Financial Technology and Its Impact on Poverty in India
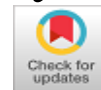
Rahul Singh Gautam, Jagjeevan Kanoujiya, Venkata Mrudula Bhimavarapu, Shailesh Rastogi

Abstract: *The paper aims to examine the effects of financial technology (Kisan Credit Card and ATM) on India's Poverty and empirically analyze the influence of financial technology on poverty scores. We consider data from twenty-two Indian states for three fiscal years, i.e., from 2018 to 2020. The current study uses panel data analysis to test the hypothesis. Results suggest a negative association between financial technology (Kisan credit card and ATM) and its influence on the poverty score in India. The current study suggests that the government should pay more attention to expanding financial technology, including increasing economic growth and financial stability and eliminating poverty by investing in infrastructure that would enhance banking services.*

Keywords: Financial Technology, Financial Inclusion, Digitalization, Poverty, ATM, KCC, India.

I. INTRODUCTION

Financial inclusion (FI) and financial technology (FT), such as the Kisan credit cards, the Unified Payment Systems, and ATMs, are digitalized payment options to eliminate poverty [1],[58] In this 21st-century, novel concepts like FI and FT are used to digitalize banking services to eradicate poverty.[5],[61]. In the preceding ten years, financial inclusion has accelerated into developing economies to eradicate poverty, starting from Kenya in 2007 utilizing the phone [2],[52]. Primarily Nandan Nilekani, Chairman of Infosys, introduced financial technology, fingerprint, and biometric keys in India [50]. This technology has reached one billion people and is being used in India's banking sector for digital payment. As opined by [27] and [33] Indian economy got a boost through digitalization. The Prime Minister of India has launched the Pradhan Mantri Jan Dhan Yojana (PMJDY), which provides free accounts to all citizens to promote financial inclusion [23].

As a part of demonetization, the PM of India had banned 1000 and 500 currency notes in November 2016, and this showed the Significance of digitalization. Financial inclusion is a way that allows anybody to profit from and contribute to economic progress. Instead of relying on regulation to establish financial inclusion, India achieved financial inclusion by nationalizing its banking institutions in the mid-1970s [36], [37], [52]. According to [22], the concept of FT and FI in India began in the 1960s when the banking industry was initially founded to help society. Ever since India has taken several steps to increase banking services in rural regions. There have been substantial advancements in financial sustainability, efficiency, and the use of financial technology [19]. Governments, academicians, and financial analysts worldwide have recognized FT and FI as a crucial tools for poverty reduction, job creation, and rising economic growth and living standards, contributing to economic growth [53]. FT and FI's high degree of effect in affluent nations remains a driving force for its adoption and implementation in countries in alleviating poverty[1],[12], [15] Digitalization frequently focuses on individuals who switch from one form of financing to another [38],[65] FT and FI do not imply that everyone should take advantage of the availability [32],[54]. financial literacy can improve FI, digitalization and employment, rural banks have must improve infruscture for poverty reduction. FI has important for poverty reduction and economic [56]. FI has important for poverty reduction and economic development. Microfinance and FI have to expand branches in rural and urban areas, this expansion of branches is cost effective and promote FI and its help on poverty alevation. [2],[18],[40]. FI and FT played a vital role in economic development and helped reduce poverty [55]. FT is a crucial chunk of FI [54]. India is one of the world's biggest emerging economies, but many states have an appalling level of financial inclusion. [62] and [68] explain that development and living standards are positively related to financial inclusion and negatively associated with poverty. The most important is financial technology training for disadvantaged people, which dramatically impacts poverty alleviation [65]. FT makes financial services more affordable for the poor [4],[26],[59]. The significant aspect of the banking sector is the expansion of branches in rural regions and increased awareness among poor people about FT, counseling credit, KCC/ATM micro-finance, UPI, M-banking, and micro-insurance [45], [59]. The bank should offer cheap and effective products or services for high specificity. FT and FI have played a critical role in economic progress [66].

The government has stabilized financial institutions and regional banks in agricultural ways to reach those living in extreme poverty [42]. FI can improve rural people living standard and most uses of FT is help to economic grouth, people in rural areas must be educated about the importance of FT and FI. [3] , [16], [21] , [23], [58], [68]

There has been no study in India to examine the influence of financial technology (FT) on poverty. FT is an essential factor for a country's economic and social development. It will transform the image of the poor in the future by generating higher profits and minimizing harm to the poor [27], [36] ,[57],[66]. The current study mainly focuses on financial technology and its impact on poverty in India. The scarcity of studies in this field and the crucial need for scenario study are the driving forces for this research. We have chosen to explore the impact of FT on people living in poverty using evidence and a panel data analytic technique [32],[42].

Panel data analysis is chosen for the study as it assists in determining the cumulative impact of cause on the output while simultaneously accounting for inverse correlation and other unseen factors and reveals the undiscovered variables [11]. Panel data technique captures the behavioral aspects of financial technology and its influence on poverty in India better than standard econometric or regression research [10]. As a result, panel data analysis has been chosen as a component of the model. The purpose of this study is to investigate the impact of Financial Technology on India's poverty [22],[39],[42].

The remainder of the paper is structured as follows; the second section deals with poverty, FI, and FT in India, followed by Literature Review and Hypotheses Formulation in the third part. The fourth part of the paper focuses on data collation and methodology, followed by results and discussion in the fifth and sixth sections. Conclusions of the study are presented in the final part.

II. POVERTY, FINANCIAL INCLUSION AND FINANCIAL TECHNOLOGY IN INDIA

With a population of over 1.3 billion people, India is the world's second-most densely inhabited country. It has emerged as one of the world's fastest-growing economies and one of the top ten emerging industrialized nations. The country is now well-known for its rapidly growing relationship with financial markets. It has evolved into one of the world's most costly technical labor nations, with a large pool of skilled employees such as staff and managers. FI and FT link with poverty and economic development, FI has effect on economic development and it can reduce poverty [6],[20],[35],[64].

FI and FT are both concerned with the provision of low-cost financial services to disadvantaged and low-income individuals. Financial services are considered a public right, providing banking and payment services without discrimination and must be the primary goal of social policy [13],[14],[48],[62]. [31] and [44] define access to finance as providing efficient financial institutions to individuals at risk of exclusion through formal banking institutions (such as access to payments and transfer services, deposits, credit, banking, and insurance). [5], [9], [31] [43], [49] define access to finance as providing efficient financial institutions to those at risk of exclusion through formal banking institutions, such as access to payments and transfer services, deposits, credit, banking, and insurance.

III. LITERATURE REVIEW AND HYPOTHESES FORMULATION

The literature review is discussed in two parts, the first part is focused on FT and FI, and the second part deals with the issue of poverty.

A Financial Technology and Financial Inclusion

FI and FT has play important role to reach financial services and the uses of the services to reduce poverty rural and urban areas. [27] and [28] Empirically found that increased financial inclusion reduces income disparity as measured by the number of banks. FI has to reduce inequality and poverty, and its effective on business growth. [39] discovered that financial inclusion correlates positively to financial stability in this region using the generalized least squares technique. FI have to reduce inequality and poverty, and its effective on business grouth. FT can promote to FI in rural people, and it can help to increase income and reduce poverty. ATMs in developing economies have become outmoded, necessitating a technological upgrade to have a meaningful influence in rural areas [23],[29]. The government should consider poverty reduction as a top priority by investing in infrastructure that improves banking services [66]. The FI and M-Banking have reduce poverty and its effect on increase rural people income. [2]. Farmers' embracing digital financial services have a positive impact on their vulnerability. ICT businesses' digital financial services significantly influence farmers' vulnerability than traditional banks' offerings [65]. FI can improve the living standards of many people in society, and ensuring maximum inclusion can lead to better growth. Further research shows a direct association between FI and growth and standard of living and a negative association between financial inclusion and poverty [3]. The utilization of financial services is anticipated to decrease household budget deficits and poverty significantly, and financial literacy is critical to increasing financial inclusion [58]. For public sector banks, financial inclusion and deepening reflect statistically significant negative associations with poverty ratios, but not for private sector banks. The depth and breadth of public sector banks in India may synergize poverty alleviation [28]. The equal distribution of growth opportunities and profit is critical to achieve inclusive growth. Financial inclusion is an essential possibility that must be made available across the country for the government to attain comprehensive growth [16], [45]. RBI has adopted various steps to improve India's financial inclusion. Since 2005-06, initiatives like reduced KYC rules, "no-frills" accounts, and "General Credit Cards" for small deposits and credit have provided the impetus. FI is regarded as a forerunner of broader involvement in the financial system by vulnerable groups such as weaker parts and low-income groups as a "quasi-public benefit" [24].

FI for low-income households can enhance household financial resilience, diversify funding sources, and decrease poverty through boosting economic stability by speeding growth, diversification, and poverty reduction by improved access to formal financial institutions' savings [25].

Policymakers worldwide should seek to increase the degree of financial inclusion to achieve optimum, sustainable, and inclusive economic growth and development by concentrating on resolving regional imbalances [5]. FI is a critical tool for alleviating poverty and redistributing resources in developing countries such as Nigeria. In practice, this implies that financial sector participants must continue to collaborate to minimize the number of people who cannot access financial services, therefore decreasing poverty and promoting income transfer in developing countries [15], [20]. According to [46], there is a positive correlation between economic growth and financial inclusion and a negative correlation between inequality and poverty. [47] opined that the higher the digitalization level, the lower the poverty level. The financial industry may be able to relieve poverty by providing capital. Financial inclusion and economic growth are essential for developing income distribution methods and reducing poverty [19].

FI has the potential to become a commercially viable enterprise. Villagers are still uninformed of banking policies and the credit system. A large portion of India's rural population lacks financial access in the form of bank accounts, financial advice, and financial services, among other things. The primary issue in India is providing financial services to impoverished individuals who have been excluded from the financial system. As these people do not have an income or own property, they cannot give bank guarantees, and as a result, they are frequently overlooked by financial institutions and banks [8], [59],[60]. The notion of FI has risen in prominence in recent years. The idea of financial inclusion has grown in relevance and momentum [37].

Financial literacy is typically inadequate in rural areas. This makes it difficult for customers to understand the financial services accessible to them, which banks may misuse. Furthermore, because financial inclusion has been highlighted as a significant accelerator for decreasing rural poverty, financial inclusion implies that non-agricultural financial services in rural regions are equally as crucial as agricultural financial services. These could be educational, financial services, irrigation systems, housing, emergency, and other productive infrastructure [4]. Financial inclusion has been a popular approach for developing countries to reduce poverty during the last ten years.

One of its pillars is digital banking, which debuted in Kenya in 2007 with mobile phone text messaging to perform financial transactions [51], [63]. The demonetization of India's currency in 2016 underscored the country's desire to expedite its economy's digitalization [36]. Infrastructure, technology, and financial awareness may all help with FI. Financial inclusion is crucial to the abolition of poverty. Furthermore, the Usage Dimension has little impact on poverty alleviation. Rather than offering clients easy and low-cost financial services, financial services do not assist the poor in escaping poverty [18], [69].

FI and Poverty Reduction are inextricably linked. Decreasing the financial limitations imposed by the central bank, developing gender-sensitive financial products and services that are accessible to low-income earners, and finally, enhancing financial literacy in both urban and rural areas [25].

FI in Private-sector credit as a proportion of GDP has a significant negative influence on economic growth. In contrast, commercial bank liquidity ratios have a strong positive impact on economic growth. Loans to rural regions and rural deposits have a significant beneficial influence on poverty alleviation in Nigeria [33],[41]. Financial liberalization policies have aided India's economic progress. The government of India's most significant task is to enhance the efficiency of financial institutions, which would promote both financial inclusion and economic growth [34]. Financial inclusion is a strong predictor of total factor productivity and capital per worker, which always decides the final level of production in the economy [9]. Financial inclusion has a positive and enormous impact on investment and growth and a big negative impact on poverty, but no significant impact on development [7]. Financial inclusion has been demonstrated to substantially influence per capita income, poverty levels, and living standards, and this will help promote the availability of low-cost financial services for poverty reduction [12], [40].

B. Poverty

Financial inclusion can alleviate poverty in several ways and evaluate the relationship between financial inclusion and poverty rates in relevant important variables [27]. Poor people's financial services have proven to be an effective instrument for poverty reduction, allowing them to develop wealth, improve income, and reduce their vulnerability to economic stress. India has solidified its position as a significant potential contributor to the government's "financial inclusion" program [64]. There is a strong relationship between financial inclusion and poverty reduction. Financial technology helps to regulate the relationship between the variables under investigation. Other services such as education loans, technical assistance loans, skills training, and home appliance loans should be included to strengthen the financial technology services. Financial inclusion in rural areas makes financial technology a more practical approach to reducing poverty [26]. Financial dependence has a significant impact on economic development. Poverty, income inequality, poverty, and financial inclusion are all issues that need to be addressed [57].

The poor seek financing for high-cost expenditure to emulate the rich's consuming patterns, resulting in greater poverty or a "tunnel" effect. The rich's economic success and investment affect the poor. It is believed that the tunneling effect occurs, with credit applicants spending more on human capital than non-applicants. Access to credit is the primary motivator for relatively poor households to engage in the credit market [35].

The link between digital payments and poverty has received little attention among the different policy approaches being studied to reduce energy poverty. Employees are anticipated to gain the most from financial inclusion in terms of decreasing energy poverty. Financial inclusion can influence energy poverty through consumption poverty and net family income [30].

According to the Granger causality test, poverty alleviation causes economic growth, economic growth causes finance development, financial development causes poverty reduction, and economic growth causes poverty reduction. Economic growth is a policy tool that may accelerate financial development, and both can aid in poverty reduction [49]. Income growth, poverty, income disparity, and economic stability all significantly influence each other. However, the partial influence of the financial inclusion factor on economic development, poverty reduction, income inequality, and financial stability has been less than ideal in eleven Asian countries. Each country's government is adopting measures to increase financial inclusion to realize long-term development policy and enhance people's well-being [43],[57].

Financial inclusion has the potential to turn into a profitable business. Villagers still have little understanding of banking rules and the credit system. A substantial percentage of India's rural population, for example, lacks financial access in the form of bank accounts, financial counseling, and financial services. In India, the main concern is providing financial services to underprivileged people who have been shut out of the financial system. They are unable to offer bank guarantees since they do not have an income or own property, and as a result, they are usually disregarded by financial institutions and banks [17]. Because it helps disadvantaged segments of the population develop, financial inclusion is particularly helpful in combating poverty and income inequality. Financial inclusion reduces poverty rates and income inequality in developing countries by encouraging excluded segments to access and use formal financial services, improving society's overall well-being [42].

Financial inclusion reduces poverty and vulnerability in rural areas more than it does in metropolitan areas. Governments are being asked to adopt or strengthen laws that allow the private sector to develop and expand financial services to more remote places. For emerging nations to achieve greater financial inclusion, government investment and regulation of the mobile money business will be required [31],38. Inclusionary financing has an excellent and enormous influence on investment and growth and a negative and significant impact on poverty but does not affect economic growth [6].

Financial inclusion has the ability to boost overall economic growth and hence alleviate poverty, but it also has the potential to increase inequality. Financial inclusion has a significant detrimental influence on poverty [6]. This is best accomplished by expanding the number of consumers in the financial system to foster financial inclusion, stimulate the economy, and decrease poverty in the country [1].

The purpose of this study is to determine the influence of financial technology on poverty in India. Existing studies lacked empirical results regarding the association between financial technology and poverty in India. The absence of specific literature is not limited to the concept; the method also needs a novel viewpoint not before seen in the literature. According to the review of literature, the hypothesis proposed in this study is:

H1: Financial technology significantly affects poverty in India.

IV. METHODOLOGY

This section includes a description of the data collection, sources of data and model design for panel data analysis, and variables used for the study.

A. Data

Secondary data of 22 states in India has been fetched between 2018 and 2020. The list of states is mentioned in Table A1(see Appendix). The criteria to choose these states is based on the availability of sufficient data. The period of the study is chosen to include the most recent reflection of the study and to have enough observations for reliable output. The data has been collected from the official website of the Reserve Bank of India (RBI) and NABARD. The study used the data of the following variables: Poverty score(ps), KCC in amount (kcc_a), Kisan Credit card (kcc_n) in volume, and number of ATMs in the selected states to represent poverty, digitalization, and financial technology. Table 1 presents the description of the variables included in the study.

Table 1. Variable Definition

Variable Name	Symbol	Definition	Literature
Poverty score	ps	Poverty is defined as a level of spending (or earnings) below which products and services essential to meet basic requirements are not available at a socially affordable price, a person who lacks a sufficient supply of cash or material goods to be considered normal or socially desirable.	NITI Aayog (2018, 2020) and SDG Index 2018-20., RBI, 2015)
Kisan Credit Card (Number)	kcc_n	Kisan Credit Card (KCC) plan was established in 1998 to provide farmers with Kisan Credit Cards based on their lands for broad acceptance by banks, allowing farmers to buy agriculture materials like as fertilizer, seeds, and chemicals more easily.	RBI (2017)

4

www.ijmh.org
Exploring Innovation

| Kisan Credit Card (amount) | kcc_a | Kisan Credit Card has been made for the investment credit requirement of farmers. | RBI (2017) |
| ATM (Number) | atm | ATM is a computer-controlled machine that allows bank clients to access their accounts to withdraw cash and conduct other financial as well as non-activities without having to visit a bank office. | RBI (2020) |

Note: Where kcc_n and atm represents financial technology and kcc_a is proxy for adoption of digitalization.

B. Methodology

This study has used panel data analysis to investigate the hypotheses presumed in the paper. A panel data analysis is used to have more variability and information since it considers both time-series and cross-sectional behavior of the data analysis[10],[11]. There are three models specified in this study. The description of the models is as follows:

Model 1 ->   ps=f(kcc_a)

$Y_{it} = const + \beta kcc\_a_{it} + u_{it}$

Eq.1

Model 2 ->   ps=f(kcc_n)

$Y_{it} = const + \beta kcc\_n_{it} + u_{it}$

Eq. 2

Model 3->   ps=f(atm)

$Y_{it} = const + \beta atm_{it} + u_{it}$

Eq. 3

Where, Yit is the dependent variable (i.e., ps). *Const* is a constant term. b is the coefficient for the independent variable. X represents independent variable (i.e. kcc_n, kcc_a, or atm). uit is an error term. The subscript it represents ith state at time t. Definition of all variables is presented in Table 1.

V. RESULTS

A. Descriptive Statistics

Table 2 and Table 3 present the descriptive statistics and correlation matrix of the variables used in the study. The mean value of the poverty score is 58.667 indicating a high poverty level in India. Its Standard deviation is 10.557; therefore, these scores do not much deviate from its mean value. The maximum and minimum poverty scores are 76 and 28, respectively. The mean value of the number of Kisan credit cards (kcc_n) is 2180.15, indicating a good number of KCC are given to customers. The standard deviation of the number of KCC is 2669.46. This means that the deviation from the mean value is high for kcc_n. The minimum and maximum values for kcc_n are 4 and 12005, respectively.

Further, the average value of kcc_a is Rs. 21780.84 (in crore), indicating that kcc_a contributes a good amount on average across the states in India. The standard deviation of 27058.64 is high from the mean value of KCC_a. The minimum and maximum values of KCC_a are Rs.15.6 (in crore) and Rs.113070.20 (in crore). This indicates a huge difference between maximum and minimum values for KCC_a among states. Lastly, the mean value of the number of ATMs (atm_n) is 28221.63. This indicates that, on average, a good number of ATMs are deployed in these states in India. Its standard deviation is 29867.60 indicating a high deviation from the mean value. The minimum and maximum values for atm_n are 446 and 110496. It also shows a vast difference between the minimum and maximum values.

Table 2. Descriptive Statistics

Variables	Mean	SD	Min	Max
ps	58.667	10.557	28	76
kkc_n	2180.151	2669.463	4	12005
kkc_a	21780.84	27058.64	15.6	113070.2
atm	28221.63	29867.6	446	110496

Note: Mean, SD, Min and Max are mean value, standard deviation, minimum and maximum value respectively.

In Table 3, the correlation matrix of variables is presented. The orrelation between kcc_n and ps is negative and significant. kcc_a and kcc_n have a strong positive correlation between them. kcc_n and atm also have a strong correlation. Moreover, Atm and kcc_a also have a strong. The rest of the correlations have been found insignificant.

Financial Technology and Its Impact on Poverty in India

Table 3. Correlation Matrix

Variables	ps	Kkc_n	Kkc_a	atm
ps	1			
kkc_n	-0. 2379*	1		
kkc_a	-0. 1951	.8971*	1	
atm	-0. 0387	.7414*	.6878*	1

Note: values are correlation coefficient. * represents significance level at 5%.

B. Result of Model 1

Table 3 depicts the regression analysis output of Model 1, including the dependent variable ps (poverty score) explanatory variable kcc_n (log value of KCC in number). First, observing the diagnostics of the model, the R-square value indicates only 0.5 percent variability in ps can be explained by the independent variable kcc_n. $\sigma_{i\mu}$ value of 0.4149 shows the variance in individual effect. Hausman test indicates a random effect. Theta value of 0.4149 indicates that the model is 41.49% fit for random effect. Wald test rejects the null of no heteroscedasticity as its value is lower than 5 percent significance. Wooldridge test also confirms the availability of autocorrelation [67] as its value is significant at 5 percent. Due to the presence of heteroscedasticity and autocorrelation, the robust estimates are taken into consideration [10],[11]. Bruesh -Pagan test also confirms the presence of heteroscedasticity as it is significant at 1 percent.

The coefficient of kcc_n is -0. 6393, and its p-value is 0.210. This indicates that the relationship between kkc_n and ps (poverty score) is negative, but this relationship is not significant at a 5 percent significance level. Therefore, kcc has no influence on poverty in India. Hence, it rejects the assumed hypothesis H1.

Table 4. Result of Regression Analysis (Model 1) (Random Effect Model)

Part A (Coefficient Analysis) Dependent Variable: ps						
	Standard Errors (Normal)			Robust Standard Errors		
Variable Name	Coefficient	SE	p-value	Coefficient	SE	p-value
Constant	67.0102	7.6421	.0000	67.0102	6.7337	.0000
lkkc_n_	-.6393	.5749	.2660	-.6393	.51043	.2100
Part B (Model Estimates)						
F-test (Model)	1.57 (.2104)					
R-Square	.0055					
Theta	.4149			.4149		
$\sigma_{\mu i}$	.4149			.4149		
F-test Fixed Effect	2.86* (.0003)					
Breush-Pagan Test	.0002* (.0002)					
Hausman Teat	1.05 (.3053)					
No of observations (n)	93					
Degree of freedom	61					
Wald test for Heteroscedasticity[1]	1984.10* (.0000)					
Wooldridge Autocorrelation Test[2] AR (1)	36.9430* (.0000)					

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in panel has the null of no autocorrelation (with 1 lag). $\sigma_{i\mu}$ is variance of individual effect (states in this case). Theta estimates the fitness of random effect model (higher is better). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on the scale of 1-100 and **lower means poorer**. lkkc_n is the log of the kisan credit card in number. * sig at 5%. ** sig at 10%.

C. Result of Model 2

In model 2, the relationship between ps and kcc_a is examined. Table 4 presents the outputs of Model 2. In this, it can be observed that the R-square value indicates only 0.7 percent variability in ps can be explained by the independent variable kcc_a. $\sigma_{i\mu}$ value of 6.667 shows the variance in individual effect. Hausman test indicates for random effect. Bruesh -Pagan test also confirms the presence of heteroscedasticity as it is significant at 1 percent. Theta value of 0.4194 indicates that the model is 41.94% fit for random effect. Wald test rejects the null of no heteroscedasticity as its value is lower than 5 percent significance. Wooldridge test also confirms the availability of autocorrelation [67] as its value is significant at 5 percent. Due to the presence of heteroscedasticity and autocorrelation, the robust estimates are taken into consideration [10],[11]. The explanatory variable kcc_a also has a negative coefficient (-0.5984) and p-value (0.186) higher than 0.05. This indicates that kcc_a is negatively linked to ps, but this association is insignificant. Therefore, it rejects the hypothesis H1. This implies kcc_a has no significant impact on poverty.

Table 5. Result of Regression Analysis (Model 2)

Part A (Coefficient Analysis) Dependent Variable: ps						
	Standard Errors (Normal)			Robust Standard Errors		
Variable Name	Coefficient	SE	p-value	Coefficient	SE	p-value
Constant	66.3587	7.244	.0000	66.3587	5.9284	.0000
kkc_a	-.5984	.5520	.278	-.5984	.4524	.186
Part B (Model Estimates)						
F-test (Model)	1.18 (.2783)			1.18 (.2783)		
R-Square	.0072			.0072		
Theta	.4194			.4194		
$\sigma_{\mu i}$	6.6678			6.6678		
F-test Fixed Effect	2.88* (.0002)					
Breush-Pagan Test	13.13* (.0000)					
Hausman Teat	.3400 (.5600)					
No of observations (n)	93					
Degree of freedom	61					
Wald test for Heteroscedasticity[1]	1995.53* (.0000)					
Wooldridge Autocorrelation Test[2] AR (1)	37.708* (.0000)					

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in panel has the null of no autocorrelation (with 1 lag). $\sigma_{i\mu}$ is variance of individual effect (states in this case). Theta estimates the fitness of random effect model (higher is better). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on the scale of 1-100 and **lower means poorer**. lkkc_a is the log of the amount transacted through kisan credit card. * sig at 5%. ** sig at 10%.

D. Result of Model 3

In model investigates the relationship between ps and kcc_a. Table 5 demonstrates the outputs of Model 3. In this, it can be observed that the R-square value indicates only 0.09 percent variability in ps can be explained by the independent variable atm. $\sigma_{i\mu}$ value of 6.6585 shows the variance in individual effect. Hausman test indicates for random effect. Theta value of 0.4202 indicates that the model is 42.02% fit for random effect. Wald test rejects the null of no heteroscedasticity as its value is lower than 5 percent significance. Wooldridge test also confirms the availability of autocorrelation [67] as its value is significant at 5 percent.

Due to the presence of heteroscedasticity and autocorrelation, the robust estimates are taken into consideration [10],[11]. Bruesh -Pagan test also confirms the presence of heteroscedasticity as it is significant at 1 percent. The explanatory variable atm has a negative coefficient (-0.9668) and p-value (0.2470) higher than 0.05. This indicates that atm is negatively linked to ps, but this association is insignificant. This implies atm has no significant impact on poverty. Therefore, it also rejects the hypothesis H1.

.Table 6. Result of Regression Analysis (Model 3)

Part A (Coefficient Analysis) Dependent Variable: ps						
	Standard Errors (Normal)			Robust Standard Errors		
Variable Name	Coefficient	SE	p-value	Coefficient	SE	p-value
Constant	67.7002*	8.4306	.000	67.7002*	7.6943	.0000
atm	-.9668	.8886	.2770	-.9668	.8354	.2470
Part B (Model Estimates)						
F-test (Model)	1.18 (.2766)			1.18 (.2766)		
R-Square	.0009			.0009		
Theta	.4202			.4202		
$\sigma_{\mu i}$	6.6585			6.6858		
F-test Fixed Effect	2.88* (.0002)					
Breush-Pagan Test	13.28* (.0001)					
Hausman Teat	.1300 (.7166)					
No of observations (n)	93					
Degree of freedom	61					
Wald test for Heteroscedasticity[1]	4589* (.0000)					
Wooldridge Autocorrelation Test[2] AR (1)	6.971* (.0130)					

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in panel has the null of no autocorrelation (with 1 lag). $\sigma_{i\mu}$ is variance of individual effect (states in this case). Theta estimates the fitness of random effect model (higher is better). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on the scale of 1-100 and **lower means poorer**. atm is the explanatory variable for the number of ATMs. * sig at 5%. ** sig at 10%.

Summarily, it has been found from all three models that financial technology and digitalization do not affect poverty in India.

VI. DISCUSSION

The study, as stated in the literature review, tests the frame hypotheses. The hypothesis, H1, has been verified to be an appropriate model (Table 4, Table 5, Table 6) in comparison to the model developed in methodology (Eq.1, Eq.2, Eq.3). The model demonstrates that all variables have high validity and reliability (Table 1). The literature substantially supports the study's hypothesis. This research looks at financial inclusion, financial technology, and poverty.

It indicates the critical need for academic attention to the financially excluded to determine the impact of digitalization. As a result, the current study considers the poor beneficiaries who require financial technology. Existing research examines the influence of financial technology on poverty [6],[9],[49]. Investigating digital innovation related to the growth of credit cooperatives researches the financial technology platform in collaboration with the banking industry. The current study focuses on financial inclusion and technology platform providers. However, such a programming interface was lacking in studies on electronic payments and drivers of financial literacy and financial inclusion [39], [66].

The novelty of this research lies in the study of financial technology and its impact on poverty reduction with regard to the Indian research on poverty reduction. Furthermore, this research analyses the moderating role of financial technology as proposed in the model. The study is relevant as it contributes to financial technology and poverty score. Additionally, our key theoretical contribution is the study of the moderating effects of financial technology and poverty score.

The conceptual conclusion of this study is that financial technology may have a good impact on poverty reduction, sustainable growth, income disparity reduction, and economic stability in India. Regrettably, not all parts of financial technology have a significant effect. The government should pay more attention to the processes of activities to expand financial technology so that the primary aim of financial technology, which includes increasing economic growth and financial stability and eliminating poverty and income gaps, may be fully fulfilled.

VII. CONCLUSION

The study aims to assess the moderating impacts of financial technology in the link between poverty scores. The model was put to the test to see if the hypotheses about financial technology and poverty score were correct. Concerning the academic contribution of this work, we must emphasize that there are studies in the literature concerning the suggested model's effect on financial technology and poverty score. On the other hand, this study is pioneering research in the field of empirical studies of the moderating influence of financial technology on poverty scores. The findings indicate that financial technology and deepening have statistically significant negative relationships with the poverty score for Kisan credit cards and ATMs. Given the positive effects of financial technology, this result suggests that increasing the breadth and depth of KCC and ATM may have a synergistic impact on poverty alleviation in India.

REFERENCES

1. Abimbola, A., Olokoyo, F. O., Babalola, O., & Farouk, E. (2018), "Financial inclusion as a catalyst for poverty reduction in Nigeria," *International Journal of Scientific Research and Management*, Vol. 6. No. 06 pp. 441-490.
2. Abor, J. Y., Amidu, M., & Issahaku, H. (2018), "Mobile telephony, financial inclusion and inclusive growth," *Journal of African Business*, Vol. 19 No. 3, pp. 430-453.
3. Ahuja, K., & Phatak, S. S. (2018). Financial Inclusion in India and its Impact on Development and Poverty," Vidyasagar *University Journal of Economics*," Vol. 22 No. 2017-18, pp. 29-39.
4. Ajide, F. (2015), "Financial inclusion and rural poverty reduction: Evidence from Nigeria," International *Journal of Management Sciences and Humanities*, Vol. 3. No. 2, pp. 1-23.
5. Anand, S., & Chhikara, K. S. (2013), "A theoretical and quantitative analysis of financial inclusion and economic growth," *Management and Labour Studies*, Vol. 38. No. 1-2, pp. 103-133.
6. Anwar, A. I., & Amrullah, A. (2017, October), "Impact of Financial Inclusion towards Poverty in Indonesia," *In* Proceedings *of the 2nd International Conference on Accounting, Management, and Economics.* https://dx.doi.org/10.2991/icame-17.2017.32.
7. Anwar, A., Uppun, P., Tri, I., & Reviani, A. (2016), "The role of financial inclusion to poverty reduction in Indonesia," *Journal of Business and Management (IOSR-JBM)*, Vol. 18. No. 6, pp. 37-39.
8. Athaley, C., Rastogi, S., Goel, A. & Bhimavarapu, V. (2020), "Factors Impacting Bank's Performance: A Literature Review", Test Engineering and Management,Vol. 83 No. May-June, pp. 7389-7398.
9. Babajide, A. A., Adegboye, F. B., & Omankhanlen, A. E. (2015), "Financial inclusion and economic growth in Nigeria," *International Journal of economics and financial issues*, Vol. 5. No. 3, pp. 629-637.
10. Baltagi, B. H. (2008), "Forecasting with panel data," *Journal of forecasting*, Vol. 27. No. 2, pp. 153-173.
11. Baltagi, B. H., Demetriades, P. O., & Law, S. H. (2009), "Financial development and openness: Evidence from panel data," *Journal of development economics*, Vol. 89. No. 2, pp. 285-296.
12. Banerjee, S. (2020), "Effect of Financial Inclusion and Stability on Equality, Poverty, and Human Development: An Empirical Analysis in the Context of South Asia," *DLSU Business & Economics Review*, Vol. 30 No. 1, pp. 130-142.
13. Bhimavarapu, V. M. & Rastogi, S. (2020), "Valuation of Transparency–A Systematic Literature Review Paper", *Test Engineering and Management*,Vol. 83 No. May-June, pp. 9092-9102.
14. Bhimavarapu, V. M., & Rastogi, S. (2021) Dividend and Bank Performance in India: Evidence using Panel Data Analysis. International Journal of Management and Humanities, Vol. 6 No.1, pp.1-4
15. Chibba, M. (2009), "Financial inclusion, poverty reduction, and the millennium development goals," *The European Journal of Development Research*, Vol. 21. No. 2, pp. 213-230.
16. Dixit, R., & Ghosh, M. (2013), "Financial inclusion for inclusive growth of India-A study of Indian states," *International Journal of Business Management & Research*, Vol. 3 No. 1, pp. 147-156.
17. Durrani, M. K. K., Usman, A., Malik, M. I., & Shafiq, A. (2011), "Role of microfinance in reducing poverty: A look at social and economic factors," *International Journal of Business and Social Science*, Vol. 2. No. 21, pp. 198-144.
18. Enisan, A. A., & Akinwumi, S. (2019), "Financial Inclusion in Ondo State, Nigeria: Determinants and Its Impact on Poverty," *Review of Market Integration*, Vol. 11. No. 3, pp. 151-175.
19. Erlando, A., Riyanto, F. D., & Masakazu, S. (2020). Financial inclusion, economic growth, and poverty alleviation: evidence from eastern Indonesia, "*Heliyon*, Vol. 6. No. 10, pp. 1-13.
20. Fadun, S. O. (2014), "Financial inclusion, tool for poverty alleviation and income redistribution in developing countries: Evidences from Nigeria," *Academic Research International*, Vol. 5. No. 3, pp. 137-146.
21. Gautam, R.S., & Mishra, K., (2018), "Impact of Post-demonetization On Adaptation of Digital Transaction by The Lucknow's Youth: An Empirical Study", R.K. Chaturvedi (Ed.), Contemporary Research in Management (pp.97-126), *Educreation Publishing*.
22. Gautam, R.S., Bhimavarapu, V. M., & Rastogi, S. (2021), "Impact of Digitalization on the Farmers in India: Evidence Using Panel Data Analysis", *International Journal of Management and Humanities (IJMH)*, Vol. 6, No. 1, pp. 5-12.
23. Gautam, R.S., Yadav, L.N., Kumar, S. (2021), "Impact of Digital Economy in Rural Areas in India: Issues and Challenges and Opportunities", *Kala : The Journal of Indian Art History Congress*, Vol. 27, No. 1, pp. 495-504.
24. Gupte, R., Venkataramani, B., & Gupta, D. (2012), "Computation of financial inclusion index for India," *Procedia-Social and Behavioral Sciences*, Vol. 37 No. 2012, pp. 133-149.

25. Haleem, A., & Madhuwanthi, W. P. C. (2020), "The determinants of financial inclusion and its mediating effect on poverty reduction," *Journal of Business Economics*," Vol. 02. No. 1, pp. 80-97.

26. Hussaini, U., & Chibuzo, I. C. (2018), "The effects of financial inclusion on poverty reduction: The moderating effects of microfinance," *International Journal of Multidisciplinary Research and Development*, Vol. 5. No. 12, pp. 188-198.

27. Inoue, T. (2011), "Financial inclusion and poverty alleviation in India: An empirical analysis using state-wise data," *In Inclusiveness in India*, pp. 88-108. https://doi.org/10.1057/9780230304956_4.

28. Inoue, T. (2019), "Financial inclusion and poverty reduction in India," *Journal of Financial Economic Policy*, Vol. 11. No. 1, pp. 21-33.

29. Kanoujiya, J., Bhimavarapu, V. M., & Rastogi, S. (2021), "Banks in India: A Balancing Act Between Profitability, Regulation and NPA", *Vision*, 09722629211034417. Access from https://journals.sagepub.com/doi/pdf/10.1177/09722629211034417.

30. Koomson, I., & Danquah, M. (2021), "Financial inclusion and energy poverty: Empirical evidence from Ghana," *Energy Economics*, Vol. 94. No. February2021, pp. 1-26.

31. Koomson, I., Villano, R. A., & Hadley, D. (2020), "Effect of financial inclusion on poverty and vulnerability to poverty: Evidence using a multidimensional measure of financial inclusion," *Social Indicators Research*, Vol. 149. No. 2, pp. 613-639.

32. Kuknor, S. & Rastogi, S. (2021), "DETERMINANTS OF PROFITABILITY IN INDIAN BANKS: A PANEL DATA ANALYSIS", *International Journal of Modern Agriculture*, Vol. 10 No. 2, pp. 978-986.

33. Lal, T. (2018), "Impact of financial inclusion on poverty alleviation through cooperative banks. *International Journal of Social Economics*, Vol. 45. No. 5, pp. 808-828.

34. Lenka, S. K., & Sharma, R. (2017), "Does financial inclusion spur economic growth in India?," *The Journal of Developing Areas*, Vol. 51. No. 3, pp. 215-228.

35. Li, L. (2018), "Financial inclusion and poverty: The role of relative income," *China Economic Review*, Vol. 52. No. C, pp.165-191. https://doi.org/10.1016/j.chieco.2018.07.006.

36. Maripally, A., & Bridwell, L. (2017, July), "The future of financial inclusion and its impact on poverty reduction in India," *In Competition Forum*, Vol. 15. No. 2, pp. 329-335.

37. Murari, K., & Didwania, M. (2010), "Poverty alleviation through financial inclusion: an analytical study with special reference to India," *Revelation*, Vol. 3, pp.60-72. https://ssrn.com/abstract=2187201.

38. Mushtaq, R., & Bruneau, C. (2019). Microfinance, financial inclusion and ICT: Implications for poverty and inequality. *Technology in Society*, Vol. 59. No. November 2019. pp. 1-19. https://doi.org/10.1016/j.techsoc.2019.101154.

39. Neaime, S. and Gaysset, I. (2018), "Financial inclusion and stability in MENA: evidence from poverty and inequality", *Finance Research Letters*, Vol. 24 No. C, pp. 230-237.

40. Ogbeide, S. O., & Igbinigie, O. O. (2019), "Financial inclusion and poverty alleviation in Nigeria," Accounting and Taxation Review, Vol. 3. No. 1 pp. 42-54.

41. Okoye, L. U., Adetiloye, K. A., Erin, O., & Modebe, N. J. (2017), "Financial inclusion as a strategy for enhanced economic growth and development. *Journal of Internet Banking and Commerce*, Vol. 22. No. S8, pp. 1-14.

42. Omar, M. A., & Inaba, K. (2020), "Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis," *Journal of Economic Structures*, Vol. 9. No. 1, pp. 1-25.

43. Ouechtati, I. (2020), "The Contribution of Financial Inclusion in Reducing Poverty and Income Inequality in Developing Countries," *Asian Economic and Financial Review*, Vol. 10 No. 9, pp. 1051-1061.

44. Patil, A. C. & Rastogi, S. (2019), "Time-Varying Price–Volume Relationship and Adaptive Market Efficiency: A Survey of the Empirical Literature", *Journal of Risk and Financial Management*, Vol. 12 No. 2, pp. 1-18.

45. Patil, A. C. & Rastogi, S. (2020a), "Multifractal Analysis of Market Efficiency across Structural Breaks: Implications for the Adaptive Market Hypothesis", *Journal of Risk and Financial Management*, Vol. 13 No. 10, pp. 1-18.

46. Patil, A. C. & Rastogi, S. (2020b), "Multifractal Analysis of Time-Varying Market Efficiency: Implications for Adaptive Market Hypothesis", *Test Engineering and Management*, Vol. 83 No. May-June pp. 16646–16660.

47. Pinto, G. & Rastogi, S. (2019), "Sectoral Analysis of Factors Influencing Dividend Policy: Case of an Emerging Financial Market", *Journal of Risk and Financial Management*, Vol. 12 No. 3, pp. 110.

48. Pinto, G., Rastogi, S., Kadam, S. & Sharma, A. (2019), "Bibliometric study on dividend policy", *Qualitative Research in Financial Markets*, Vol. 12 No. 1, pp. 72-95.

49. Pradhan, R. P. (2010), "The nexus between finance, growth and poverty in India: The cointegration and causality approach," Asian Social Science, Vol. 6. No. 9, pp. 114-122.

50. Rastogi, S. & Ragabiruntha, E. (2018), "Financial inclusion and socioeconomic development: gaps and solution", *International Journal of Social Economics*, Vol. 45 No. 7, pp. 1122-1140.

51. Rastogi, S. (2011), "Impact of Currency Futures on Spot Market Volatility: An Empirical Study", *Vidwat: The Indian Journal of Management*, Vol. 4 No. 2, pp. 3-8.

52. Rastogi, S., Goel, A. & Doifode, A. (2020a), "Open API in Indian banking and economic development of the poor: opportunities and challenges", *International Journal of Electronic Banking*, Vol. 2 No. 4, pp. 321-348.

53. Rastogi, S., Gupte, R. & Meenakshi, R. (2021a), "A Holistic Perspective on Bank Performance Using Regulation, Profitability, and Risk-Taking with a View on Ownership Concentration", *Journal of Risk and Financial Management*, Vol. 14 No. 3, pp. 1-19.

54. Rastogi, S., Sharma, A. & Panse, C. (2020b), "Open Banking and Inclusive Growth in India", *Indian Journal of Ecology*, Vol. 47 No. SI9, pp. 75-79.

55. Rastogi, S., Sharma, A., Panse, C. & Bhimavarapu, V. M. (2021b), "Unified Payment Interface (UPI): A Digital Innovation and Its Impact on Financial Inclusion and Economic Development", *Universal Journal of Accounting and Finance*, Vol. 9 No. 3, pp. 518-530.

56. Rastogi, S., Suresh, V. & Leonard, D. (2017), "FINANCIAL INCLUSION AND DEMONETIZATION: AN EMPIRICAL STUDY USING EXPLORATORY FACTOR ANALYSIS", *Indian Journal of Commerce and Management Studies*, Vol. 8 No. 1(5), pp. 38-46.

57. Ratnawati, K. (2020), "The impact of financial inclusion on economic growth, poverty, income inequality, and financial stability in Asia," *The Journal of Asian Finance, Economics, and Business*, Vol. 7. No. 10, pp. 73-85.

58. Seng, K. (2020), "The Poverty-Reducing Effects of Financial Inclusion: Evidence from Cambodia," *Economic Research Institute for ASEAN and East Asia*," ERIA-DP-2020-16, pp. 1-42. https://think-asia.org/handle/11540/12596.

59. Sethi, D., & Acharya, D. (2018), "Financial inclusion and economic growth linkage: Some cross country evidence," *Journal of Financial Economic Policy*, Vol. 10. No. 3, pp. 369-385.

60. Sharma, A. & Rastogi, S. (2021), "Impact of Efficiency on Voluntary Disclosure of Non-Banking Financial Company—Microfinance Institutions in India", *Journal of Risk and Financial Management*, Vol. 14 No. 7, pp. 289-311.

61. Sharma, A., Rastogi, S. & Gupta, N. (2020), "Financial Efficiency of Non–Banking Financial Companies-Microfinance Institutions: A Data Envelopment Analysis", *Test Engineering and Management*, Vol. 83 No. May-June 2020, pp. 9080-9091.

62. Singh, I. & Rastogi, S. (2020), "Drivers impacting bank risk in India", *Test Engineering and Management*, Vol. 83 No. May-June, pp. 8005-8011.

63. Singh, S., Rastogi, S., & Bhimavarapu, V. M. (2020). Do Informed Investors Prefer Futures?. International Journal of Modern Agriculture, Vol. 9 No.3, pp. 257-262.

64. Singh, J., & Yadav, P. (2012), "Micro finance as a tool for financial inclusion & reduction of poverty," Journal of Business Management & Social Sciences Research (JBM&SSR), Vol. 1 No. 1, pp. 1-12.

65. Wang, X., & He, G. (2020), "Digital financial inclusion and farmers' vulnerability to poverty: Evidence from rural China," *Sustainability*, Vol. 12. No. 4, pp. 1-18.

66. Williams, H. T., Adegoke, A. J., & Dare, A. (2017), "Role of financial inclusion in economic growth and poverty reduction in a developing economy," *Internal Journal of Research in Economics and Social Sciences (IJRESS)*, Vol. 7. No. 5, pp. 265-271.

67. Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

68. Yadav, L.N., Ahmad, M., Gautam, R.S., Singh, B.M. (2021),

"Adoption of Digital Payment- With Special Reference to Unified Payment Interface (UPI) Among Students and Faculties of Goel Group of Institutions Lucknow", *Kala : The Journal of Indian Art History Congress*, Vol. 27 No. 1, pp. 505-528.

69. Zahidi, S., & Khan, W. (2019), "Financial Inclusion and its Effect on Alleviation of Poverty: A Case of Afghanistan," *Kardan Journal of Economics and Management Sciences,"* Vol. 2. No. 3, pp. 15–26.

AUTHORS PROFILE

Rahul Singh Gautam, (bouddhrahul@gmail.com) is currently pursuing a Ph.D. as a full-time research scholar at SIBM Pune Constitution of Symbiosis International (Deemed University). He is an MBA (Finance) from the Dr. Shakuntala Mishra National Rehabilitation University, Lucknow, and MPhil in Financial Management from Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow. He has around 3 years of experience in the field of research.

Jagjeevan Kanoujiya, is a PhD scholar in the Symbiosis Institute of Business Management, Symbiosis International (Deemed University), Pune. He is an MBA in Financial Management from the Banaras Hindu University. He has experience of around 5 years in IT industry. He has attended many national and international conferences and presented papers E-mail. (jagjeevan24288@yahoo.co.in) .

Venkata Mrudula Bhimavarapu, currently pursuing Ph.D. as a full-time research scholar at Symbiosis International (Deemed University). She is an MBA gold medallist from Andhra University and MPhil in Financial Management from Annamalai University. She has around 7 years of experience in the field of academics and research. She has presented papers at national-level conferences. E-mail. (mrudulabhimavarapu@gmail.com)

Shailesh Rastogi is presently working as a professor at SIBM Pune. He has more than 20 years of experience of academics and industry. His areas of expertize include conducting MDPs on Panel Data Econometrics, Financial Econometrics, Financial Analytics using spreadsheet & V.B. and Corporate Valuation. He is a prolific researcher and has more than 70 research papers published in the national and international journal of repute E-mail. (krishnasgdas@gmail.com)