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Research Article

The Fintech Revolution and its Impact on Bank Profitability: Empirical Evidence from Indian Commercial Banks

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Abstract: In the era of rapid digital transformation, fintech has emerged as a key driver of innovation in the banking sector. This study examines the impact of fintech investment on the financial performance of Indian commercial banks during the period 2015–2023. Using panel data from 12 Nifty-listed banks, a fintech investment index is constructed through text mining techniques applied to annual reports. The study employs the System Generalized Method of Moments (SGMM) to analyze the dynamic relationship between fintech investment and bank profitability. The findings reveal that fintech investment has a positive and significant effect on Return on Assets (ROA), while its impact on Return on Equity (ROE) is not significant. The study contributes to the growing literature on fintech by highlighting its role in improving operational efficiency and profitability, while also providing policy implications for promoting digital innovation in banking.

Keywords: Fintech Investment, Bank Profitability, Indian Commercial Banks, Digital Transformation, Return on Assets (ROA), System Generalized Method of Moments (SGMM).

INTRODUCTION

The global financial landscape is undergoing a significant transformation driven by rapid advancements in digital technologies. Fintech innovations have fundamentally altered the way financial services are delivered, creating new opportunities as well as challenges for the banking sector. These innovations encompass a wide range of services including digital payments, online lending, wealth management, and blockchain-based solutions.

India has emerged as one of the leading countries in embracing digital transformation, supported by strong technological infrastructure, regulatory initiatives, and a growing fintech ecosystem. The banking sector in India plays a crucial role in economic development by facilitating financial intermediation, promoting investment, and enabling credit expansion. Scheduled commercial banks form the backbone of this system, holding a major share of financial assets and driving economic growth.

Fintech investment refers to the allocation of resources towards advanced digital technologies aimed at enhancing banking operations and service delivery. These investments enable banks to improve efficiency, reduce operational costs, and enhance customer experience. However, the impact of fintech on bank performance remains a subject of debate. While some researchers argue that fintech enhances profitability, others suggest that it may increase operational risks and reduce short-term returns. Given these contrasting perspectives, this study aims to examine the relationship between fintech investment and bank profitability in the Indian context. By focusing on selected commercial banks, the research provides insights into how digital transformation influences financial performance.

LITERATURE REVIEW

2.1 Concept and Measurement of Fintech

Fintech is broadly defined as the integration of technology into financial services, resulting in innovative business models and improved service delivery. It includes applications such as digital payments, robo-advisory services, cryptocurrencies, and online lending platforms. Digitalization has significantly improved the efficiency, speed, and security of financial transactions. Measuring fintech adoption has been challenging due to the lack of standardized data. Earlier studies relied on survey methods and proxy indicators such as ATM usage. However, these approaches have limitations, including subjectivity and inability to capture the full scope of digital transformation. Recent research has adopted advanced methods such as text mining to quantify fintech adoption. This approach converts qualitative information from annual reports into measurable indices, providing a more accurate representation of fintech investment.

2.2 Fintech Investment and Bank Performance

Technological innovation has become a critical factor influencing business performance across industries. In banking, fintech plays a vital role in enhancing operational efficiency and customer satisfaction. According to transaction cost theory, investment in technology reduces operational costs and improves productivity. Empirical studies on fintech and profitability present mixed results. Some studies report a positive relationship, indicating that fintech improves efficiency and financial performance. Others suggest a non-linear or negative relationship, particularly in the short term, due to high implementation costs. Profitability is commonly measured using Return on Assets (ROA) and Return on Equity (ROE). While ROA reflects operational efficiency, ROE indicates returns to shareholders. Understanding the impact of fintech on both measures provides a comprehensive view of bank performance. Bank profitability is typically measured using indicators such as Return on Assets (ROA) and Return on Equity (ROE). ROA reflects the efficiency with which a bank utilizes its assets to generate income, while ROE measures the returns generated for shareholders. Both indicators provide complementary perspectives on financial performance and are widely used in empirical research (Lv et al., 2022). Accordingly, this study employs both ROA and ROE to assess the impact of fintech investment on bank profitability. Although fintech adoption contributes to cost reduction, operational efficiency, and improved service delivery, its short-term impact on profitability may not always be positive due to high implementation costs and associated risks. Given these mixed findings, it becomes essential to empirically examine the relationship between fintech investment and bank performance in the Indian context.

3. Hypothesis Development

Based on the theoretical arguments and empirical evidence discussed above, the study proposes the following hypothesis:
H1: Fintech investment has a positive effect on the financial performance of scheduled commercial banks in India.

RESEARCH METHODOLOGY

The study uses samples from 12 Indian commercial banks from 2015 to 2023 mentioned in Table 1. These banks are listed in the Nifty Bank Index which includes most liquid and large-capitalised Indian Commercial-Banks. The underlying reason for the choice of the 2015-2023 timeline is due to the recent advances in the fintech landscape that allow for investigation of the impact of fintech investments on the financial performance of the banks. It seems very interesting to study the Indian banking sector due to its heavy investments in the fintech advancements of the financial industry and moving towards digitalization (IIBF, 2023; IBEF, 2024).

Table 1: List of 12 Indian Scheduled Commercial Banks

Name of the Banks	Ownership	Abbreviations
Housing Development Finance Corporation	Private	HDFC
Industrial Credit and Investment Corporation of India	Private	ICICI
Axis Bank	Private	AXIS
Kotak Mahindra	Private	KOTAK
State Bank of India	Public	SBI
Indu Sind Bank	Private	Indus
AU Small Finance Bank	Private	AU SFB
Bandhan Bank	Private	BDN
Federal Bank	Private	Fed
Infrastructure Development Finance Company First Bank	Private	IDFC
Bank of Baroda	Public	BOB
Punjab National Bank	Public	PNB

Variables

Table 2 shows all the variables used in the study, along with their measurement and sources. To investigate the impact of Digitalization scores on the financial performance of banks. To measure the accounting-based performance ROA and ROE

both are used in this study as a proxy for bank profitability. Several control variables are employed based on the earlier literature that impact the dependent variables which are divided into bank-specific and macro-economic variables

Table:2 Description of Variables

Type	Variable (Symbol)	Measurement	Source
Dependent Variables (Bank performance)	Return on asset (ROA)	Net Profit/ Total Assets	STRBI
	Return on equity (ROE)	Net Profit/ Total Equity	STRBI
Independent Variable (Fintech Investments)	Digitalization Score (DIG score)	DIG index	Annual Reports
Control Variables (Bank Specific)	Bank Size (SIZE)	Natural Log of Total Assets	STRBI
	Capital Adequacy ratio (CAR)	Capital/Risk-weighted asset	STRBI
	Non-performing assets (NPA)	NPA/ Gross loans	STRBI
Control Variables (Macroeconomic)	Inflation rate (INF)	Annual Inflation Rate (CPI)	WDI
	Gross Domestic Product (GDP)	Annual GDP growth rate	WDI

System Generalized method of moments (SGMM)

To examine the impact of the fintech investments on the performance of banks the dynamic panel data model was employed. The study uses the generalized method of moments, proposed by Arellano and Bond (1991). This method has been used extensively in research related to bank profitability (Gržeta et al., 2023; Horobet et al., 2021; Maria & Hussain, 2023). GMM provides the benefit of control for endogeneity, unobserved heterogeneity, and persistence of the dependent variable. Between the difference and system GMM, we have employed SGMM given by Blundell and Bond (1998) as it provides results with higher precision and allows for lagged first differences. The SGMM method is best suited when the time frame is very small and deals with the problem of endogeneity. For conducting SGMM two conditions are required to be satisfied (Horobet et al., 2021). Firstly, to verify the validity of the instruments. There should be a correlation between instruments and endogenous variables but not with error terms. For the first condition, the Sargan test was conducted and the null hypothesis stated that the instruments were valid. Secondly, the Arrellano-Bond autocorrelation (AR) test was used to assess the presence of first-order correlation in error terms, but no second-order correlation. The second condition was met using the AR1 and AR2 tests (Arellano & Bover, 1995). The below-mentioned two equations are estimated using the SGMM model.

$$ROAit = \alpha + \delta ROAi,-1 + \beta DIGit + \gamma 1SIZEit + \gamma 2CARit + \gamma 3NPAit + \phi 1INFt + \phi 2GDPt + \lambda it \quad (1)$$

$$ROEit = \alpha + \delta ROEi,-1 + \beta DIGit + \gamma 1SIZEit + \gamma 2CARit + \gamma 3NPAit + \phi 1INFt + \phi 2GDPt + \lambda it \quad (2)$$

Results and Discussion

Descriptive Statistics

The results for descriptive statistics for the variables are shown in Table 4. The results are for the time period of 9 years, from a balanced panel data set resulting in 108 bank-year observations in the study. The mean values indicate that ROE shows a good image as compared to ROA. While ROE shows a higher standard deviation in comparison to the ROA, which shows that ROA is more volatile than ROE at the time of the study period. The explanatory variable DIG score has a mean value of 6.59 with a lower value of standard deviation of 0.52.

Table:3 Descriptive Statistics

	ROA	ROE	DIG	SIZE	CAR	NPA	INFLATION	GDP
Mean	1.15	10.77	6.59	12.83	16.85	8.03	1.58	7.04
Standard Deviation	0.88	6.17	0.52	1.44	3.87	1.87	0.2324	1.56
Minimum	0.02	0.39	5.72	8.29	9.2	4.24	1.20	3.86
Maximum	3.99	32.85	8.66	15.29	31.48	13.39	1.90	9.69

Correlation Matrix

Table 5 presents the Pearson correlation analysis of the variables as a test for multicollinearity before performing regression analysis. The results show that the issue of multicollinearity is not present as all the values in the correlation matrix are less than the threshold limit of 0.8 (Shrestha, 2020; Gujarati, 1980). Regarding the high correlation between ROA and ROE,

both are dependent variables and are used in different equations.

Table: 4 Correlation Matrix

Variables	ROA	ROE	DIG	SIZE	CAR	NPA	INFL ATIO N	GDP
ROA	1.0000							
ROE	0.8016	1.0000						
DIG	- 0.0046	0.0825	1.0000					
SIZE	- 0.5416	- 0.3120	- 0.1329	1.0000				
CAR	0.6181	0.2325	- 0.2947	- 0.4707	1.0000			
NPA	- 0.6155	- 0.3905	0.0305	0.7513	- 0.5382	1.0000		
INF	0.0529	- 0.0562	- 0.2803	0.1582	0.1120	0.0130	1.000 0	
GDP	0.0774	0.0796	- 0.0657	- 0.0022	0.0535	- 0.0615	0.279 4	1.000 0

Regression Analysis

Table 6 shows the results for both SGMM models mentioned in Equation 1 and Equation 2. The outlined results are divided for both the measures of bank performance i.e., ROA and ROE. Notably for ROA, the DIG score shows a significant positive relationship whereas for the ROE it does not show a significant relationship, suggesting no discernible impact on ROE. The positive and significant relationship between ROA and DIG score could indicate that the digitalization efforts are improving the operational efficiency and asset utilization of the banks. This result is in line with the earlier empirical findings in different economies (Chhaidar et al., 2022; Kayed et al., 2024; Kharrat et al., 2023). As fintech helps streamline processes, reduce operational costs, and improve customer services, banks are likely able to maximize their existing resources. On the side, ROE represents the return on shareholders' equity and is more influenced by the capital structure, dividend policy, and financial leverage rather than the operational efficiency of the firm. The DIGI score may not make an immediate impact on the ROE, leading to an insignificant relationship in a short period.

In the case of bank-specific control variables, Bank size has a significant and positive relationship with the ROA with a positive insignificant relationship with ROE. This suggests that large banks benefit from economies of scale, allowing them to spread their operational costs over a more extensive asset base, leading to a boost in ROA. Whereas CAR shows an insignificant relationship, positive with ROA and negative with ROE. On the other hand, NPA shows a negative significant relationship with both the performance metrics, Depicting an inverse relationship. Moreover, both macroeconomic variables do not have a significant relationship with ROA and ROE.

The lagged values for both the indicators ROA and ROE are significant and positive. The findings suggest that the past performance of the banks has a lasting effect on the outcomes of the future. Banks tend to keep some Plow back of profit each year rather than distributing all as dividends. This reflects how the success of earlier years carries forward, creating a favorable baseline for future performance. Furthermore, the predictive potential of the model is estimated through the Wald chi-square value which is significant for both models, indicating ROA has a very high predictive potential compared to ROE. Furthermore, the Sargan test shows that instruments are unrelated to residuals. AR2 shows no evidence for second-order correlation. The requirements of the GMM model were satisfied and the results are consistent and acceptable.

Table: 5 GMM Model for Banks Profitability

Variables	**Dependent Variable ROA**		**Dependent Variable ROE**	
	Coefficients	**z-statistics**	**Coefficients**	**z-statistics**
DIG	0.2514*	1.93	-0.2226	-0.05
SIZE	0.4067*	1.69	5.839	1.36
CAR	0.2300	0.68	-0.659	-0.80
NPA	-0.3240*	-1.98	-4.018***	-3.06
INFLATION	-0.3508	-0.75	-0.668	-0.64

GDP	-0.0063	-0.32	0.084	0.27
Lag ROA	0.352***	3.98		
Lag ROE			0.583***	3.35
Constant	32.64***	3.90	79.64***	4.22
Diagnostic Tests				
Wald x^2	557.75		51.73	
Sargan Test	3.707 (1.000)		2.756 (1.000)	
AR (1)	-2.702 (0.0069)		-2.071 (0.0384)	
AR (2)	-1.8773 (0.0605)		-1.2169 (0.2237)	
NOTE: *indicates significance level 0.1%, **indicates significance level 0.05%, ***indicates significance level 0.01%				
Authors own calculation				

Implications

This study enhances our understanding of the variables influencing the digitalization process in Indian commercial banks and has practical implications for banks, policymakers, and shareholders to promote investment in fintech in the financial industry. Banks should prioritize investing in fintech activities as it tends to affect their performance positively by lowering the costs through economies of scale. It can be achieved through the collaboration between banks and fintech companies that will lead to the reduction of innovation costs. For policymakers, financial regulatory bodies should promote fintech advancement, adoption, and integration for moving toward digitalization and enhancing the stability of the banking system. The shareholders of the company benefit by gaining clarity on the bank's operational strength, financial stability, and the real value added by digitalization. Albeit, these contributions the study is not free from some limitations, our sample includes only data from listed banks, so there is a degree to which our investigation of the impact of fintech investment on commercial banks is incomplete. In future research, academicians should incorporate a larger sample size for empirical testing. Moreover, the concentration on a single emerging economy can limit the generalizability and depth of understanding, so future scholars can expand the research scope internationally.

CONCLUSION

The research investigates the relationship effect of Fintech investments on the financial performance of the 12 listed banks in India from 2015-2023. Particularly it explores how banks' development process towards digitalization with the help of fintech influences the profitability of the banks. In this paper, the Fintech index was prepared using a certain set of keywords encompassing both the dimensions, “technology and innovation” & “digital and financial services”. Term frequency (TF) text mining technique is used for creating the Digitalization Score using the keywords from the annual reports of the banks. Afterward, the research verified the hypothesized relationship. The results indicate a positive and significant relationship with Return on asset and no significant relationship with ROE. The findings show the crucial role played by Fintech in moving towards a digital economy while enhancing the economic performance of the banks.

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