

## EXPLORING FINANCIAL INCLUSION AND POVERTY DYNAMICS IN PAKISTAN: EVIDENCE FROM PRINCIPAL COMPONENT ANALYSIS BASED INDEXES

Maaz Ullah<sup>\*1</sup>, Zakir Hussain<sup>2</sup>, Rabia Sajjad<sup>3</sup>, Rida Mehmood<sup>4</sup>

<sup>1</sup>Department of Management Sciences, PEF University College

<sup>2</sup>Department of Business Administration, Federal Govt Degree College Peshawar

<sup>3</sup>Department of Management Sciences, Iqra National University

<sup>4</sup>Department of Management Sciences, Islamia College University Peshawar

<sup>\*1</sup>maazm4u@gmail.com, <sup>2</sup>zakirhussainmalkani@gmail.com, <sup>3</sup>rabiasajjad35@yahoo.com, <sup>4</sup>melic22230@gmail.com

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Corresponding Author: \*

Maaz Ullah

### Abstract

This study investigates the impact of financial inclusion on poverty dynamics in Pakistan over the period 2002-2021. Using annual data, we construct composite indexes of financial inclusion based on access and usage dimensions through principal component analysis (PCA), ensuring a comprehensive coverage of supply and demand side indicators. The relationship between financial inclusion and poverty is examined using time series regression techniques, with robust checks in different specifications. The results show that greater financial inclusion - mainly through the improved usage of financial services - significantly reduces poverty levels. Access indicators such as branch and ATM density also contribute positively, but measures related to usage (deposit accounts, private sector credit and digital transactions) exert a stronger effect. Control variables, including exchange rate, financial development and loan rates, highlighting the broader macroeconomic context that influences the dynamics of poverty. The study contributes to the growing literature, offering a specific financial inclusion rate of Pakistan and providing empirical evidence on the role of inclusive finances in the relief of poverty. Political implications emphasize the need to strengthen digital finances, expand dissemination and promote women's participation in the financial system to obtain sustainable results.

### INTRODUCTION

Financial Inclusion is a multidimensional concept of financial development. It refers to the availability to both individuals and companies of useful and cost-effective financial goods and services, including payments, transactions, savings, credit, and insurance, that are offered in a sustainable and ethical form. Credits, savings, insurance, payment and remittance services are examples of basic formal

financial services. Individuals who lack these services are more likely to rely on high-cost informal financial sources; this financial exclusion is expected to have a disproportionately bad impact on low-income groups. Thus promoting financial inclusion is significant to reducing poverty and lowering income disparities within a country. Financial inclusion is more than just the inverse of "financial exclusion"; it

has a broader and more fundamental dimension. (Allen et al. 2012). "Financial inclusion denotes an individual's capacity to get and efficiently use suitable conventional financial services and products" (Clark et al. 2005).

Financial inclusion has emerged as a fascinating topic of the twenty-first century, and it continues to widen the gap between underdeveloped and developed countries. According to the Global Findex report, almost all financially excluded adults reside in developing nations. About half of them are belonged from Bangladesh, China, Pakistan, Indonesia, Mexico, India, and Nigeria. Maximum financial inclusion is the focus of academics, professionals, and governments worldwide. An inclusive financial system offers equal opportunities to both individuals and businesses to get simple and cheap financial products and services, such as transactions, payments, saving, and credit, to satisfy their requirements (World Bank annual report 2013). It has transformative effects in the initial levels such as increasing financial literacy, enhancing investment opportunities, assisting people in adjusting their consumption patterns in response to shocks, and empowering women. All of these initial effects contribute to a better economic result, namely the ability to escape poverty, lessen income disparity, and put the economy on the route to growth.

The dimension of "access" is included on the supply side of financial inclusion. Individuals have the ability to use financial services if they have access to them. According to theoretical literature, access is one of the critical dimensions for measuring supply-side financial inclusion. According to the literature, the supply of financial services (formal) matters (Camara & Tuesta 2014), and financial inclusion has a strong positive impact on economic growth (Toxopeus & Lensink 2007).

In Pakistan the State Bank of Pakistan starts Financial Inclusion Program (FIP) in order to enhance inclusive economic growth and to improve income and livelihoods prospects for low-income and marginalized groups. The Objective of the Financial Inclusion Program (FIP) is "To increase access to financial services for the poor and marginalized groups as well as micro, and small enterprises in Pakistan" (SBP). The Financial Inclusion Program (FIP), implemented by SBP with support of the UK

Department for International Development (DFID), targets to reshape the financial market with a clear goal to provide equitable and efficient market-based financial services to the formerly excluded poor and marginalized population, including women and young people.

Pakistan has established a larger National Financial Inclusion Strategy (NFIS) in consultation with stakeholders to address the issues of low financial inclusion. In May 2015, the Government of Pakistan publicly launched and implemented the policy. The goal of the Strategy is to provide a national vision for achieving universal financial inclusion in Pakistan. The National Financial Inclusion Strategy (NFIS) outlines the goal, structure, action plan, and desired results for financial inclusion. The strategy intends to increase formal financial access to 50% of the adult population by 2020.

The Financial Inclusion Program (FIP) has set aside £10 million for the Institutional Strengthening Fund (ISF) from 2008 to 2012. The ISF is intended to build capacity in the microfinance industry in order to improve potential for development and depth in outreach by improving human resource quality, service quality, and service availability to potential customers.

In Pakistan Islamic Banking practices has also played a vital role in Financial Inclusion. According to the Islamic Financial Services Board (IFSB), the Islamic finance industry had reached \$1.8 trillion in 2013. The sector is a well-established international phenomenon, with operations in all Muslim nations and major financial markets such as North America, Europe, the Gulf Cooperation Council (GCC), Asia Pacific, South Asia, North and East Africa. Globally, Shariah-compliant assets are predicted to expand by 15-20 percent each year over the next few years, with some estimates predicting that Islamic financial assets had reached \$5 trillion by 2020. (Global Islamic Finance Report (GIFR) 2014).

Pakistan is the second-largest Muslim nation in terms of population, while according to the Global Islamic Financing Report (GIFR) 2014, globally it is only placed 9th in terms of Islamic finance. Pakistan has also fallen from 7th position in the world for Islamic finance in 2011 to 9th position in 2014. (Global Islamic Finance Report (GIFR) 2014). The population of Pakistan is more than 180 million.

Only 2.4% of the population has access to official financial sources of credit, making the financial sector's penetration incredibly low. 53 percent of Pakistan's adult population is considered to be financially excluded. A large portion of the population also lacks basic money and fundamental financial management skills. They are unfamiliar with basic concepts like Budgeting, investing, and savings etc.

While the headline figure for financial inclusion in Pakistan has been increasing, disaggregated data suggests that the gender gap is rising. According to the most recent statistics, 36% (2017: 20%) of Pakistan's adult male population is now considered to be financially involved; the percentage for adult females remains in the single digits, at 7% (2017: 7%). The gender disparity has increased by 30% in the previous five years. Problematically, the Global Gender Gap Report 2021 by the World Economic Forum (WEF) 2021 rates Pakistan at 153 out of 156 nations, two places worse than its 2020 position. Pakistan has the lowest gender parity (0.33) among the sub-indices for "Economic Participation and Opportunity."

Mobile phone ownership is an essential indicator of the adoption and penetration of digital financial services. According to the most recent FII survey results, just 26% of female respondents reported possessing a mobile phone, whereas the number was nearly three times higher for male respondents. Similarly, the gender gap in SIM card ownership was as high as 47%. The negative impact of this inequality is supported by the fact that the male population reporting having a registered mobile money account in their name increased by 10 percentage points since 2017 and now stands at 17%, while just 2% of female respondents reported having a mobile money account. The study also assesses respondent's financial literacy, based on their understanding of four essential concepts: i) interest rates, ii) interest compounding, iii) inflation, and iv) risk diversification. 14% of female respondents were classified as financially literate, whereas 25% of males appeared to comprehend similar words. All of these demand-side figures raise severe concerns about Pakistani women's preparedness to integrate with the financial ecosystem.

This study contributes to the following existent financial inclusion related literature. First, it develops a distinct index of financial inclusion for access dimension, then it develops index of financial inclusion for usage dimension and finally it constructs a novel index of financial inclusion utilising a comprehensive collection of financial sector accessibility and usability metrics with a time series data set of 2002–2021. Second, it explores the causes of financial inclusion and examines the impact of financial inclusion on poverty. Third, it examines the conditional links between financial inclusion and other micro or macroeconomic variables under which financial inclusion contribute to poverty. Fourth, to appropriately address factors related with financial inclusion, it evaluates the significant relationships between variables using a time series data set.

## LITERATURE REVIEW

A wide amount of literature addresses the financial inclusion, financial development and poverty conditions. Generally relevant empirical studies define financial development as the increased proportion of financial sector in the real economy which in turn has a significant impact on poverty conditions of a nation.

### The Demand Side of Financial Inclusion:

Given the importance of consumer spending in economic activity, it is assumed that a functioning market economy is significantly rely on credit availability. Consumer credit may boost economic growth by allowing for the anticipation of purchases and moving demand toward durable goods industries with high growth potential. Conversely failure to give fair credit can restrict consumer spending and limit economic progress. When credit is restricted, potential trade draws to a rest.

Second, the presence of affordable credit serves as a buffer for unexpected events and a source of temporary income to help stabilize consumption. So Credit is an external support for people who are unable to face difficulties by their own efforts. As a result, inability to obtain affordable credit is regarded as a component of financial exclusion.

The same is truly the case in Pakistan, where financial exclusion in consumer credit is a problem.

The exclusion is clear, as A2F 2015 (SBP) indicates that 84 percent of Pakistan's population has no access to "high street credit" from the banking sector. In the context of grim and prospective financial inclusion landscape in Pakistan, very few studies have examined the financial inclusion circumstance. Amin and Jalil (2017) investigated the link between remittances and financial inclusion in Pakistan. Studies upon the demand and supply dimensions of financial inclusion have received little attention in the local literature and context. Financial inclusion appears to be an incremental and complementary way to meeting the Millennium Development Goals of the United Nations (Chibba 2009).

Data from the demand side show that there is still a lot of distance to cover, particularly for women. According to the most recent Financial Inclusion Insights (FII) Survey 2020, topline financial inclusion in Pakistan is estimated to just be 21%, up 7 percentage points (ppt) from the previous wave conducted in 2017. Whereas the delta between the two waves is the largest since the FII survey's start in 2013, financial inclusion is still significantly low when compared to countries with similar socioeconomic profiles, such as India (78 percent) and Bangladesh (47 percent). Ullah et al. (2025) reveals that people are attracted more when the financial services are social and environment friendly.

Access to finance is regarded as crucial for establishing sustainable and inclusive economic growth since it is a prerequisite for equitable distribution of economic opportunities, poverty reduction, and achieving financial stability. However, before 2015, Pakistan had one of the lowest levels of financial inclusion in the world. Only 16% of the adult population owned a bank account. Women's account ownership was considerably lower, at 11%. Financing to priority sectors such as agriculture, SME (Small and Medium sized Enterprises), and housing remained extremely limited. A significant portion of the religiously sensitive population remained voluntarily excluded. Regional differences have widened over time. Overall, people's reliance on cash also increased. The extravagant access to credit increases the risk of bad debts that can cause financial instability and lead to inflation (Lapukeni

A. F., 2015). So, increasing financial inclusion must be effective for the economy and financial system.

### **The Supply Side of Financial Inclusion**

The supply side of financial inclusion is a multidimensional phenomenon that is determined by a significantly large range of indicators and cannot be determined by a single indicator. According to the literature, numerous supply-side data variables are used at the country level to determine access to financial services. Honohan (2008) developed a financial access indicator to investigate the influence of country-specific factors such as population density, age dependency ratio, and gross national income on the financial inclusion process in 160 countries. When he examined the cross-country relationship between poverty and financial access, he discovered that financial access greatly reduces poverty. Kumar (2013) researched the situation of financial inclusion in India and came to the conclusion that the branch network level has a significant and beneficial influence on financial inclusion. He further added that ease of access and geographical region are drivers of financial inclusion level among particular groups of the population. According to the literature, the supply of financial services (formal) matters (Camara and Tuesta 2014), and financial inclusion has a strong positive impact on economic growth (Toxopeus and Lensink 2007).

The majority of research employed basic indicators such as ATM/100,000 adults, ATM/1000 km<sup>2</sup>, commercial bank branches/100,000 people, and commercial bank branches/1000 km<sup>2</sup>. These variables indicate "physical points of service" offered by financial service providers (commercial banks, rural and agri-banks, saving banks, saving and credit co-operations, microfinance institutions, and money market funds).

In terms of financial service provision, several researches employed the factors of land mass, adult population, geographic outreach, and demographic outreach. According to the findings of the studies, demographic indicators include more information than geographic (area) indicators in describing the access dimension of the supply side of financial inclusion.

Park and Mercado (2015) researched financial inclusion determinants, and investigated the

relationships between inequality, poverty, and financial inclusion and noticed that demographic determinants such as age dependency ratio, literacy rate, per capita income, and state of law influence the financial inclusion process in developing Asian countries. Corrado and Corrado (2015) used substantial data from the "life in transition survey" performed in Europe during the 2008-2010 global crisis to demonstrate that the likelihood of financial inclusion is dependent on a household's economic, social, and demographic factors. Another variable, "having a loan," represents a consolidated stage of financial inclusion because it corresponds to the level in the hierarchy of availing financial services where such persons have already used other types of financial services such as bank accounts, pay roll accounts, etc.

The supply side's access dimension is simultaneously influenced by a number of factors, including supply-side traits at the national level. We used two aspects of the access dimension—availability and accessibility—based on strong support from the literature for establishing determinants and the measurement of financial inclusion from the supply side. The distance travelled to the financial services point can prove to be a significant barrier to financial inclusion. The dimension of availability accounts for financial system outreach and the size and shape of banking outlets (Allen et al. 2013).

Having a loan may be a good indicator to determine advanced level of financial inclusion (Camara and Tuesta 2014). According to the literature, another component that influences the supply-side level of financial inclusion is the efficiency of the financial system. Because efficient financial systems deliver services at a competitive price, the efficiency of the financial system reduces the barrier of financial service affordability (formal). Financial inclusion was measured in the context of transactions by Arora (2014), and the dimensions were "easy of transaction, cost of transaction, and outreach." Furthermore, the supply side of financial inclusion is not only dependent on idiosyncratic financial market issues such as financial institution efficiency and financial stability, but also on larger issues outside the financial market such as governance and macroeconomic factors like GDP, inflation, and the

net interest margin. According to Allen et al. (2012) financial inclusion is strongly connected with net interest margin.

A number of studies have attempted to identify the root causes, consequences, and potential solutions for financial exclusion, but most of the studies are either cross-country investigations or conducted in a single country where the socioeconomic landscape differs significantly from that of Pakistan.

Sarma (2008) developed a financial inclusion index but due to the variability of country-specific regulations, he was unable to determine a common factor for all countries. The characteristics and preferences that lead to financial inclusion vary greatly among countries (Kempson et al. 2004; Sinclair et al. 2009; Kendall et al. 2010; The World Bank 2008). Despite these researches, the literature on the determinants of financial inclusion in Pakistan is still lacking.

Most scholars used the Global Findex Database to better understand the global financial inclusion process (Allen et al. 2012; Efobi et al. 2014; Tuesta et al. 2015; Mohammed et al. 2017) and studied individual behaviour in terms of credit, payments, saving, and risk management using Findex data from 148 countries. Other researchers used survey data; Swamy (2014) utilized household survey data from India to examine the connections among financial inclusion, economic development, and gender. However, there has been minimal research into identifying financial inclusion based on secondary data and country-specific features. Explicitly, recent work focuses on individual characteristics to identify those who are financially excluded. Furthermore, little attempts have been made to model and actualize financial inclusion in a comprehensive manner. This study varies from earlier studies in that it seeks to simulate the supply side of financial inclusion in a thorough manner.

#### **Female Mobile Money Accounts:**

The government has set a target of 20 million women-operated digital transaction accounts by 2023 in the improved National Financial Inclusion Strategy (NFIS), which was pushed out by the current administration as part of its 100-day plan. According to the most recent statistics published by the State Bank of Pakistan (SBP), 5 million women operated

mobile money accounts as of December 2020, representing a 51% YoY rise. This considerable rise can be attributed to the current pandemic's increased customer demand for online commerce. However, it is critical to emphasize the discrepancy across provinces. 67% of these women have mobile money accounts, and the share has increased by 3 percentage points by 2020. While Sindh and Khyber Pakhtunkhwa (KP) accounted for 22% and 10% of the pie, respectively, their respective percentages decreased over the previous year. Baluchistan, Azad Kashmir, and Gilgit Baltistan (GB) account for only 3% of these female accounts. While the total number of women-operated accounts is increasing, outreach appears to be limited due to an imbalanced strategy taken by the supply side, with underdeveloped regions lagging behind.

## RESEARCH METHODOLOGY

### Type of study:

The type of research is applied research and we used explanatory research design. It can be applied to increase financial inclusion and decrease financial exclusion and as a result to decrease poverty conditions.

### Data Collection:

Although financial inclusion has been a top priority for many years, the approach and policy regarding financial inclusion has remained questionable, essentially showing bias in the way financial inclusion is measured.

The dimension of the overall financial picture is assumed to be determined by the two dimensions: usage of financial inclusion from the demand side, as well as financial inclusion's access component from the supply side.

The supply side's access dimension is simultaneously influenced by a number of factors, including supply-side traits at the national level. We used two aspects of the access dimension—availability and accessibility—based on strong support from the literature for establishing determinants and the measurement of financial inclusion from the supply side. The distance travelled to the financial services point can prove to be a significant barrier to

Furthermore, the national male/female split for mobile money accounts is presently 76%/24%. The percentage of female accounts in KP, Baluchistan, Azad Kashmir, and GB is shockingly lower than the national average.

Financial inclusion appears to be an incremental and complementary way to meeting the Millennium Development Goals of the United Nations (Chibba 2009).

### Hypothesis

H<sub>1</sub>: Financial inclusion access has a significant negative impact on Poverty.

H<sub>2</sub>: Financial inclusion usage has a significant negative impact on Poverty.

H<sub>3</sub>: Financial inclusion has a significant negative impact on Poverty.

financial inclusion. The dimension of availability accounts for financial system outreach and the size and shape of banking outlets (Allen et al. 2013). The banking industry's branch network, penetration, assets, agents, or ATMs are all ways that availability is demonstrated (Ahamed and Mallick 2019). Studies have used the quantity of bank loans, the types of loan portfolios, and mobile accounts to account for the degree of financial accessibility.

Studies have also shown how financial inclusion affects society as a whole and demonstrated how bank-specific micro variables have an impact on financial inclusion, which results in more financial services, better ways to address user capital problems, increased consumption, and ease of use (Corrado and Corrado 2015). In terms of the macro-impact, an increase in the number of channels for users and a more equitable and balanced distribution of resources are made possible by the supply and availability of economic services (Chakravarty and Pal 2013).

### Construction of Financial inclusion index:

Financial inclusion cannot be quantified with a single variable since one variable cannot adequately describe. As a result, many measures are employed to assess financial inclusion. The different studies from Anarfo E.B., et al., (2019), Sarma, M., (2008),

Demirguc-Kunt. A., et al (2018), Hung, B.D., (2016), Huong N.T.T., (2018), Camara N. & Tuesta D., (2014) uses banking population, geographic penetration, availability of financial services to the people, and utilization of financial services the most widely utilized variables. Kumar (2013) researched the situation of financial inclusion in India and came to the conclusion that the branch network level has a significant and beneficial influence on financial inclusion.

The IMF financial access survey in 2004 classified the variables into two major categories: (i) usage indicators and (ii) access indicators. The utilization or demand side measures how much individuals utilize financial services. The variables in the utilization category are (a) outstanding loans from commercial bank, (b) outstanding commercial bank deposits, (c) number of deposit accounts with commercial banks per 1000 adults, and (d) number of commercial bank borrowers per 1000 adults. The provision of financial services is estimated by Access. The indicator consists of (a) the number of commercial bank branches per 1000km<sup>2</sup>, (b) the number of commercial bank branches per 1000 adults, (c) the number of ATMs per 1000km<sup>2</sup>, and (d) the number of ATMs per 1000 adults.

The following are the variables we are using to compute an index

#### 1. Supply-side factors (access)

- a. Numbers of commercial bank branches per 1000km<sup>2</sup> (CBBKM)
- b. Numbers of commercial bank branches per 1000 adults (CBBAD)
- c. Number of ATMs per 1000km<sup>2</sup> (ATMSKM)
- d. Number of ATMs per 1000 adults (ATMSAD)

#### 2. Demand-side factors (usage)

- a. Number of Depositors with commercial banks per 1,000 adults
- b. Number of borrowers from commercial banks per 1,000 adults
- c. Number of borrowers from all Microfinance Institutions per 1,000 adults
- d. Number of registered mobile money accounts per 1,000 adults,

- e. Number of active mobile money accounts per 1,000 adults
- f. Number of mobile money transactions (during the reference year) per 1,000 adults
- g. Domestic credit to private sector by banks (% of GDP).

The Principal Component Analysis (PCA) technique is used to handle the suspected multi-collinearity among variables to construct a financial inclusion index. Sarma, M., (2008) and Enders, W., (2015) also used a Principal Component Analysis approach to construct a financial inclusion index. PCA transforms the correlated variable into orthogonal and uncorrelated variables (factors or pcs) by reducing correlated variables while keeping as much information as possible in the variables. These factors are arranged so that the first few values retain the majority of variation in all the original variables (Gujarati, D.N., 2011). According to this method, the index of the  $n^{th}$  factor can be addressed as

$$FII_m = B_{m1}X_1 + B_{m2}X_2 + \dots + B_{mn}X_n \quad (1)$$

Where FII is the financial inclusion index,  $B_m$  is the factor of coefficient's weight;  $X$  is the original variable;  $n$  is the number of variables in the equation.

At first the separate index has been formed for both access and usage dimensions. Finally overall financial inclusion index has been developed.

#### RESEARCH MODEL

For access dimension (Supply side) we approached financial inclusion by taking Number of ATMs per 100,000 adults, Number of ATM per 1000 km<sup>2</sup>, Number of Commercial bank Branches per 100,000 adults, Number of Commercial bank Branches per 1000 Km<sup>2</sup>.

While for usage dimension (Demand side) of financial Inclusion we take Number of Depositors with commercial banks per 1,000 adults, Number of borrowers from commercial banks per 1,000 adults, Number of borrowers from all Microfinance Institutions per 1,000 adults, Number of registered mobile money accounts per 1,000 adults, Number of active mobile money accounts per 1,000 adults, Number of mobile money transactions (during the reference year) per 1,000 adults, Domestic credit to private sector by banks (% of GDP).

Finally in the last we combined all the factors including factors from supply side of financial inclusion and demand side of financial inclusion. Thus we find a financial Inclusion by combining all the variables.

Sarma, M., (2008) and Enders, W., (2015) also used a Principal Component Analysis approach to construct a financial inclusion index. We develop indexes by Principal component analysis, which includes KMO and Bartlett's test. KMO Measure of Sampling Adequacy shows that whether the data is preferred or not. While Bartlett's test of sphericity show the statistically significance of the model. Then we have communalities which show the percentage of variance for the factors of the model. Then we have total variance explained, in which the cumulative percentage is listed and also it shows the total variance explained. The component matrix shows that all the factors in the model are fine.

First we develop an index for access (supply side) of financial inclusion by principal component analysis. Secondly, we develop an index for usage (demand side) of financial inclusion. Finally we develop an overall index for financial inclusion by Principal component analysis.

A descriptive statistical approach, correlation and regression analysis is used to interpret the relationship between the factors.

## RESULTS AND DISCUSSIONS

### Principle Component Analysis (PCA):

Table 1: KMO and Bartlett's Test

| KMO and Bartlett's Test                          |                    |
|--------------------------------------------------|--------------------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .784               |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square |
|                                                  | Df                 |
|                                                  | Sig.               |
|                                                  | 290.306            |
|                                                  | 6                  |
|                                                  | .000               |

Then we have the communalities in Table 4.1.2 which shows the percentage of variance for the four factors of access to financial inclusion. The communalities value should be greater than 0.5, and in our data all the four factors have communalities value greater than 0.5.

Table: Communalities

|                    | Initial | Extraction |
|--------------------|---------|------------|
| ATMA               | 1.000   | .998       |
| ATMKm <sup>2</sup> | 1.000   | .997       |
| CBBA               | 1.000   | .997       |
| CBBKm <sup>2</sup> | 1.000   | .999       |

We develop indexes by Principal component analysis, which includes KMO and Bartlett's test. KMO Measure of Sampling Adequacy shows that whether the data is preferred or not. While Bartlett's test of sphericity show the statistically significance of the model. Then we have communalities which show the percentage of variance for the factors of the model. Then we have total variance explained, in which the cumulative percentage is listed and also it shows the total variance explained. The component matrix shows that all the factors in the model are fine.

First we develop an index for access (supply side) of financial inclusion by principal component analysis. Secondly, we develop an index for usage (demand side) of financial inclusion. Finally we develop an overall index for financial inclusion by Principal component analysis.

### ACCESS TO FINANCIAL INCLUSION:

In principal component analysis First we have KMO Measure of Sampling Adequacy in Table 1, the value should be greater than 0.50 and for our first index we have KMO Measure of Sampling Adequacy value of 0.784 which shows that the data is preferred.

In Table1 we also have Bartlett's test of sphericity, and for significance value of Bartlett's test of sphericity it should be less than 0.05 for our data the significance value of Bartlett's test of sphericity is 0.000, which shows that these are statistically significant.

Extraction Method: Principal Component Analysis.

Then we have table 3 of total variance explained, in which the cumulative percentage is 99.970 which is almost fine. For correct results total variance explained should be greater than 60%.

**Table 3: Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1         | 3.991               | 99.780        | 99.780       | 3.991                               | 99.780        | 99.780       |
| 2         | .006                | .152          | 99.931       |                                     |               |              |
| 3         | .002                | .053          | 99.984       |                                     |               |              |
| 4         | .001                | .016          | 100.000      |                                     |               |              |

Extraction Method: Principal Component Analysis.

From the below table 4 we see that all the factors in the component matrix have value more than 0.9 so it's also fine.

**Table 4: Component matrix:**

|                    | Component<br>1 |
|--------------------|----------------|
| CBBKm <sup>2</sup> | .999           |
| ATMA               | .999           |
| ATMKm <sup>2</sup> | .999           |
| CBBA               | .999           |

### USAGE OF FINANCIAL INCLUSION

Secondly we analyze the factors for usage of financial inclusion. KMO Measure of Sampling Adequacy whose value is 0.643 from table 5 which shows that it is preferred.

Similarly the significance value of Bartlett's test of sphericity is 0.000, which shows that these are statistically significant.

**Table 5 KMO and Bartlett's Test**

| KMO and Bartlett's Test                          |                    |         |
|--------------------------------------------------|--------------------|---------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .643    |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 253.890 |
|                                                  | Df                 | 21      |
|                                                  | Sig.               | .000    |

The communalities value should be greater than 0.5, and in our data all the factors have communalities value greater than 0.5.

**Table 6: Communalities**

|                    | Initial | Extraction |
|--------------------|---------|------------|
| Ndeposit           | 1.000   | .886       |
| Nborrower          | 1.000   | .687       |
| Nborrowermicro     | 1.000   | .935       |
| Nregisteredaccount | 1.000   | .918       |
| Nactiveaccounts    | 1.000   | .880       |
| NMMtranc           | 1.000   | .888       |
| Dcredit            | 1.000   | .638       |

Extraction Method: Principal Component Analysis.

Table 7 shows the total variance explained, in which the cumulative percentage is 83.31% which is almost fine. For correct results total variance explained should be greater than 60%.

**Table 7: Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1         | 5.832               | 83.311        | 83.311       | 5.832                               | 83.311        | 83.311       |
| 2         | .713                | 10.188        | 93.499       |                                     |               |              |
| 3         | .264                | 3.779         | 97.278       |                                     |               |              |
| 4         | .133                | 1.904         | 99.182       |                                     |               |              |
| 5         | .042                | .599          | 99.781       |                                     |               |              |
| 6         | .014                | .201          | 99.982       |                                     |               |              |
| 7         | .001                | .018          | 100.000      |                                     |               |              |

Extraction Method: Principal Component Analysis.

From the below table 8 we see that all the factors in the component matrix have value more than 0.9 so it's also fine.

**Table 8: Component Matrix**

| Component Matrix <sup>a</sup> |                |
|-------------------------------|----------------|
|                               | Component<br>1 |
| Nborrowermicro                | .967           |
| Nregisteredaccount            | .958           |
| NMMtranc                      | .942           |
| Ndeposit                      | .941           |
| Nactiveaccounts               | .938           |
| Nborrower                     | -.829          |
| Dcredit                       | -.799          |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

**OVERALL FINANCIAL INCLUSION INDEX:**

Finally we make an overall index for financial inclusion. Table 9 have KMO Measure of Sampling Adequacy whose value should be greater than 0.50 and for our overall index of financial inclusion the value is 0.807 which shows that it is preferred.

Similarly the significance value of Bartlett's test of sphericity in the table 9 needs to be less than 0.05 for our overall index of financial inclusion the significance value of Bartlett's test of sphericity is 0.000, which shows that these are statistically significant.

**Table 9 KMO and Bartlett's Test:**

| KMO and Bartlett's Test                          |                    |  |         |
|--------------------------------------------------|--------------------|--|---------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    |  | .807    |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square |  | 607.689 |
|                                                  | Df                 |  | 36      |
|                                                  | Sig.               |  | .000    |

The communalities value in our data is greater than 0.5.

**Table 10: Communalities**

|                    | Initial | Extraction |
|--------------------|---------|------------|
| ATMA               | 1.000   | .955       |
| ATMKm <sup>2</sup> | 1.000   | .983       |
| CBBA               | 1.000   | .954       |
| CBBKm <sup>2</sup> | 1.000   | .974       |
| Ndeposit           | 1.000   | .941       |
| Nborrowermicro     | 1.000   | .971       |
| Nregisteredaccount | 1.000   | .900       |
| Nactiveaccounts    | 1.000   | .863       |
| NMMtranc           | 1.000   | .861       |

Extraction Method: Principal Component Analysis.

Then we have total variance explained, in which the cumulative percentage is 93.362% which is almost fine. For correct results total variance explained should be greater than 60%.

**Table 11 :Total Variance Explained**

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1         | 8.403               | 93.362        | 93.362       | 8.403                               | 93.362        | 93.362       |
| 2         | .519                | 5.765         | 99.127       |                                     |               |              |
| 3         | .047                | .519          | 99.646       |                                     |               |              |
| 4         | .015                | .162          | 99.809       |                                     |               |              |
| 5         | .012                | .136          | 99.944       |                                     |               |              |
| 6         | .004                | .042          | 99.986       |                                     |               |              |

|   |          |      |         |
|---|----------|------|---------|
| 7 | .001     | .008 | 99.995  |
| 8 | .000     | .004 | 99.999  |
| 9 | 9.880E-5 | .001 | 100.000 |

Extraction Method: Principal Component Analysis.

From the below table 12 we see that all the factors in the component matrix have value more than 0.9 so it's also fine.

**Table 12: Component Matrix**

|                    | Component<br>1 |
|--------------------|----------------|
| ATMKm <sup>2</sup> | .992           |
| CBBKm <sup>2</sup> | .987           |
| Nborrowermicro     | .985           |
| ATMA               | .977           |
| CBBA               | .977           |
| Ndeposit           | .970           |
| Nregisteredaccount | .949           |
| Nactiveaccounts    | .929           |
| NMMtranc           | .928           |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

#### Descriptive Statistics:

Table 4.2 shows the descriptive statistics, the observations for each variable is 20. The Mean value of ATM per 100,000 adults is 5.729 with standard Deviation of 3.844. Minimum value of these observations is 0.74 and Maximum value of these observations is 11.14. The mean of ATM per 1000km<sup>2</sup> is 9.537 with standard Deviation of 7.277. The minimum value of these observations is 0.9 and having maximum value of 20.81. The Mean of Commercial bank branches per 100,000 adults is 8.904 having standard Deviation of 1.06. The minimum value of commercial bank branches per 100,000 adults is 7.59 and having maximum value of 10.41. The mean of commercial bank branches per 1000 km<sup>2</sup> is 7.401 with a standard Deviation of 1.06. The minimum value of commercial bank branches per 1000 km<sup>2</sup> is 9.18 and having maximum value of 19.26. The mean of number of depositors with commercial banks per 1,000 adults is 259.637 with a standard Deviation of 93.866. The minimum value of number of depositors with commercial banks per 1,000 adults is 126.31 and having a maximum value of 402.27. The mean value of number of borrowers

from commercial banks per 1,000 adults is 24.921 with a standard Deviation of 3.612. Minimum value of these observations is 16.89 and Maximum value of these observations is 31.32. The mean of number of borrowers from all microfinance institutions per 1,000 adults is 9.422 with standard Deviation of 8.416. The minimum value of these observations is 0.1 and having maximum value of 23.84. The mean of number of registered mobile money accounts per 1,000 adults is 113.198 having standard Deviation of 156.857. The minimum value of number of registered mobile money accounts per 1,000 adults is 8.09 and having maximum value of 435.87. The mean of number of active mobile money accounts per 1,000 adults is 59.262 with a standard Deviation of 86.618. The minimum value of number of active mobile money accounts per 1,000 adults is 4.35 and having maximum value of 257.12. The mean of total number of mobile transactions is 3102.324 with a standard Deviation of 4087. The minimum value of total number of mobile transactions is 426.07 and having a maximum value of 12637.1. The mean value of domestic credit to private sector is 19.737 with standard Deviation of 4.994. Minimum value of these observations is 14.579 and maximum value of

these observations is 28.602. The mean of depositors with commercial banks per 1,000 adults is 32.588 with standard deviation of 2.808. The minimum value of these observations is 27.98 and having maximum value of 38.14. The mean of loans from commercial banks is 20.919 having standard deviation of 4.068. The minimum value is 15.96 and having maximum value of 28.32. The mean of FII is 0.847 with a standard Deviation of 0.494. The minimum value of FII is 0.09 and having maximum value of 1.762. The mean of FIA is 0.873 with a standard deviation of 0.445. The minimum value of FIA is 0.117 and having a maximum value of 1.446. The mean value of FIU is 0.841 with a standard Deviation of 0.506. Minimum value of these observations is 0.07 and maximum value of these observations is 1.855. The mean of GDP growth is 4.129 with standard deviation of 2.122. The minimum value of these observations is -1.33 and

having maximum value of 7.547. The mean value of FDC is 1.766 with standard deviation of 1.118. Minimum value of these observations is 0.711 and maximum value of these observations is 3.614. The mean of interest rate is 0.033 with a standard deviation of 0.019. The minimum value of these observations is 0.007 and having maximum value of 0.071. The mean of inflation rate is 0.083 having standard deviation of 0.043. The minimum value is 0.025 and having maximum value of 0.203. The mean of exchange rate is 1.949 with a standard deviation of 0.15. The minimum value of exchange rate is 1.762 and having maximum value of 2.212. The mean of log of poverty is 1.531 with a standard deviation of 0.148. The minimum value of log of poverty is 1.34 and having a maximum value of 1.713.

Table 4.2 Descriptive Statistics:

| Variable           | Obs | Mean     | Std. Dev. | Min    | Max     |
|--------------------|-----|----------|-----------|--------|---------|
| Atmad              | 20  | 5.729    | 3.844     | .74    | 11.14   |
| Atmkm <sup>2</sup> | 20  | 9.537    | 7.277     | .9     | 20.81   |
| CBBad              | 20  | 8.904    | 1.06      | 7.59   | 10.41   |
| CBBkm <sup>2</sup> | 20  | 13.746   | 3.688     | 9.18   | 19.26   |
| Ndep               | 20  | 259.637  | 93.886    | 126.31 | 402.27  |
| Nbor               | 20  | 24.921   | 3.612     | 16.89  | 31.32   |
| Nbormicr           | 20  | 9.422    | 8.416     | .1     | 23.84   |
| Nregacc            | 20  | 113.198  | 156.857   | 8.09   | 435.87  |
| Nactacc            | 20  | 59.262   | 86.618    | 4.35   | 257.12  |
| Nmobmtrx           | 20  | 3102.324 | 4087.232  | 426.07 | 12635.1 |
| DcrPrSec           | 20  | 19.737   | 4.994     | 14.579 | 28.602  |
| DepwithCB          | 20  | 32.588   | 2.808     | 27.98  | 38.14   |
| Loan from CB       | 20  | 20.919   | 4.068     | 15.96  | 28.32   |
| FII                | 20  | .847     | .494      | .09    | 1.762   |
| Fia                | 20  | .873     | .445      | .117   | 1.446   |
| Flu                | 20  | .841     | .506      | .07    | 1.855   |
| Gdpg               | 20  | 4.129    | 2.122     | -1.33  | 7.547   |
| FDC                | 20  | 1.766    | 1.118     | .711   | 3.614   |
| Intr               | 20  | .033     | .019      | .007   | .071    |
| Infr               | 20  | .083     | .043      | .025   | .203    |
| Lexr               | 20  | 1.949    | .15       | 1.762  | 2.212   |
| Lpov               | 20  | 1.531    | .148      | 1.34   | 1.713   |

Atmad= Number of ATM machines per 100,000 adults

Atmkm<sup>2</sup>= Number of ATM machines per 1000 km<sup>2</sup>

CBBad= Number of Commercial bank branches per 100,000 adults

CBBkm<sup>2</sup>= Number of Commercial bank branches per 1000 km<sup>2</sup>

Ndep= Number of depositors with commercial banks per 1,000 adults

Nbor = Number of borrowers from commercial banks per 1,000 adults

Nbormic= Number of borrowers from all microfinance institutions per 1,000 adults

Nregaa= Number of registered mobile money accounts per 1,000 adults

Nactacc= Number of active mobile money accounts per 1,000 adults

Nmobmtrx= Number of mobile money transactions per 1,000 adults

Dcrto PrvSec= Domestic credit to private sector by banks (% of GDP)

Depwith CB= Outstanding deposits with commercial banks (% of GDP)

Loan from CB= Outstanding loans from commercial banks (% of GDP)

Gdpg= Gross Domestic Product growth

Intr= Interest rate

Infr= Inflation rate

Lexr= Log of Real effective exchange rate index (2010 = 100)

Lpov= Log of Poverty headcount ratio

is a negative association between Poverty and financial inclusion access. The relationship between them is moderate with a value of -0.145, which shows that in a country where there is a high level of financial inclusion access there will be low level of poverty.

The co-efficient value of correlation shows that there is a negative association between Poverty and financial inclusion usage. The relationship between them is moderate with a value of -0.265, which shows that in a country where there is a high level of financial inclusion access there will be low level of poverty.

The co-efficient value of correlation shows that there is a positive association between Poverty and FDC. The relationship between them is high with a value of 0.885, which shows that in a country where there is a high level of FDC there will be high level of poverty.

The co-efficient value of correlation shows that there is a negative association between Poverty and Interest rate. The value of correlation so-efficient is -0.280, which shows that in a country where there is a high level of interest rate there will be low level of poverty.

The co-efficient value of correlation shows that there is a positive association between Poverty and inflation rate. The value of correlation co-efficient is 0.172, which shows that in a country where there is a high level of Inflation rate there will be high level of poverty.

The co-efficient value of correlation shows that there is a negative association between Poverty and Exchange rate. The relationship between them is high with a value of -0.914, which shows that in a country where there is a high exchange rate there will be a low level of poverty.

Table 4.3 shows the correlation between variables.

## CORRELATION

The co-efficient value of correlation shows that there is a negative association between Poverty and financial inclusion. The relationship between them is significant with a value of -0.357, which shows that in a country where there is a high level of financial inclusion there will be low level of poverty. The co-efficient value of correlation shows that there

**Table 4.3 Correlation:**

| Variables | (1)    | (2)   | (3)   | (4)   | (5) | (6) | (7) | (8) | (9) |
|-----------|--------|-------|-------|-------|-----|-----|-----|-----|-----|
| (1) lpov  | 1.000  |       |       |       |     |     |     |     |     |
| (2) FII   | -0.357 | 1.000 |       |       |     |     |     |     |     |
| (3) FIa   | -0.145 | 0.349 | 1.000 |       |     |     |     |     |     |
| (4) FIu   | -0.265 | 0.502 | 0.848 | 1.000 |     |     |     |     |     |

|          |        |        |        |        |        |        |        |        |       |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| (5) FDC  | 0.885  | -0.780 | 0.032  | 0.007  | 1.000  |        |        |        |       |
| (6) Intr | -0.280 | 0.078  | -0.697 | -0.600 | -0.286 | 1.000  |        |        |       |
| (7) Infr | 0.172  | -0.101 | -0.315 | 0.093  | 0.310  | 0.015  | 1.000  |        |       |
| (8) Exer | -0.914 | 0.963  | 0.272  | 0.477  | -0.772 | 0.013  | 0.017  | 1.000  |       |
| (9) Gdpg | 0.180  | -0.214 | 0.165  | -0.093 | 0.110  | -0.026 | -0.482 | -0.316 | 1.000 |

#### 4.4 Regression:

The first regression runs for financial inclusion access dimension (supply side) and poverty rate. The effect of variables from access dimensions of financial inclusion determined on poverty condition. The dependent variable poverty was regressed on predicting variables.

The co-efficient of financial inclusion access with the poverty is -0.08 and it's t-value is -3.57 and it's p-value is 0.003. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative effect of financial inclusion access on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of financial inclusion access on the poverty. So these results suggest that increase in financial inclusion access is expectedly leads to decrease in the poverty.

The co-efficient of FDC with the poverty is 0.036, it's t-value is 5.29 and it's p-value is 0. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.01, so these results shows that there is a significant positive effect of FDC on poverty. There co-efficient is positive so that's why we expect that there is a positive effect of FDC on the poverty. So these results suggest that increase in FDC is expectedly leads to increase in the poverty.

The co-efficient of interest rate with the poverty is -2.101 and it's t-value is -3.38 and it's p-value is 0.004. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative

effect of Interest rate on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of interest rate on the poverty. So these results suggest that increase in Interest rate is expectedly leads to decrease in the poverty.

The co-efficient of inflation rate with the poverty is 0.099 and it's t-value is 0.43 and it's p-value is 0.674. As the t-value is less than 1.96 and p-value of the co-efficient is more than 0.10, so these results shows that there is a non-significant effect of inflation rate on poverty.

The co-efficient of Exchange rate with the poverty is -0.641 and it's t-value is -11.69 and it's p-value is 0. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.01, so these results shows that there is a significant negative effect of exchange rate on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of exchange rate on the poverty. So these results suggest that increase in exchange rate is expectedly leads to decrease in the poverty.

The lower part of the table shows that the overall model is significant. The table 4.4.2 shows that the independent variables play a significant role in LPov. Moreover  $R^2 = 0.971$  depicts the model explains 97.1% of the variance in LPov.

$$Lpov = \alpha + \beta_1(FIA2) + \beta_2(FDC) + \beta_3(Intr) + \beta_4(Inflr) + \beta_5(Lexrate) + \mu$$

#### REGRESSION

| Lpov     | Coef.  | St.Err. | t-value | p-value | [95%<br>Conf | Interval] | Sig |
|----------|--------|---------|---------|---------|--------------|-----------|-----|
| Fia      | -.08   | .022    | -3.57   | .003    | -.127        | -.032     | *** |
| FDC      | .036   | .007    | 5.29    | 0       | .021         | .051      | *** |
| Intrp    | -2.101 | .621    | -3.38   | .004    | -3.432       | -.769     | *** |
| Infrp    | .099   | .229    | 0.43    | .674    | -.393        | .59       |     |
| Lexer    | -.641  | .055    | -11.69  | 0       | -.758        | -.523     | *** |
| Constant | 2.847  | .086    | 33.28   | 0       | 2.664        | 3.031     | *** |

|                    |         |                      |         |
|--------------------|---------|----------------------|---------|
| Mean dependent var | 1.531   | SD dependent var     | 0.148   |
| R-squared          | 0.971   | Number of obs        | 20      |
| F-test             | 273.178 | Prob > F             | 0.000   |
| Akaike crit. (AIC) | -79.642 | Bayesian crit. (BIC) | -73.668 |

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

The second regression runs for financial inclusion usage dimension (demand side) and poverty rate. The impact of variables from financial inclusion usage dimension determined on poverty, table 4.4.2 shows the values. The dependent variable poverty was regressed on predicting variables.

The co-efficient of financial inclusion usage with the poverty is -0.056 and it's t-value is -3.51 and it's p-value is 0.003. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative effect of financial inclusion usage on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of financial inclusion usage on the poverty. So these results suggest that increase in financial inclusion usage is expectedly leads to decrease in the poverty.

The co-efficient of FDC with the poverty is 0.035 and it's t-value is 3.80 and it's p-value is 0.002. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant positive effect of FDC on poverty. There co-efficient is positive so that's why we expect that there is a positive effect of FDC on the poverty. So these results suggest that increase in FDC is expectedly leads to increase in the poverty.

The co-efficient of interest rate with the poverty is -1.746 and it's t-value is -2.45 and it's p-value is 0.028. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative effect of interest rate on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of interest rate on the poverty. So these results suggest that increase in interest rate is expectedly leads to decrease in the poverty.

The co-efficient of inflation rate with the poverty is 0.425 and it's t-value is 2.06 and it's p-value is 0.058. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.10, so these results shows that there is a significant positive effect of inflation rate on poverty. There co-efficient is positive so that's why we expect that there is a positive effect of inflation rate on the poverty. So these results suggest that increase in inflation rate is expectedly leads to increase in the poverty.

The co-efficient of exchange rate with the poverty is -0.627 and it's t-value is -7.96 and it's p-value is 0. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative effect of exchange rate on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of exchange rate on the poverty. So these results suggest that increase in exchange rate is expectedly leads to decrease in the poverty.

The lower part of the table shows that the overall model is significant. The table 4.4.2 shows that the independent variables plays a significant role in LPov

Moreover  $R^2 = 0.967$  depicts the model explains 96.7% of the variance in LPov.

$$Lpov = \alpha + \beta_1(Fiu2) + \beta_2(FDC) + \beta_3(Intrate) + \beta_4(Inflrate) + \beta_5(Lexrate) + \mu$$

**Table 4.4.2 Regression:**

| Lpov | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|------|-------|---------|---------|---------|-----------|-----------|-----|
|------|-------|---------|---------|---------|-----------|-----------|-----|

|                    |         |      |                      |      |         |       |     |
|--------------------|---------|------|----------------------|------|---------|-------|-----|
| Flu                | -.056   | .016 | -3.51                | .003 | -.09    | -.022 | *** |
| FDC                | .035    | .009 | 3.80                 | .002 | .015    | .054  | *** |
| Intrp              | -1.746  | .711 | -2.45                | .028 | -3.271  | -.22  | **  |
| Infrp              | .425    | .206 | 2.06                 | .058 | -.017   | .867  | *   |
| Lexer              | -.627   | .079 | -7.96                | 0    | -.796   | -.458 | *** |
| Constant           | 2.762   | .136 | 20.33                | 0    | 2.47    | 3.053 | *** |
| Mean dependent var | 1.531   |      | SD dependent var     |      | 0.148   |       |     |
| R-squared          | 0.967   |      | Number of obs        |      | 20      |       |     |
| F-test             | 302.899 |      | Prob > F             |      | 0.000   |       |     |
| Akaike crit. (AIC) | -77.033 |      | Bayesian crit. (BIC) |      | -71.059 |       |     |

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Finally we run a regression for overall financial inclusion and poverty. The co-efficient of inflation rate with the poverty is 0.089 and its t-value is 0.58 and its p-value is 0.573. As the t-value is less than 1.96 and p-value of the co-efficient is more than 0.05, so these results shows that there is a significant positive effect of thumb and poverty was regressed on predicting variables.

The co-efficient of financial inclusion with the poverty is -0.107 and its t-value is -4.93 and its p-value is 0.002. As the t-value is more than 1.96 as a rule of thumb results shows that there is a significant negative effect of financial inclusion on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of financial inclusion on the poverty. So these results suggest that increase in financial inclusion is expectedly leads to decrease in the poverty.

The co-efficient of FDC with the poverty is 0.032 and its t-value is 6.24 and its p-value is 0.002. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant positive effect of FDC on poverty. There co-efficient is positive so that's why we expect that there is a positive effect of FDC on the poverty. So these results suggest that increase in FDC is expectedly leads to increase in the poverty.

The co-efficient of interest rate with the poverty is -1.162 and its t-value is -2.90 and its p-value is 0.012. As the t-value is more than 1.96 as a rule of thumb and p-value of the co-efficient is less than 0.05, so these results shows that there is a significant negative effect of interest rate on poverty. There co-efficient is negative so that's why we expect that there is a negative effect of interest rate on the poverty. So these results suggest that increase in interest rate is expectedly leads to decrease in the poverty.

**Table 4.4.3 Regression:**

| Lpov               | Coef.    | St.Err. | t-value              | p-value | [95% Conf | Interval] | Sig |
|--------------------|----------|---------|----------------------|---------|-----------|-----------|-----|
| FII                | -.107    | .022    | -4.93                | 0       | -.153     | -.06      | *** |
| FDC                | .032     | .005    | 6.24                 | 0       | .021      | .044      | *** |
| Intrp              | -1.162   | .4      | -2.90                | .012    | -2.021    | -.304     | **  |
| Infrp              | .089     | .154    | 0.58                 | .573    | -.242     | .42       |     |
| Lexer              | -.032    | .152    | -0.21                | .833    | -.358     | .293      |     |
| Constant           | 1.568    | .296    | 5.29                 | 0       | .933      | 2.204     | *** |
| Mean dependent var | 1.531    |         | SD dependent var     |         | 0.148     |           |     |
| R-squared          | 0.984    |         | Number of obs        |         | 20        |           |     |
| F-test             | 1238.448 |         | Prob > F             |         | 0.000     |           |     |
| Akaike crit. (AIC) | -91.690  |         | Bayesian crit. (BIC) |         | -85.715   |           |     |

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## CONCLUSION

The study examined the link between financial inclusion and poverty condition. The study employed regression analysis along with Principle component analysis, correlation and descriptive statistics on the data set from 2002 to 2021. Moreover, this study constructs a new composite financial inclusion index using access, usage and overall dimension of financial inclusion, analysis provides a more comprehensive measurement of inclusion than unique indicators in previous studies. Financial inclusion is quantified using three 3 dimensions, firstly access dimension or supply side, secondly usage dimension or demand side and finally overall financial inclusion. Using the financial inclusion index, this study initially investigates the crucial factors that influence the level of financial inclusion. This study then assesses the impact of financial inclusion on reducing poverty in Pakistan. The result demonstrates that financial inclusion has a negative impact on poverty conditions. Increased financial inclusion increases financial development, which causes a decrease in poverty. All of the indexes of the financial inclusion shows the negative impact on poverty, indicating that the availability of financial services to individuals can help them alleviating poverty.

The results of this study offer important policy implications for a country. Financial institutions should first adapt new effective techniques and demanded formal financial services specially for financially excluded segments of the population. Second, in order to raise financial awareness and modify low-income people's financial behavior, a directed and effective policy on increasing financial literacy in rural and remote areas is required. Third, governments, central banks, financial institutions, and development agencies should work together to upgrade the financial services network in both urban and rural areas and to develop the necessary systems for financial services. Finally, efforts should be taken by supportive policies like transfer of government subsidy to account holders for effective use of dormant accounts, as higher rates of inactive accounts are not expanding financial inclusion.

The policy makers are recommended to focus on the availability of formal financial services to the whole community in such a way that the maximum population may use them. This will enhance financial development in a country which will in turn cause a reduction in the poverty in the country. Despite its contribution, there are some limitations of this study. The annual secondary data dependence and relatively short time-series constrains the depth of inference. Future research should include large datasets including regional panel data or domestic level surveys to catch disparity in population groups. Primary data can provide richer insight in behavioral and social obstacles for financial inclusion. In addition, incorporating affordability indicators and discovering non-traditional measures such as adopting mobile money, fintech innovation, and gender dis-aggregated access will get a more nuance understanding of nexus.

Overall, the evidence presented here underscores the financial inclusion, especially when combined with complementary policies in literacy, digital infrastructure and targeted transfer, can play a transformative role in alleviating poverty in Pakistan.

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