from a third-party interface, each line item should be reconciled directly with audited annual reports and RBI or institutional databases before external submission.

Return measures

The primary outcome is the annual log price return calculated from corporate-action-adjusted closing prices. Because cash dividends are excluded, this measure is not a total shareholder return. For the estimation years, aggregating daily returns reconciles exactly to the corresponding financial-year price ratio:

$$R_{it} = ln(P_{it} / P_{i,t-1}) \quad (1)$$

A second outcome expresses each bank's performance relative to the sampled public-sector-bank group by subtracting the contemporaneous return of the other banks. For bank i in year t, the leave-one-out PSB benchmark is the equal-weighted mean daily log return of the remaining banks; the daily differences are then summed within the financial year:

$$AR_{it} = \Sigma d\ [\ r_i d_t - (1/(N_t - 1))\ \Sigma j \neq i\ r_j d_t\ ] \quad (2)$$

The focal bank is excluded from its own benchmark. In a balanced cross-section, however, the PSB-demeaned return is algebraically proportional to that bank's deviation from the same-year PSB mean. With year fixed effects, it is therefore a rescaled version of the raw-return specification rather than an independent robustness test. It is retained for interpretation and for the exploratory quantile analysis.

CAMEL variables and controls

Table 2. Variables and operational definitions

Variable	Construct	Definition	Expected role
ΔCRAR	Capital adequacy	Annual change in reported total capital adequacy ratio	Ambiguous/positive
ΔGNPA	Asset quality	Annual change in gross NPA / gross advances (%)	Negative
ΔCTI	Management efficiency	Annual change in operating expenses / net operating revenue (%)	Negative

Variable	Construct	Definition	Expected role
ΔROAA	Earnings	Annual change in net profit / average total assets (%)	Positive
ΔLIQTA	Liquidity	Annual change in cash, RBI balances, interbank balances and investments / total assets (%)	Ambiguous/positive
SIZE	Scale	Lagged natural log of total assets	Control
LOAN_GROWTH	Business growth	Lagged annual growth in gross advances	Control
DEPOSIT_GROWTH	Funding growth	Lagged annual growth in deposits	Control
CAPTA	Book capitalisation	Lagged equity capital and reserves / total assets (%)	Control
MERGER_POST	Structural change	Indicator for post-amalgamation observations of affected banks	Control

Note. Δ indicates an annual first difference. All continuous right-hand-side variables are lagged one financial year in the regression equations.

Two accounting measures were reconstructed. The cost-to-income ratio uses net operating revenue rather than total income, and ROAA uses average rather than closing total assets. Continuous predictors are winsorised at the pooled 1st and 99th percentiles and standardised over the estimation sample. Pooled transformations avoid mechanically altering approximately two observations in each bank's short ten-observation series and preserve absolute cross-bank variation before fixed effects are applied.

Mean regression design

The preferred mean specification is:

$$Y_{it} = \beta_1 \Delta CRAR_{i,t-1} + \beta_2 \Delta GNPA_{i,t-1} + \beta_3 \Delta CTI_{i,t-1} + \beta_4 \Delta ROAA_{i,t-1} + \beta_5 \Delta LIQTA_{i,t-1} + \Gamma X_{i,t-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

Y is either the raw annual log price return or its PSB-demeaned transformation; X contains size, loan growth, deposit growth, capital-to-assets, and the merger indicator. Bank effects absorb time-invariant bank characteristics, while year effects absorb conditions common to all banks in a given year. The model therefore estimates within-bank associations relative to common annual movements. A dynamic specification adds lagged return only as a sensitivity check because the short time dimension can generate Nickell-type bias.

Exploratory distributional specification

To explore P1, conditional quantile models are estimated for τ = 0.10, 0.25, 0.50, 0.75 and 0.90 using the same covariates and indicator structure:

$$Q_\tau(AR_{it} \mid Z_{it}) = Z_{it}'\beta(\tau) \quad (4)$$

The quantile coefficients are descriptive and are not interpreted causally. Conventional heteroskedasticity-robust standard errors are reported for comparability, but they do not resolve the few-cluster problem. Bank-block bootstrap intervals are therefore used as the more conservative sensitivity check. Their width, together with the short time dimension, precludes a confirmatory distributional claim.

Inference, multiplicity and falsification

The principal standard errors are clustered by bank, allowing arbitrary heteroskedasticity and within-bank dependence. Because the panel contains only 12 banks and eight return years, the analysis also reports year-clustered and two-way bank-and-year-clustered inference. The GNPA coefficient is assessed through enumerated Rademacher sign randomisation over all 2^12 = 4,096 bank patterns and, as a time-cluster

sensitivity check, all 2^8 = 256 year patterns (Arellano, 1987; Cameron et al., 2008; Cameron & Miller, 2015; MacKinnon & Webb, 2017; Petersen, 2009; White, 1980).

A 9,999-replication within-year permutation placebo randomly reassigns GNPA changes across banks while preserving the year structure. The Benjamini-Hochberg procedure controls the false-discovery rate across the five CAMEL coefficients in the fully controlled model (Benjamini & Hochberg, 1995). Leave-one-bank-out and leave-one-year-out estimates assess influence. Other checks vary winsorisation, remove highly collinear growth controls, exclude merger-affected banks, and compare alternative asset-quality measures. The permutation diagnostic assumes within-year exchangeability and is not an exact causal randomisation test.

Empirical Results

Descriptive evidence

Table 3. Descriptive statistics

Variable	N	Mean	SD	P25	Median	P75	Min	Max
Annual log return	96	0.0097	0.5750	-0.3205	0.0320	0.4107	-1.8716	0.9909
PSB-demeaned annual return	96	0.0000	0.2652	-0.1534	-0.0078	0.1847	-0.9659	0.6016
ΔCRAR (pp)	96	0.6621	1.3871	-0.0250	0.5400	1.3200	-2.8895	5.2570
ΔGNPA (pp)	96	-0.8216	2.9380	-2.6600	-1.0150	0.0000	-7.0500	8.0000
ΔCost-to-income (pp)	96	-0.0613	6.0198	-3.4943	0.0391	2.7995	-13.7969	17.5980
ΔROAA (pp)	96	0.1520	0.8657	-0.1270	0.1526	0.3716	-1.8645	3.4962
ΔLiquidity/assets (pp)	96	-0.0746	3.2654	-2.2413	-0.0825	2.2529	-7.7992	7.1308
Log total assets	96	13.1981	0.9655	12.4640	13.2479	13.9032	11.5160	15.5290
Loan growth	96	0.0910	0.1314	0.0224	0.0901	0.1444	-0.1735	0.6105
Deposit growth	96	0.0892	0.1280	0.0323	0.0722	0.1069	-0.0949	0.7182
Capital/assets (%)	96	6.4736	1.2249	5.7601	6.1767	7.1251	4.4945	11.0972

Note. CAMEL changes are shown in percentage points before standardisation. Growth rates are decimals. Statistics reflect the pooled-winsorised estimation sample where applicable.

The mean raw annual log return is close to zero, with substantial dispersion across bank-years. The mean PSB-demeaned return is zero by construction. GNPA declines by an average of 0.82 percentage points, but the standard deviation is 2.94 percentage points and the range remains wide.

Correlation and model diagnostics

Table 4. Correlation matrix for principal regressors

Variable	ΔCRAR	ΔGNPA	ΔCTI	ΔROAA	ΔLIQTA	SIZE	LOAN GR.	DEP. GR.	CAP/TA
ΔCRAR	1.000								
ΔGNPA	-0.208	1.000							
ΔCTI	-0.107	0.255	1.000						
ΔROAA	0.324	-0.344	-0.606	1.000					

Variable	ΔCRAR	ΔGNPA	ΔCTI	ΔROAA	ΔLIQTA	SIZE	LOAN GR.	DEP. GR.	CAP/TA
ΔLIQTA	0.038	0.295	-0.109	0.055	1.000				
SIZE	-0.131	-0.096	0.028	0.040	-0.122	1.000			
LOAN GR.	-0.068	-0.251	0.032	0.170	-0.315	0.322	1.000		
DEP. GR.	-0.117	-0.021	-0.002	0.133	0.198	0.301	0.828	1.000	
CAP/TA	0.051	-0.418	-0.029	0.278	-0.203	-0.192	0.212	-0.002	1.000

Note. Pairwise Pearson correlations. Loan and deposit growth are highly correlated (0.828). Their variance inflation factors are approximately 17.5 and 16.0, respectively; dropping either or both leaves the GNPA coefficient virtually unchanged.

Among the five CAMEL changes, the largest pairwise correlation is -0.606 between ΔCTI and ΔROAA. The high correlation between loan and deposit growth increases uncertainty around those control coefficients, so reduced-control specifications are reported as robustness checks. The high overall R^2 in the raw-return models mainly reflects common annual movements and should not be read as the explanatory power of the CAMEL variables.

Mean return regressions

Table 5. CAMEL changes and subsequent bank equity returns

Predictor	(1) Raw return CAMEL	(2) Raw return full	(3) Raw return dynamic	(4) PSB-demeaned return
ΔCRAR (t−1)	0.0092 (0.0259)	0.0160 (0.0359)	0.0169 (0.0354)	0.0169 (0.0391)
ΔGNPA (t−1)	-0.0992*** (0.0255)	-0.1078*** (0.0327)	-0.1116*** (0.0311)	-0.1173*** (0.0357)
ΔCTI (t−1)	-0.0035 (0.0405)	-0.0006 (0.0398)	0.0014 (0.0374)	-0.0001 (0.0433)
ΔROAA (t−1)	-0.0039 (0.0318)	-0.0057 (0.0318)	-0.0043 (0.0297)	-0.0054 (0.0345)
ΔLIQTA (t−1)	0.0405 (0.0490)	0.0260 (0.0848)	0.0305 (0.0850)	0.0278 (0.0928)
Size (t−1)	—	0.1158 (0.2847)	0.1406 (0.3137)	0.1225 (0.3082)
Loan growth (t−1)	—	-0.0167 (0.1807)	-0.0098 (0.1868)	-0.0191 (0.1976)
Deposit growth (t−1)	—	0.0244 (0.1794)	0.0188 (0.1850)	0.0271 (0.1960)

Predictor	(1) Raw return CAMEL	(2) Raw return full	(3) Raw return dynamic	(4) PSB-demeaned return
Capital/assets (t−1)	—	0.0313 (0.0469)	0.0323 (0.0491)	0.0337 (0.0511)
Merger-post	—	0.1054 (0.2027)	0.0882 (0.2149)	0.1143 (0.2212)
Lagged return	—	—	-0.0259 (0.0584)	—
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	96	96	96	96
R^2	0.847	0.851	0.852	0.168
Adjusted R^2	0.798	0.789	0.786	-0.180

Note. Bank-clustered standard errors are reported in parentheses. Continuous predictors are standardised; coefficients therefore correspond to a one-standard-deviation change. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Model (4) is a sector-demeaned rescaling of the raw outcome when the panel is balanced and year effects are included; it is not an independent robustness test.

The central estimate in model (2) is -0.1078 (bank-clustered $p = 0.007$). The standard deviation of the winsorised GNPA change is 2.94 percentage points. A one-standard-deviation increase in lagged GNPA change is therefore associated with an annual log return lower by 0.1078 log points. In multiplicative terms, the gross return factor is about 10.2% lower, conditional on the other variables and fixed effects. The enumerated bank-cluster p-value is 0.011. In contrast, the year-clustered p-value is 0.168 and the two-way-clustered p-value is 0.111. H1 therefore receives qualified, dependence-sensitive support; the null is not rejected under every reasonable dependence structure.

No other CAMEL change is statistically significant in the fully controlled models. The evidence therefore supports a specific asset-quality association under selected inference procedures, not a claim that equity markets price every CAMEL component uniformly.

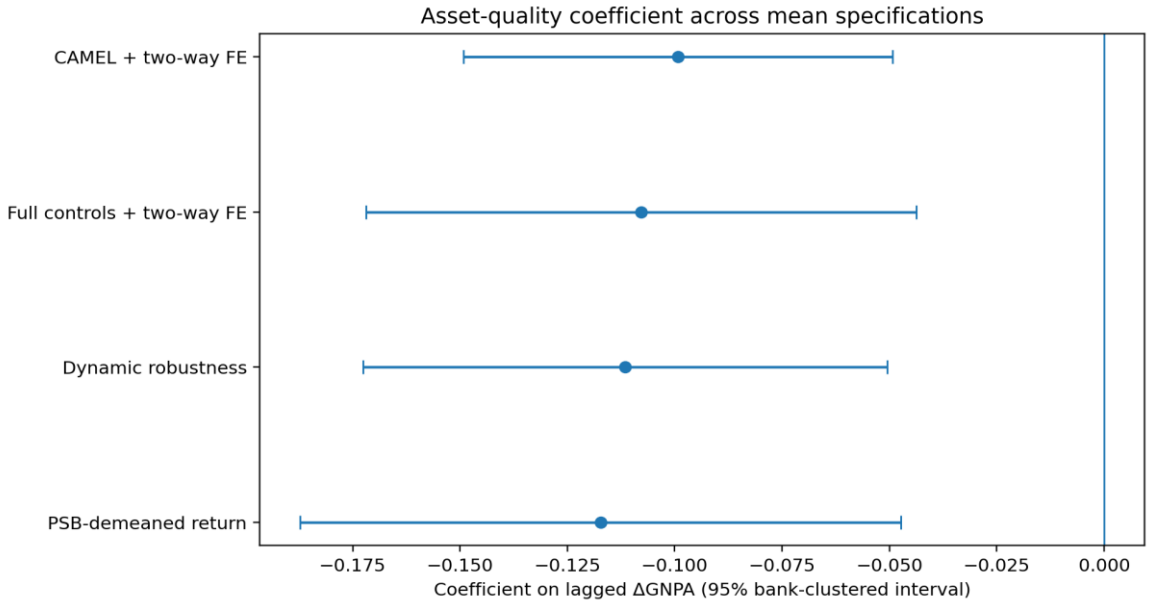


Figure 2. Stability of the lagged GNPA coefficient across mean specifications

Small-cluster inference, permutation and multiplicity

Table 6. Alternative inference for the asset-quality coefficient

Inference method	Raw coef.	Raw p	PSB-demeaned coef.	PSB-demeaned p
Bank-clustered t-test (12 clusters)	-0.1078	0.007	-0.1173	0.007
Enumerated bank-cluster sign test (4,096 patterns)	-0.1078	0.011	-0.1173	0.012
Year-clustered t-test (8 clusters)	-0.1078	0.168	-0.1173	0.168
Two-way bank-year-clustered test	-0.1078	0.111	-0.1173	0.111
Enumerated year-cluster sign test (256 patterns)	-0.1078	0.250	-0.1173	0.250
Within-year permutation placebo (9,999)	-0.1078	0.028	-0.1173	0.029
Benjamini-Hochberg adjusted p (5 CAMEL)	-0.1078	0.036	-0.1173	0.036

The inference results are mixed. The bank-clustered asymptotic test, the enumerated bank-cluster test, the within-year permutation placebo, and the false-discovery-rate adjustment reject the null. The year-clustered, enumerated year-cluster, and two-way-clustered procedures do not. This divergence, combined with the leave-one-year sensitivity, is a central limitation. It cannot be resolved by selecting the smallest p-value.

Distributional evidence

Table 7. Quantile estimates for PSB-demeaned annual returns

Quantile	ΔGNPA coefficient	Robust SE	95% lower	95% upper	p-value
0.10	-0.2215**	0.0904	-0.3986	-0.0444	0.017
0.25	-0.1189***	0.0430	-0.2032	-0.0347	0.007
0.50	-0.0841**	0.0385	-0.1596	-0.0086	0.032
0.75	-0.0389	0.0486	-0.1341	0.0563	0.426
0.90	-0.0194	0.0696	-0.1557	0.1170	0.781

Note. The quantile regressions include the full CAMEL set, controls, bank indicators and year indicators. The displayed intervals use conventional heteroskedasticity-robust quantile standard errors. Bank-block percentile intervals at the 10th and 25th quantiles include zero; the estimates are therefore exploratory.

The GNPA point estimate is -0.222 at the 10th percentile, -0.119 at the 25th percentile, and -0.084 at the median; its magnitude declines toward the upper tail. Conventional robust intervals exclude zero at the lower three quantiles. Bank-block bootstrap intervals for the 10th and 25th quantiles, however, include zero. The pattern is consistent with P1 but does not confirm quantile asymmetry.

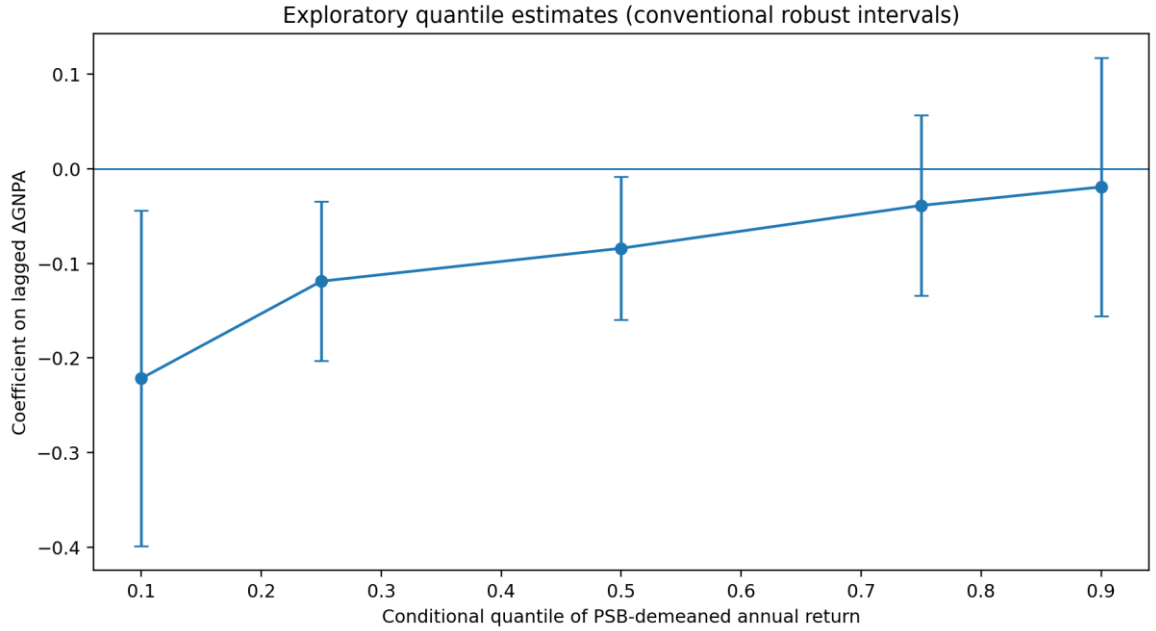


Figure 3. Lagged GNPA coefficient across the conditional distribution of PSB-demeaned returns

5.6 Robustness, influence and boundary conditions

Table 8. Robustness and scope of the asset-quality result

Specification	N	Asset-quality coefficient	Bank-cluster p
Baseline fully controlled model	96	-0.1078	0.007
No winsorisation	96	-0.1197	0.009
5th/95th percentile winsorisation	96	-0.1040	0.003
Drop deposit growth	96	-0.1073	0.007

Specification	N	Asset-quality coefficient	Bank-cluster p
Drop loan and deposit growth	96	-0.1066	0.005
Exclude merger-affected banks	56	-0.1015	0.123
Exclude FY2020-FY2021	72	-0.0339	0.584
Exclude FY2018	84	-0.0708	0.144
Exclude FY2020	84	-0.0468	0.202
Exclude FY2021	84	-0.0839	0.138
Replace GNPA with net NPA	96	-0.1049	0.109
Replace with GNPA/total assets	96	0.0198	0.602
Replace with provision-coverage change	94	-0.0455	0.016

Note. All specifications retain bank and year effects and the applicable fully controlled covariates. P-values are bank-clustered unless the inference method is stated separately. Alternative asset-quality variables are standardised independently.

The coefficient is stable across the reported outlier rules and after removing one or both highly collinear growth controls. It remains negative but is not statistically significant when all merger-affected banks are excluded. In the fully controlled model, leave-one-bank-out estimates range from -0.124 to -0.091 and remain significant under bank-clustered inference, indicating that no single bank drives the result. Time-period influence is more important: the coefficient loses bank-clustered significance when FY2018, FY2020, or FY2021 is removed and declines sharply when FY2020-FY2021 are excluded together.

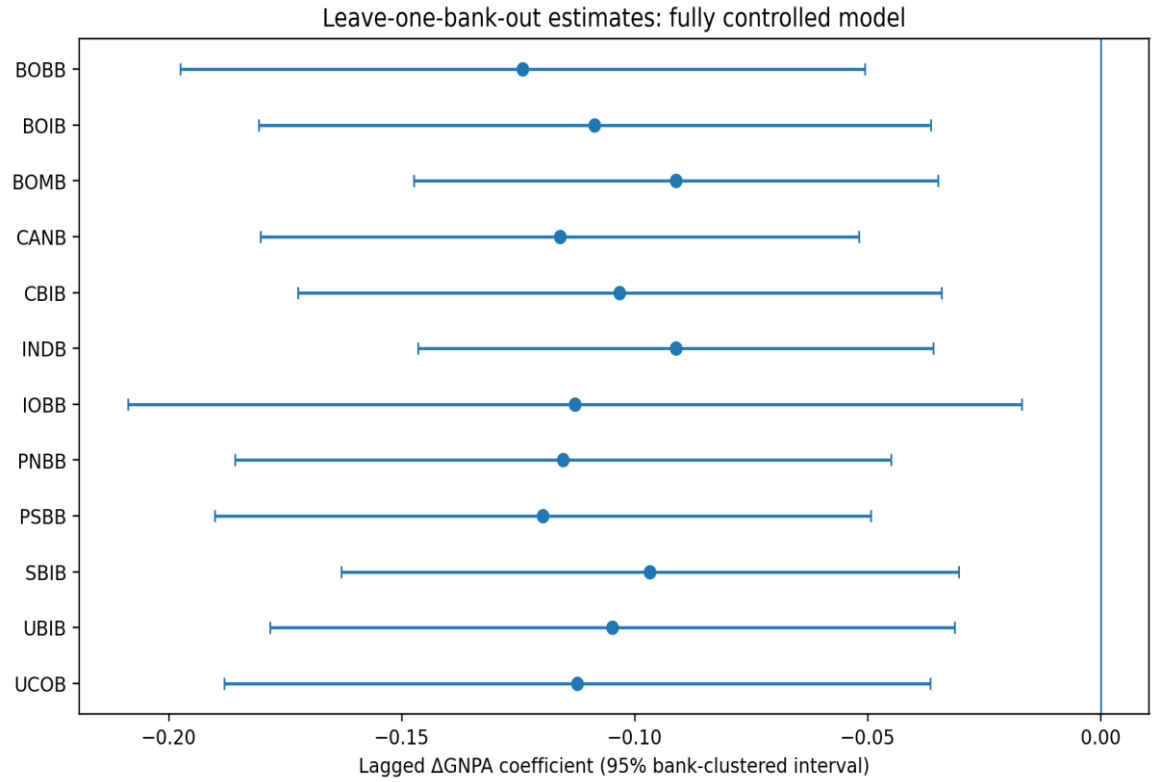


Figure 4. Leave-one-bank-out estimates of the lagged GNPA coefficient

Non-results and falsification outcomes

The direct downside outcomes—idiosyncratic volatility, downside semivariance, maximum drawdown, negative-return skewness, and down-to-up volatility—do not produce stable, statistically significant GNPA coefficients. Results for alternative asset-quality proxies are also mixed: net NPA is weak, GNPA-to-total-assets is null, and the change in provision coverage has a significant negative coefficient that is difficult to interpret causally because provisioning responds endogenously to stress. These results narrow the conclusion and show that it is sensitive to the asset-quality proxy.

Discussion

Equity returns remain associated with credit risk

Under several inference procedures, the negative GNPA-return coefficient indicates an association between bank-specific credit risk and the equity returns of the sampled government-owned banks. It does not demonstrate the influence component of market discipline and does not compare the strength of monitoring with private banks. The proposition that safety nets redistribute monitoring incentives across claimants remains plausible but untested in this design.

Asset quality provides the clearest annual CAMEL association

The null coefficients on CRAR, CTI, ROAA, and broad liquidity are theoretically plausible. Capital ratios combine loss-absorbing capacity with recapitalisation, changes in risk weights, and balance-sheet contraction. Efficiency changes may be obscured by restructuring and integration costs. Profitability is jointly determined with provisioning and may already be anticipated by investors. Broad liquidity combines resilience benefits with the cost of holding lower-yield assets. Within this specification, GNPA is the only CAMEL change that shows a consistent negative association under bank-clustered inference; this does not establish that it is a universally superior market signal.

State-contingent pricing

The more negative lower-tail point estimates and the attenuation outside FY2020-FY2021 are consistent with, but do not establish, state-contingent pricing. The year-clustered and leave-one-year results show that the association is temporally fragile. It should therefore be described as a pattern concentrated in high-uncertainty years that requires replication, not as a stable structural regime effect.

Implications

For bank managers, the results suggest that investors may respond more to deterioration in recognised asset quality than to mechanical changes in several headline CAMEL ratios. This interpretation is limited to the sampled banks and years. Delayed recognition may temporarily support reported performance while increasing uncertainty about future losses.

For investors, changes in GNPA should be interpreted alongside the loss-recognition regime, the credibility of provisioning, and aggregate financial stress. A decline from a high NPA base may convey different information from a fresh deterioration of the same size.

For regulators and public owners, the findings are consistent with transparent asset classification and resolution disclosure helping market participants interpret credit risk. The study does not test whether public support changes this monitoring process or how losses should be allocated among claimants.

For researchers, the results caution against treating CAMEL as a checklist of independently significant predictors. A theory-led focal mechanism, explicit reporting of null results, and inference adapted to a small number of clusters produce a narrower but better-supported contribution.

Conclusion

This study examines equity-market monitoring in 12 listed Indian public-sector banks using corporate-action-adjusted annual price returns and financial data through FY2025. It replaces price-level regressions with lagged return specifications, reconstructs key ratio definitions, includes bank and year effects, and reports enumerated small-cluster tests, permutation diagnostics, and sensitivity analyses.

The main result is narrow and inference-dependent. Deterioration in gross non-performing assets is associated with lower returns in the following financial year under bank-clustered, enumerated bank-cluster sign-randomisation, permutation, and false-discovery-rate procedures. The estimate is not significant under year or two-way clustering, is not robust to excluding merger-affected banks, and is influenced by several return years. Quantile estimates are more negative in the lower tail, but cluster-block intervals include zero. The other CAMEL changes do not provide robust incremental information in the reported models.

The paper therefore provides suggestive evidence that equity markets monitor changes in asset quality within listed public-sector banks. It does not identify the causal effect of asset-quality deterioration, the effect of government ownership, or the extent of implicit sovereign support. Its most defensible contribution is to show transparently the conditions under which the negative association between GNPA and returns appears.

Limitations

1. The effective sample contains 96 observations, 12 bank clusters, and only eight return years. Enumerated bank-cluster and permutation procedures strengthen inference along one dimension, but year and two-way clustering show that the short time dimension materially limits precision.
2. Annual fundamentals cannot be aligned precisely with every disclosure date. Investors may anticipate reported changes in asset quality, and annual returns may partly overlap the period in which prior-year results become public.
3. The leave-one-out PSB benchmark removes the sampled sector mean, but in the balanced panel it is algebraically related to the raw return when year effects are included. It is neither a broad-market factor model nor an independent validation outcome.
4. The data archive relies partly on a third-party financial-statement interface. Although the analytical panel can be rebuilt exactly from the archived workbooks, every line item should be reconciled with audited annual reports, RBI DBIE, CMIE Prowess, Capitaline, or an equivalent institutional database.

5. Merger indicators and exclusion tests cannot reconstruct the pro forma histories of the amalgamated institutions. The sample also omits the separate pre-merger market histories of absorbed banks and is therefore subject to survivorship and aggregation limitations.
6. Quantile inference is especially uncertain because the fixed-effects quantile models use only 12 banks and eight return years. Conventional robust intervals are narrower than the bank-block bootstrap intervals; the asymmetry result remains exploratory.
7. The design is predictive only in calendar ordering and associational in interpretation. Annual returns partly overlap the period in which prior-year financial results become public, investors may anticipate GNPA changes, and the study identifies no exogenous asset-quality shock.
8. The dependent variable is a price return and excludes cash dividends. It therefore understates total shareholder return when dividend yields differ across banks or years.
9. All sampled banks are majority government-owned. Without a private-bank comparison or a time-varying measure of expected public support, the design cannot estimate how ownership affects the strength of market monitoring.

Future research

1. Use quarterly disclosures and exact earnings-announcement dates to isolate unanticipated asset-quality information.
2. Compare public- and private-sector banks and interact asset-quality shocks with government ownership and expected support.
3. Exploit recapitalisation or recognition-policy discontinuities using event-study or quasi-experimental designs.
4. Construct expected-versus-unexpected NPA changes from analyst forecasts or supervisory stress indicators.
5. Extend the distributional analysis to cross-country panels of listed state-owned banks and apply cluster-robust quantile methods.
6. Test whether transparent resolution and provisioning disclosures moderate the equity penalty associated with deteriorating asset quality.

Declarations

Funding. No external funding was received for this study.

Competing interests. The authors declare that they have no competing interests.

Ethics approval. Not applicable. The study uses secondary financial and market data and involves no human participants.

Data and code availability. The final analytical panel, variable dictionary, verification scripts, and output logs are included in the accompanying reproducibility package, subject to the licensing and redistribution terms of the underlying price and financial-statement sources.

CRediT author statement. Saifali Abdul Latif Gadiwale: conceptualisation, methodology, data curation, formal analysis, investigation, visualisation and writing—original draft. Sakshi Desai, Nagaraj Yatnalli, Omkar Dhamnekar, Pankaj Shamanewadi and Pruthvi Naik: data curation, validation, investigation and writing—review and editing. Rahul Mailcontractor and Savitha Kulkarni: conceptualisation, supervision, validation, project administration and writing—review and editing. All authors approved the manuscript and take responsibility for the integrity of the work.

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Online Appendix

Appendix A. Data-construction audit

Component	Earlier treatment	Revised treatment	Rationale
Outcome	Standardised price level	Corporate-action-adjusted annual log price return and PSB-demeaned transformation	Avoids price-level non-stationarity; the sector-demeaned outcome is interpretive, not independent.
Cost efficiency	Operating expenses / total income	Operating expenses / net operating revenue	Uses the conventional banking cost-to-income denominator.
Profitability	Net profit / ending assets	Net profit / average assets	Aligns flow earnings with an average stock denominator.
Outliers	Within-bank 1%/99% winsorisation	Pooled 1%/99% winsorisation	Avoids mechanically replacing about two observations in every ten-point bank series.
Scaling	Bank-wise z-scores	Pooled-sample standardisation	Preserves cross-bank information before fixed effects.
Timing	Contemporaneous ratios and price	Lagged annual CAMEL changes and controls	Improves information timing and reduces simultaneity risk.
Specification	Separate pooled pillar regressions	Joint two-way fixed-effects model	Controls common shocks, limits multiple testing and estimates incremental associations.
Inference	Single robust covariance option	Bank, year and two-way clustering; enumerated sign tests; permutation and FDR	Shows that statistical significance depends on the assumed dependence structure.

Appendix B. Leave-one-bank-out estimates

Excluded bank	Coefficient	Clustered SE	p-value	N
BOBB	-0.1241	0.0375	0.008	88
BOIB	-0.1086	0.0368	0.015	88
BOMB	-0.0912	0.0287	0.010	88
CANB	-0.1161	0.0328	0.005	88
CBIB	-0.1032	0.0352	0.015	88

Excluded bank	Coefficient	Clustered SE	p-value	N
INDB	-0.0912	0.0282	0.009	88
IOBB	-0.1128	0.0489	0.044	88
PNBB	-0.1154	0.0359	0.009	88
PSBB	-0.1197	0.0359	0.008	88
SBIB	-0.0967	0.0338	0.017	88
UBIB	-0.1048	0.0375	0.019	88
UCOB	-0.1123	0.0387	0.016	88

Note. Dependent variable: raw annual log return. The specification is the fully controlled two-way fixed-effects model.

Appendix C. Direct downside-risk outcomes

Outcome	ΔGNPA coefficient	Clustered SE	p-value	N
Idio Vol	-0.0026	0.0063	0.692	96
Downside Risk	0.0061	0.0042	0.174	96
Abn Max Drawdown	-0.0218	0.0137	0.140	96
Ncskew Daily	0.3724	0.2871	0.221	96
Ncskew Weekly	0.1023	0.1448	0.495	96
Duvol	-0.0049	0.0929	0.959	96

Note. These outcomes do not provide consistent evidence that lagged deterioration in GNPA is associated with volatility, drawdown, or return-asymmetry measures. They are retained as transparent null tests.

Appendix D. Quantile block-bootstrap sensitivity

Quantile	Replications	Mean coefficient	Bootstrap SE	P2.5	P97.5	Share negative
0.10	299	-0.1576	0.1069	-0.3549	0.0295	94.3%
0.25	149	-0.1432	0.0898	-0.3301	0.0209	94.6%

Note. Banks are resampled as blocks. Percentile intervals include zero at the reported lower quantiles, which reflects the small-cluster uncertainty of the distributional extension. The limited number of successful bootstrap replications is an additional constraint.