



**NATIONAL  
BANK OF  
TAJIKISTAN**

# **Impact of Financial Inclusion on Economic Growth**

**In the context of  
Alliance for Financial Inclusion (AFI)**

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## Abstract

This study examines the impact of financial inclusion on economic growth in 70 member countries of the Alliance for Financial Inclusion (AFI) over the period 2004–2023, with a particular focus on Tajikistan. A comprehensive financial inclusion index is constructed using seven indicators across three dimensions. The analysis employs Fixed Effects (FE), System Generalized Method of Moments (GMM), and a Vector Error Correction Model (VECM), alongside Granger causality tests to explore both long-run relationships and dynamic interactions.

The results show that financial inclusion has a positive and statistically significant effect on economic growth across AFI countries. Panel estimates confirm this relationship, while regional analysis reveals heterogeneous effects across different AFI initiatives. The VECM results for Tajikistan indicate a stable long-run equilibrium relationship, with financial inclusion significantly supporting economic growth over time. Granger causality findings further suggest that economic growth predicts foreign direct investment inflows, while FDI subsequently contributes to improvements in financial inclusion. Overall, the findings highlight the important role of financial inclusion in promoting sustainable economic growth, particularly in developing economies.

## 1. Introduction

Financial inclusion has gained significant attention from researchers and policymakers in recent years. It refers to the accessibility and usage of formal financial services, such as bank deposits, credits, insurance and so forth for all members<sup>i</sup>.

Despite its importance, empirical evidence on the relationship between financial inclusion and economic growth remains limited, particularly in developing regions. Cross-country studies on members of the Alliance for Financial Inclusion (AFI) are scarce, and country-specific evidence for Tajikistan remains very limited. This study aims to fill these gaps by providing a comprehensive analysis of the relationship between financial inclusion and economic growth across AFI member countries, with special focus on regional differences and the case of Tajikistan.

This research contributes to the literature in several ways:

- 1) It examines the role of financial inclusion in promoting economic growth across AFI member countries, including regional initiatives such as AFPI, ECAPI, FILAC, SARFII, ARFIPI, and PIRI.

- 2) It develops a comprehensive financial inclusion index using seven indicators across three dimensions.

- 3) It applies rigorous econometric approaches to analyze both short-run and long-run relationships, as well as the direction of causality between financial inclusion, economic growth, and other variables.

The research addresses the following questions:

- What are the key determinants of financial access in AFI member countries?
- Does financial inclusion contribute to economic growth across AFI economies?
- Does financial inclusion support long-run economic growth in Tajikistan?

Based on theory and prior research, the study tests the following hypotheses:

- H1: Financial inclusion has a positive and significant effect on economic growth in AFI member countries.

- H2: Financial inclusion has a positive and significant long-run effect on economic growth in Tajikistan.

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework and the construction of the financial inclusion index. Section 3 describes the data and methodology. Section 4 reports and discusses the empirical results, and Section 5 concludes with policy implications.

## **2. Literature review**

The concept of financial inclusion is comparatively new. Financial inclusion aims to ensure that all adults within a society have access to a broad range of formal financial services that are affordable, appropriate to their needs, and provided at reasonable cost. These products include payments, savings, credit, insurance, as well as other formal financial services. Central banks, as the primary regulatory authorities of national banking systems, play a critical role in promoting financial inclusion by formulating policies and regulatory frameworks that foster access to and usage of financial services.

A considerable number of studies have tried to explore the effect of financial inclusion on economic growth Kim et al. (2018)<sup>ii</sup> examined an empirical assessment of the relationship between financial inclusion and economic growth among member states of the Organization of Islamic Cooperation (OIC). By using the panel data for 55 OIC countries the study found that financial inclusion had a positive impact on economic growth in these countries. The study also revealed that financial inclusion and economic growth have mutual causalities with each other.

### **2.1 Construction of Financial Inclusion Index**

Sarma (2012)<sup>iii</sup> argues that an inclusive financial system should provide broad access reaching as many users as possible. Banking services are evolving due to technological improvements better infrastructure and higher levels of education and financial literacy. Traditional banking is increasingly complemented or replaced by technology-driven services such as Internet banking. Although these developments affect financial inclusion data on these new channels were not available for this study. In the future such data could be incorporated into the Financial Inclusion Index (FII) once available. For this study the FII is constructed using data from the International Monetary Fund's Financial Access Survey (FAS) and includes three dimensions access usage and quality measured through seven selected indicators.

### **Penetration Dimension**

The penetration dimension reflects the proportion of people with a bank account indicating how widely the financial system reaches its users. It is measured by the number of deposit accounts with credit financial institutions per 1000 adults (Sarma 2012; Martínez Turégano & García Herrero 2018<sup>iv</sup>) and the number of depositors with credit financial institutions per 1000 adults (Park & Mercado 2018<sup>v</sup>).

### **Availability Dimension**

The availability dimension captures the accessibility of financial service points to users. It is measured using the number of branches per 100.000 adults, number of ATMs per 100.000 adults and number of insurance corporations per 100.000 adults (Sarma 2012; Sharma & Changkakati 2022<sup>vi</sup>).

### **Usage Dimension**

The usage dimension reflects the active utilization of financial services. Due to the unavailability of comparable cross-country data on payments remittances and transfers it is measured using the number of loan accounts with credit financial institutions per 1000 adults (Cámara & Tuesta 2014<sup>vii</sup>) and the number of borrowers from credit financial institutions per 1000 adults (Park & Mercado 2018).

**Table 1. List of indicators for constructing FII**

<b>Dimension of financial inclusion</b>	<b>Variables</b>	<b>Weight to each indicator</b>
<b>Penetration dimension</b>	number of deposit accounts with credit financial institutions per 1000 adults	1
	number of depositors with credit financial institutions per 1000 adults	1
<b>Availability dimension</b>	number of ATMs per 100.000 adults	1
	the number of branches and ATMs per 100.000 adults	1
	number of insurance corporations per 100.000 adults	1
<b>Usage dimension</b>	the number of loan accounts with credit financial institutions per 1000 adults	1
	the number of borrowers from credit financial institutions per 1000 adults	1

Similarly, Sarma construct a Financial Inclusion Index (FII) using aggregate banking indicators including the number of rural branches, rural deposit accounts deposit volumes and credit across major Indian states. Following Sarma (2012) this study adopts the same methodological framework to construct the Financial Inclusion Index as described below.

$$d_i = w_i \frac{A_{ik,t} - m_i}{M_i - m_i}, \quad (1)$$

where  $d_i$  is the index/indicator value for dimension  $i$ ;  $w_i$  is the weight assigned to a specific indicator for dimension  $i$ ;  $A_i$  is the actual value of a particular indicator for dimension  $i$  for an economy  $k$  in year  $t$ ;  $m_i$  is the lower limit of a particular indicator for dimension  $i$  set to 0; and  $M_i$  is the upper limit of a particular indicator for dimension  $i$  set to the 90th percentile value to avoid excessively high benchmarks and to smooth the index value.

After standardizing the indicators this study combines them using normalized Euclidean distance aggregation.

$$X_1 = \frac{\sqrt{(d_1^2 + d_2^2 + \dots + d_7^2)}}{\sqrt{(w_1^2 + w_2^2 + \dots + w_7^2)}}, \quad (1)$$

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + \dots + (w_7 - d_7)^2}}{\sqrt{(w_1^2 + w_2^2 + \dots + w_7^2)}}, \quad (2)$$

$$CFII_i = \frac{1}{2} [X_1 + X_2]. \quad (3)$$

In equations (2) – (4) the financial inclusion index (FII) denotes the financial inclusion score for each country ranging from **zero** to **one** with higher values indicating greater financial inclusion. Here  $X_1$  refers to the Euclidean distance from the worst point while  $X_2$  signifies the inverse distance from an ideal point. The term  $d_i$  represents the scores for specific dimensions or indicators for each country derived from equation (1). The term  $w_i$  denotes the weight allocated to each dimension. Since the study evaluates a total of seven dimensions and assigns equal weight to each the weight for each dimension is set equally. The weight of each dimension is set as  $1/7$  i.e.

$$w_1 = w_2 = w_3 = w_4 = w_5 = w_6 = w_7 = \frac{1}{7}$$

Equal weighting is preferred because determining different weights for various indicators based on economic logic is difficult. Additionally missing values in many indicators can disproportionately impact countries' financial inclusion index scores if different weights are assigned.

Although both indexes use a similar methodology, they differ in weighting the new index assigns equal weight (1) to all dimensions ensuring balanced representation while Sarma's index applies weights of 1 0.5 and 0.5 which may underrepresent certain aspects of financial inclusion. This along with the inclusion of more indicators explains why the new index shows higher financial inclusion. Sarma (2012) also highlights that technological progress improved infrastructure and higher financial literacy are transforming banking services but data on these factors were unavailable at the time. By incorporating additional indicators and using equal weights the new index provides a more comprehensive and inclusive measure of financial access (see **Figure 1**).

### 3. Model specification

This study investigates the impact of financial inclusion on economic development utilizing both panel and time-series econometric approaches. The panel analysis covers 70 AFI member countries as well as regional initiatives, while the time-series analysis focuses on Tajikistan.

#### Fixed Effects (FE) Model

For the panel analysis, the Fixed Effects (FE) model is employed to control for unobserved, time-invariant heterogeneity across countries. The Hausman test confirms that the fixed effects model is more appropriate than the random effects mode, rejecting the null hypothesis at the 1% significance level. Robust standard errors are applied to correct for heteroskedasticity.

*To analyze the relationship between financial inclusion and economic growth we utilize the following FE regression equation (5).*

$$\begin{aligned} \ln\_gdppc_{i,t} = & a_0 + \beta_1 fii_{i,t} + \beta_2 \ln\_inflation_{i,t} + \beta_3 \ln\_scenrollsec_{i,t} \\ & + \beta_4 \ln\_tradeopen_{i,t} + \beta_5 \ln\_grosscap_{i,t} + \beta_6 contcorrupt_{it} \\ & + \beta_7 induseinternet_{i,t} + a_i + u_{i,t} \end{aligned} \quad (5)$$

here  $\ln\_gdppc$ =log of economic growth as proxy to economic growth,  $fii$ =a composite financial inclusion index,  $\ln\_inflation$  = log of inflation rate,  $\ln\_scenrollsec$ =log of secondary school enrollment ratio,  $\ln\_tradeopen$ = log of trade openness,  $\ln\_grosscap$  = log of gross capital formation,  $contcorrupt$ = Control of corruption, estimate  $i=123\dots n$  country,  $t=123\dots 13$  time period,  $a_i$ =the unobserved effects for  $i$ -th country observation and  $u_{i,t}$  = the idiosyncratic error term for  $i$ -th country on the  $t$ -th year.

#### System Generalized Method of Moments (System GMM)

To address potential endogeneity, the study employs System Generalized Method of Moments (System GMM), which uses lagged dependent variables as instruments to provide efficient and reliable estimates. The robustness of the System GMM results is verified using standard diagnostic tests, including first- and second order serial correlation (AR(1) and AR(2)), the Sargan test for overidentifying restrictions, and Hansen's J-test for instrument validity.

*To analyze the relationship between financial inclusion and economic growth we utilize the following two-stage system generalized method of moments (GMM) regression equation (6) is employed.*

$$\ln\_gdppc_{i,t} = a_0 + \beta_1 fii_{it-1} + \beta_2 \gamma Z_{it} + u_{it} \quad (6)$$

here the dependent variable is  $\ln\_gdppc$ =log of economic growth. In the system GMM method the lag value of the dependent variable is used as an independent variable. The  $fii$ = composite financial inclusion index is the primary independent variable,  $Z_{it}$ =is a vector of control variables which consists of initial log economic growth and other specification are similar to the Eqs. (5)

### Vector Error Correction Model (VECM)

For the country-specific analysis of Tajikistan, a Vector Error Correction Model (VECM) is applied to capture both long-run equilibrium relationships and short-run dynamics. Unit root tests, including the Augmented Dickey-Fuller (ADF) is conducted to account for potential non-stationarity, confirming that all series are integrated of order one, I (1). Johansen cointegration tests indicate the presence of a long-run equilibrium relationship among the variables justifying the use of a VECM.

Post-estimation diagnostics, including the Lagrange-multiplier test, Jarque–Bera test, and eigenvalue stability condition, are conducted to ensure model adequacy and reliability. Granger causality tests are also applied to examine directional relationships among the variables.

*To analyze the relationship between financial inclusion and economic growth we utilize the following Vector Error Correction Model (VECM) regression equation (7) is employed.*

$$\ln\_gdppc_t = a_0 + \alpha_1 fii_t + \alpha_2 \ln\_fdi_t + u_t \quad (7)$$

where  $\ln\_gdppc$ =log of economic growth  $fii$ =a composite financial inclusion index which is the measure of financial inclusion,  $\ln\_fdi$ = refer to natural log of foreign direct investment and  $u_t$ = is the error term.

### 3.1 Measurement and sources of data

This study utilizes annual data from the period 2004–2023 for an unbalanced panel of 70 countries that are members of the Alliance for Financial Inclusion (AFI). The sample period and country selection are primarily obtained by the availability of consistent cross-country data on financial inclusion indicators. Data are drawn from the International Monetary Fund’s Financial Access Survey (IMF-FAS) and the World Bank’s World Development Indicators (WDI). The main dependent variable is GDP per capita which serves as a proxy for economic growth while the primary explanatory variable is the financial inclusion index.

The study employs several control variables. Trade openness and foreign direct investment capture the influence of international factors on economic activity. Secondary school enrolment is used as a proxy for human capital government expenditure as a percentage of GDP reflects public spending and gross capital formation accounts for investment. Inflation and population growth are included as proxies for the macroeconomic environment. Individuals using the Internet and mobile subscriptions

capture digital and technological development while rule of law and control of corruption reflect institutional quality.

### **3.2 Determinants of financial inclusion**

We test the significance of GDP per capita income and argue that higher per capita income should increase financial inclusion as those with insufficient income and high-risk profile will no longer be excluded from financial services (Figure 2). Higher secondary school enrollment increases financial inclusion by improving financial literacy awareness and the ability of individuals to understand and use formal financial services (Figure 3). Greater internet usage enhances financial inclusion by facilitating access to digital financial services, online banking and mobile payment platforms particularly in remote and underserved areas (Figure 4). Higher population growth reduces financial inclusion by placing pressure on financial infrastructure and public services making it more difficult for credit financial institutions to expand coverage and serve the growing population effectively (Figure 5). Better control of corruption enhances financial inclusion by strengthening institutional trust improving contract enforcement and financial regulation reducing inefficiencies in credit allocation and ensuring effective delivery of financial services to underserved groups (Figure 6)

## 4. Results

Table 2. reports descriptive statistics for the study variables. GDP per capita as proxy to economic growth averages 3734 ranging from 254 to 33549 indicating large differences in income levels across countries. Financial inclusion is generally low with a mean of 0.14 and a maximum of 0.71 show financial inclusion is generally low with a mean of 0.14 though some countries reach 0.71. Inflation shows extreme variation ranging from -16.9 to 557.2 reflecting both deflationary episodes and high inflation shocks. Secondary school enrolment averages 66.3 % indicating differences in human capital across the sample. These statistics highlight the substantial variation in economic social and institutional factors that may affect financial inclusion across countries.

**Table 2. Descriptive statistics**

Variable	Obs	Mean	Std. dev.	Min	Max
gdppc	1361	3734.641	4514.293	253.6916	33549.45
fiic	1352	.1405179	.1394899	0	.7105896
inflation	1317	7.774261	18.47923	-16.85969	557.2018
scenrollsec	905	66.27785	25.6942	8.24115	141.2027
tradeopen	1219	74.82111	33.82991	15.28167	222.1783
grosscap	1206	25.04765	9.056466	1.525177	69.44873
contcorrupt	1361	-.5079191	.6044349	-1.599665	1.69851
induseinte~t	1325	27.67614	25.26327	.031	97.7
fdi	1360	4.154034	6.85746	-37.17265	103.3374
rule	1361	-.5146598	.574444	-1.870021	1.382154

### 4.1 Findings on the impact of economic growth to financial inclusion in AFI

The estimated results reveal that financial inclusion has a positive and statistically significant impact on economic growth in AFI member countries (AFPI ECAPILAC PIRI SARFII ARFIPI) over the period 2004–2023. In the FE model a 1 unit increase in the financial inclusion index raises economic growth by 8.71% significant at the 1% level reflecting a strong overall association between expanded access to banking services such as deposits, credit, ATMs and insurance and economic performance. When endogeneity and reverse causality are addressed using System GMM the effect declines to 2.22% but remains significant at the 5% level. This reduction suggests that part of the FE estimate captures feedback from economic growth to financial inclusion while the GMM result represents the causal effect. Given that the index ranges from 0 to 1 a realistic policy improvement of 0.1 units would increase economic growth by approximately 0.22% highlighting the economic relevance of inclusion-oriented reforms.

The empirical findings reveal strong dynamic persistence in economic growth as indicated by the positive and highly significant coefficient on lagged GDP in the GMM

model. This implies that past economic performance continues to influence current income levels through accumulated capital productivity and institutional development.

Human capital proxied by secondary school enrollment positively affects economic growth in the FE model with a 1% increase in enrollment raising GDP by 0.18% (significant at the 1% level). However, this effect becomes statistically insignificant in GMM suggesting that higher-income countries may invest more in education consistent with reverse causality.

Trade openness does not significantly influence economic growth in either FE or GMM models. While trade theory predicts growth benefits via specialization and technology transfer the lack of significance indicates context-dependent effects with external shocks such as global financial crises, COVID-19, geopolitical conflicts and structural reforms potentially weakening short-term growth impacts.

Gross capital formation remains a robust driver of growth. A 1% increase in capital formation raises economic growth by 0.15% in FE (significant at 1%) and 0.05% in GMM (significant at 5%) supporting Solow's neoclassical growth model which emphasizes capital accumulation as a core determinant of economic expansion.

Institutional quality measured by control of corruption positively affects economic growth in FE (significant at 1%) but becomes insignificant in GMM suggesting that the FE association partly reflects the tendency of wealthier countries to have stronger institutions rather than a direct causal effect. Similarly, internet usage shows a small positive FE effect that is insignificant in GMM indicating that ICT infrastructure alone does not drive growth without complementary factors such as human capital financial inclusion and strong institutions.

The regression results indicate reveal that diagnostic tests support the validity of the System GMM model. The AR(1) test is significant indicating expected short-run persistence while the AR(2) test is insignificant ( $p = 0.339$ ) confirming the absence of second-order serial correlation and validating the lagged instruments. The Hansen test ( $p = 0.826$ ) supports instrument exogeneity and the number of instruments is below the number of countries mitigating concerns of instrument proliferation. These diagnostics confirm that the System GMM model is theoretically sound and empirically well-specified.

Overall, the empirical findings reveal that comparing FE and System GMM highlights the importance of addressing endogeneity in growth regressions. While FE captures overall correlations GMM provides causal and policy-relevant estimates. Financial inclusion consistently emerges as a key driver of economic growth in AFI countries suggesting that policies expanding access to credit deposits and formal financial services can generate realistic and sustainable improvements in income levels.

**Table3. Financial Inclusion and economic growth in AFI member countries**

<b>Time Frame 2004–2023 Yearly Panel Fixed effect and GMM Estimation</b>		
<b>VARIABLES</b>	<b>Fixed Effect</b>	<b>System GMM</b>
	<b>Dependent variable ln_gdppc</b>	
L.ln_gdppc		1.019*** (0.0404)
fii	0.0871*** (0.182)	0.0222** (0.106)
ln_inflation	-0.00128 (0.00529)	0.00241 (0.00653)
ln_scenrollsec	0.184*** (0.0537)	-0.0859 (0.0787)
ln_tradeopen	0.0183 (0.0464)	-0.0440 (0.0345)
ln_grosscap	0.154*** (0.0347)	0.0517** (0.0232)
contcorrupt	0.101*** (0.0316)	-0.0114 (0.0109)
induseinternet	0.00286*** (0.000733)	0.000352 (0.000875)
Constant	6.357*** (0.246)	0.209 (0.225)
Observations	739	703
R-squared	0.705	
Number of id	63	62
Number of instruments		34
AR (1)		0.000
AR(2)		0.339
Sargan test		0.102
Hansen test		0.826

For details of the explanatory variables see Appendix B. All standard errors are robust and reported in parentheses. The symbols \* and \* indicate statistical significance at the 1% 5% and 10% level respectively. The data result is calculated by using Stata software.

## 4.2 Findings on the impact of economic growth to financial inclusion in the regions

### 4.2.1 African Financial Inclusion Policy Initiative (AFPI)

According to the Table 4 in Africa, financial inclusion exhibits a particularly strong association with economic growth. A 1 unit increase in the financial inclusion index leads to a 16.03% rise in economic growth at 1 % positive statistical significance. However, this positive effect varies considerably across countries. According to the World Bank's Global Findex Database (2025) account ownership among adults in Sub-Saharan Africa (excluding high income) region increased from about 23% in 2011 to 58% by 2024<sup>1</sup>, countries such as Kenya 90% account ownership and Ghana with 81% demonstrate high levels of financial inclusion, while others, including Niger about 15% and Madagascar's 24%, continue to lag significantly behind<sup>2</sup>. These disparities help explain both the strength of the estimated coefficient and the uneven distribution of growth gains across AFPI members.

Beyond financial inclusion, a 1 % increase in secondary school enrollment gives positive statistical significance associated with a 0.14% rise in economic growth, and a 1 % increase in trade openness will lead to 0.17 % increase in economic growth. This highlights those investments in education, trade facilitation alongside expanded financial access can deliver substantial economic gains.

### 4.2.2 Eastern Europe and Central Asia (ECAPI)

According to the results of the Table 4 imply that quality and utilization of financial services, rather than mere access, drive growth in ECAPI. Policy emphasis should shift toward enhancing usage (e.g., SME credit, digital payments) and strengthening ICT infrastructure.

In Eastern Europe and Central Asia (ECAPI), financial inclusion demonstrates a 5% positive statistical significance. A 1 unit increase in the financial inclusion index leads to a 5.52% increase in Economic growth, indicating that broader access to financial services supports economic activity. According to the World Bank's Global Findex Database (2025) account ownership among adults in Europe and Central Asia (excluding high income) region increased from about 44% in 2011 to 78% by 2024, there is variation across ECAPI members. Mongolia 98%, Kazakhstan 87% and North Macedonia 84%, lead the region with adult account ownership ratios, while Bosnia and Herzegovina 77%, Armenia shows 71%, Uzbekistan approximately 60%, and Tajikistan 55%. These figures illustrate substantial heterogeneity, with some countries achieving mature financial inclusion while others are still improving.

Among the control variables, a 1 unit increase of a gross capital formation leads to 0.12% and internet usage 0.63% are positive statistically significant, indicating that

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<sup>2</sup> <https://www.worldbank.org/en/publication/globalfindex/download-data>

investment and digital connectivity are important growth drivers. A 1-unit improvement of gross capital formation is associated with a 0.12 % rise in economic growth, and 1 % increase of internet usage supports to 0.63% increase in the economic growth. These patterns suggest that countries with stronger infrastructure, higher investment, and better digital penetration brings greater benefits to financial inclusion and support the economic growth.

#### ***4.2.3 Financial Inclusion Initiative for Latin America and the Caribbean (FILAC)***

In Latin America and the Caribbean (FILAC) countries, based on the Table 4. financial inclusion shows a strong and statistically significant at 1% association with economic growth. A 1 unit increase in the financial inclusion index is associated with an approximately 9.08% increase in economic growth. This result is consistent with the substantial expansion of access to formal financial services observed across the region over the past decade. According to the World Bank's Global Findex Database (2025) account ownership in the Latin America & Caribbean (excluding high income) is 70% in 2024 compare to 2011 was 39%, countries such as Costa Rica 71%, Dominican Republic 65%, Paraguay, 61% leading, followed by Peru 59%, Mexico 53%, El Salvador 43%, Honduras 42% reflecting relative progress in financial inclusion, supported by widespread bank account usage and digital payment adoption continue to face gaps in access, particularly among low-income and rural populations.

Based on the regression results in the Table 4 several control variables indicate the statistically significant and economically meaningful. A 1% increase in secondary school enrollment is associated with a 0.28% increase in economic growth, underscoring the importance of human capital accumulation in supporting productivity and income growth in the region. Trade openness displays a negative and statistically significant coefficient, with a 1% increase in trade openness associated with a 0.28% decline in economic growth. This result likely reflects the region's vulnerability to external shocks, commodity price volatility. In addition, gross capital formation plays a central role a 1% increase in investment is associated with a 0.36% increase in economic growth, highlighting the importance of capital accumulation for sustained growth. Finally, internet usages show a positive and statistically significant effect, where a 1 unit increase in internet penetration raises economic growth by 0.14%, reflecting the growing role of digital infrastructure in facilitating economic activity.

#### ***4.2.4 South Asia Region Financial Inclusion Initiative (SARFII)***

According to the results from the empirical model in the Table 4 imply that in South Asia (SARFII), the financial inclusion coefficient is not statistically significant, likely due to heterogeneous inclusion progress. Hence, the Global Findex Database (2025) shows that South Asia has made substantial progress in expanding account ownership, about 78% of adults in the region reported having a financial account in 2024 in

compare to 2011 is 32%. Sri Lanka leads with 82% account ownership, while Bangladesh 43% and Pakistan 27%.

The estimation results from the Table 4 indicate that a 1% increase in secondary school enrollment is associated with a 0.42% rise in economic growth and a 0.36% increase in gross capital formation, highlighting the importance of continued investment in secondary education and skills development. A one-unit increase in internet usage is associated with an approximately 0.31% increase in economic growth, suggesting that expanding affordable digital infrastructure and internet access can support productivity and economic growth. By contrast, a 1% increase in inflation reduces economic growth by 0.01%, underscoring the need for policies that maintain price stability to sustain growth.

#### ***4.2.5 Arab Region Financial Inclusion Policy Initiative (ARFIPI)***

The results from the empirical model in Table 4 indicate that in the Arab Region Financial Inclusion Policy Initiative, the financial inclusion coefficient is positive and statistically significant at the 10% level. A one-unit increase in the financial inclusion index is associated with an approximately 15.14% increase in economic growth, suggesting that broader access to formal financial services contributes to higher income levels in the region. According to the World Bank Global Findex Database (2025), financial account ownership in the Middle East and North Africa region (excluding high-income economies) reached about 53% in 2024 and 33% in 2011, representing an improvement from earlier years. Within this context, countries such as Jordan 46%, Morocco 44%, Egypt Arab Rep 43%, report relatively higher account ownership with, while Tunisia 38%, Iraq 30%, and Mauritania 27% inclusion remains lower in countries affected by conflict and structural constraints, contributing to heterogeneity in financial access across ARFIPI members

Other controls in the Table 4 are not statistically significant, indicating that the growth impact of these factors may be less pronounced or more context-specific in this region. In this regard, the financial inclusion itself is the primary driver of growth in this context.

#### ***4.2.6 Pacific Islands Regional Initiative (PIRI)***

As shown in Table 4 in the Pacific Islands (PIRI), financial inclusion shows a positive but statistically insignificant association with economic growth, suggesting that access to financial services has limited measurable impact across these countries

Based on Table 4, several control variables are statistically significant. A one-unit increase in secondary school enrollment is associated with a 0.37% rise in Economic growth, while trade openness increases Economic growth by 0.21%. Internet usage is also significant, indicating that improving digital access can enhance economic activity. These results suggest that, beyond financial inclusion, investments in education, trade integration, and digital infrastructure are key drivers of growth in the Pacific Islands.

Table 4.

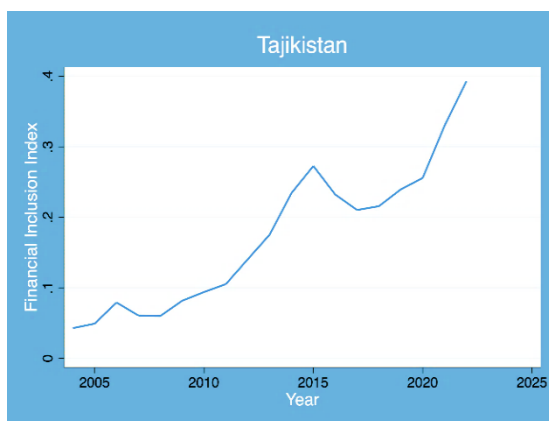
Time Frame 2004–2023 Yearly Panel Fixed effect Estimation						
VARIABLES	African Financial Inclusion Policy Initiative (AFPI)	Eastern Europe and Central Asia Policy Initiative (ECAPI)	Financial Inclusion Initiative for Latin America and the Caribbean (FILAC)	South Asia Region Financial Inclusion Initiative (SARFII)	Arab Region Financial Inclusion Policy Initiative (ARFIPI)	Pacific Islands Regional Initiative (PIRI)
Dependent variable ln_gdppc (proxy for Economic Growth)						
fii	0.1603*** (0.480)	0.0552** (0.225)	0.0908*** (0.150)	0.1273 (0.746)	0.1514* (0.620)	0.0406 (0.299)
ln_inflation	-0.00444 (0.00790)	-0.00568 (0.0100)	0.00535 (0.00708)	-0.0110* (0.00531)	0.0158 (0.0187)	0.00802 (0.00822)
ln_scenrollsec	0.143*** (0.0493)	0.352 (0.389)	0.284*** (0.0856)	0.428** (0.162)	-0.0520 (0.102)	0.379*** (0.0794)
ln_tradeopen	0.178** (0.0668)	-0.0101 (0.0507)	-0.281*** (0.0484)	-0.00298 (0.0728)	0.116 (0.0879)	0.219** (0.0753)
ln_grosscap	0.0553 (0.0389)	0.125* (0.0590)	0.367*** (0.0990)	0.367** (0.121)	0.0468 (0.142)	-0.0547 (0.0350)
contcorrupt	0.118** (0.0465)	-0.0975 (0.0804)	0.0341 (0.0412)	0.0323 (0.0573)	-0.0504 (0.112)	0.0724 (0.0509)
induseinternet	0.000370 (0.00121)	0.00634*** (0.00113)	0.00145* (0.000732)	0.00313** (0.00109)	0.00141 (0.000982)	0.00205* (0.000848)
Constant	5.463*** (0.264)	5.761** (1.835)	7.332*** (0.538)	4.211*** (0.400)	7.262*** (0.615)	5.883*** (0.561)
Observations	232	85	157	79	68	56
R-squared	0.649	0.872	0.835	0.923	0.724	0.772
Number of id	23	7	10	6	6	6

For details of the explanatory variables see Appendix B. All standard errors are robust and reported in parentheses. The symbols \* and \* indicate statistical significance at the 1% 5% and 10% level respectively. The data result is calculated by using Stata softwar

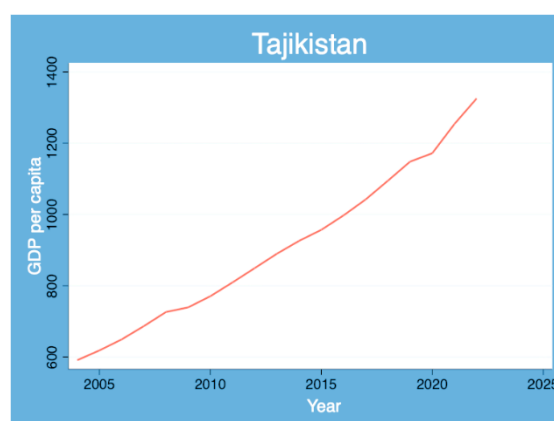
### 4.3 Findings on Financial Inclusion on economic growth in Tajikistan

Time series data suffers from the risk of unit root problem and this problem might occur if series have clear trend. Therefore, before conducting, formal unit root test in Tajikistan it is important to first examine whether such trends are present. The below Figure 13 and 14 show the graph of log of Economic growth and financial inclusion index.

**Figure 13. Financial Inclusion trend**



**Figure 14 GDP per capita trend**



Based on the figure 13 and 14, it is evident that both variables have clear trend, so the series might have unit root problem and likely be non-stationary. Therefore, in the following section, the Augmented Dickey-Fuller (ADF) is utilised to test whether series have unit root problem or not. The Table 1 below shows the result of ADF test.

#### Unit root test

Based on the Table 5. in the ADF test, all variables  $\ln\_gdppc$ ,  $fii$ ,  $\ln\_fdi$ , and  $rule$  are non-stationary at levels but become stationary after first differencing, indicating they are  $I(1)$ . This implies that while the original series have trends over time, they are suitable for Johansen cointegration test to check whether the series are integrated or not. The main conclusion is that a long-run equilibrium relationship may exist among these variables, justifying the use of a VECM model.

**Table 5. Augmented Dickey Fuller (ADF) test**

Variable	Parameter	ADF test			Decision
		t-statistics	critical value 5%	P-Value	
$\ln\_gdppc$	Level	0.121	-1.761	0.5475	I(1)
	First diff.	-3.832	-1.771	0.0010	
fii	Level	0.130	-1.761	0.5508	I(1)
	First diff.	-2.237	-1.771	0.0217	
$\ln\_fdi$	Level	-1.137	-1.761	0.1374	I(1)
	First diff.	-3.376	-1.771	0.0025	
rule	Level	-2.980	-3.600	0.1377	I(1)
	First diff.	-3.147	-1.771	0.0039	

Source The data result is calculated by using Stata software.

### Lag selection criteria

The lag length from Table 6. tests suggest that four lags are optimal. However, because the sample size is small, using four lags was not possible. Therefore, the model was estimated with two lags, which still provides reliable and Table results

**Table 6. Optimal lag structure for ARDL estimation**

Lag	LR	FPE	AIC	HQIC	SBIC
0		-5.57605	-5.33752		
1	116.83	3.8e-11	-10.0292	-10.0443	-8.61308
2	647.39	1.2e-27*	-49.8551	-49.8827	-47.2589
3	3779.2	.	-299.133	-299.171	-295.593
4	132.84*	.	-307.989*	-308.027*	-
					304.449*

\* Indicates lag order selected by the criterion

### Johansen Cointegration Test

The below Table 7. presents the results of Johansen cointegration test. This test has been carried out to check the cointegration among variables. From above Table we see that both Trace test and Max-eigenvalue test indicators have 1 cointegration at the 0.05 level. The existence of cointegration implies a long-run relationship among variables, therefore a Vector Error Correction Model (VECM) is appropriate for further analysis.

**Table 7 Johansen Cointegration Test**

Rank	Trace statistics	5% Critical Value	Max-Eigen statistics	5% Critical Value
0	32.4240	29.68	24.0087	20.97
1	8.4153*	15.41	7.6749*	14.07
2	0.7404	3.76	0.7404	3.76

Source The data result is calculated by using Stata software.

In Table 8. financial Inclusion (fii) has a positive and statistically significant long-run effect on economic growth. A 1% increase in financial inclusion increases Economic growth by 19.07% in the long run.

Foreign Direct Investment (ln\_fdi) shows a negative long-run effect on economic growth. This suggests that foreign direct investment (fdi) does not promote long-run growth but positively influences short-run GDP growth by stimulating investment shown in Table 8.

**Table 8.**

Long-run Cointegrating Relationship (Johansen Normalization)		
Variable	Coefficient	Std. Error
<b>Dependent variable ln (GDPPC)</b>		
ln_gdppc	1.0000	
fii	-0.1907***	(0.0144)
ln_fdi	0.1082***	(0.0229)
constant	-6.4712	-
<b>Adjustment Parameter (Error Correction Term)</b>		

VARIABLES	Coefficient	Std. Error
Dependent variable $\Delta \ln$ (GDPPC)		
$\Delta \ln_{gdppc}(-1)$	-0.0837	0.0546
$\Delta fii(-1)$	1.6717	1.0755
$\Delta \ln_{fdi}(-1)$	-6.4015***	1.6013

Source The data result is calculated by using Stata software.

The ECT in Table 8 presents coefficient for  $\Delta \ln$ GDPPC is negative  $-0.0837$ , this implies that Economic growth adjusts slowly toward its long-run equilibrium after short-term shocks. This suggests slow but stable long-run adjustment, which is common in macroeconomic time-series with small samples. Table 9 reports the short-run coefficients of the VECM, Short-run effects of Financial inclusion, foreign direct investment and on Economic growth are statistically insignificant, suggesting that short-run dynamics are often volatile and influenced by temporary shocks, policy adjustments, or external conditions.

**Table 9. Short-run dynamics**

VARIABLES	$\Delta \ln_{gdppc}(-1)$	$\Delta \ln_{fii}(-1)$	$\Delta \ln_{fdi}(-1)$
$\Delta \ln_{gdppc}$	-0.1056	-0.0138	0.0041
	0.2820	0.0143	0.0056
$\Delta fii$	4.1277	0.7977**	-0.2837*
	5.5461	0.2813	0.1110
$\Delta fdi$	19.9466*	-0.3684	-0.1304
	8.2578	0.4189	0.1653

Source The data result is calculated by using Stata software.

A series of tests are applied to verify model validity The Lagrange-multiplier test confirms the absence of residual autocorrelation, the Jarque-Bera test shows that residuals are normally distributed, and the eigenvalue stability condition confirms model stability.

**Table 10. Lagrange-multiplier test, Jarque-Bera test and Eigenvalue stability condition**

Lagrange-multiplier test				Jarque-Bera test				Eigenvalue stability condition		
lag	chi2	df	Prob	Equation	chi2	df	Prob > chi2	Eigenvalue	Modulus	
1	11.5689	9	0.2387	Equation	chi2	df	Prob > chi2	1	1	
2	5.0508	9	0.8298	D_ ln_gdppc	0.438	2	0.8032	1	1	
				D_fii	0.294	2	0.8631	.4249	+ .7001357i .8190	
				D_ ln_fdi	0.643	2	0.7249	.4249	- .7001357i .8190	
				ALL	1.376	6	0.9673	-.2802	.2802	
								-.1038	.1038	

Source: The data result is calculated by using Stata software.

GDP adjusts slowly toward its long-run equilibrium after shocks (VECM ECT =  $-0.0837$ ), suggesting the economy responds gradually to policy changes.

The Granger causality test is used to examine whether past values of one variable help predict changes in another variable. The results for Tajikistan show that economic

growth helps predict future inflows of foreign direct investment (fdi), indicating that stronger economic performance tends to attract more investment. In addition, the results reveal that FDI helps predict improvements in financial inclusion, suggesting that increased investment supports the expansion of access to financial services. Overall, these findings indicate a dynamic relationship in which economic growth is followed by higher investment, which in turn contributes to greater financial inclusion in Tajikistan.

While FI contributes to growth in the **long run, short-term fluctuations in FI do not predict immediate changes in GDP.**

**Table 13.**

Null Hypothesis	Chi <sup>2</sup>	df	Prob > Chi <sup>2</sup>	Inference
LD.ln_gdppc does not Granger cause $\Delta \ln\_fdi$	5.83	1	0.0157	Reject Ho $\rightarrow \ln\_gdppc \rightarrow \ln\_fdi$
LD.ln_fdi does not Granger cause $\Delta fii$	6.53	1	0.0106	Reject Ho $\rightarrow \ln\_fdi \rightarrow fii$

Source The data result is calculated by using Stata software.

## 5 Conclusion

**Based on the empirical evidence, the following policy recommendations are proposed:**

### 1. African Financial Inclusion Policy Initiative (AFPI)

- Expand financial inclusion: 1-unit increase in the financial inclusion index raises economic growth by 16.03%.
- Boost secondary school enrollment: to enhance financial literacy 0.14% economic growth increase per 1% secondary school enrollment.
- Facilitate trade openness: 0.17% economic growth increase per 1% increase of trade.

### 2. Eastern Europe and Central Asia (ECAPI)

- Focus on SME credit, digital payments, and effective use of financial services: 5.52% Economic growth increase per 1-unit index rise of fi.
- Promote investment: 0.12% economic growth increase per 1-unit rise of investment.
- Improve internet penetration: 0.63% economic growth increase per 1% improving of internet usage.

### 3. Latin America & Caribbean (FILAC)

- Expand formal financial services, especially in low-income and rural areas: 9.08% economic growth increase per 1-unit index rise of fi.
- Increase secondary school education: 0.28% economic growth increase per 1% rise of secondary school education
- Encourage investment: 0.36% economic growth increase per 1% rise of investment.
- Expand internet penetration to improve economic activity: 0.14% economic growth increase per 1-unit rise of usage of internet.

#### **4. South Asia Region Financial Inclusion Initiative (SARFII)**

- Prioritize secondary school education and skills development: 0.42% Economic growth increase per 1% rise of human capital.
- Support gross capital formation: 0.36% economic growth increase per 1% rise of investment.
- Improve internet access to facilitate financial inclusion and productivity: 0.31% Economic growth increase per 1-unit rise of digital infrastructure.
- Price Stability Implement policies to control inflation -0.01% Economic growth per 1% rise of Inflation.

#### **5. Arab Region Financial Inclusion Policy Initiative (ARFIPI)**

- Focus on expanding Financial Inclusion: 15.14% Economic growth increase per 1-unit index rise fi.

#### **6. Pacific Islands (PIRI)**

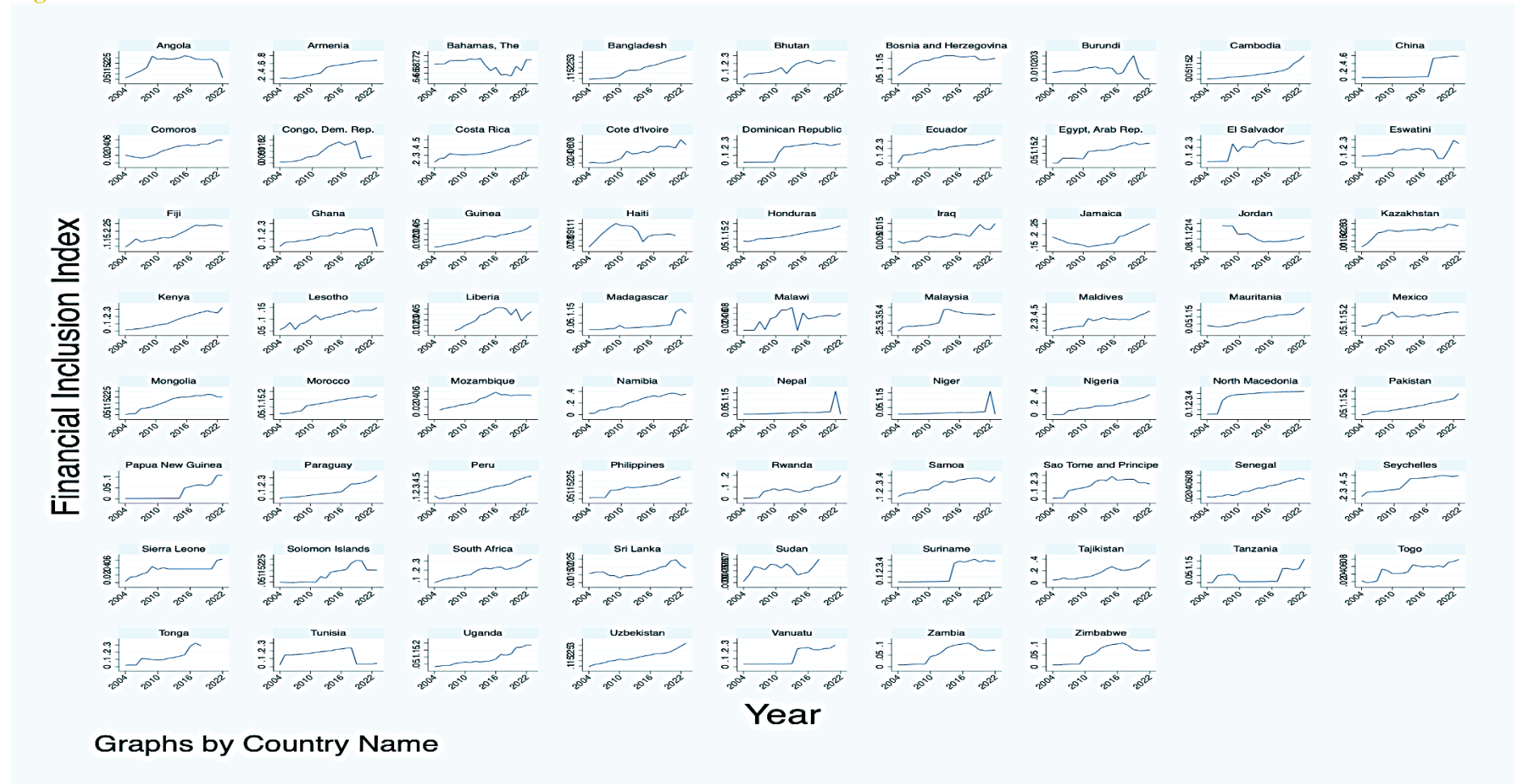
- Increase secondary school enrollment: 0.37% Economic growth increase per 1-unit rise human capital.
- Expand trade integration: 0.21% Economic growth increase per 1% rise of trade.

#### **7. Tajikistan**

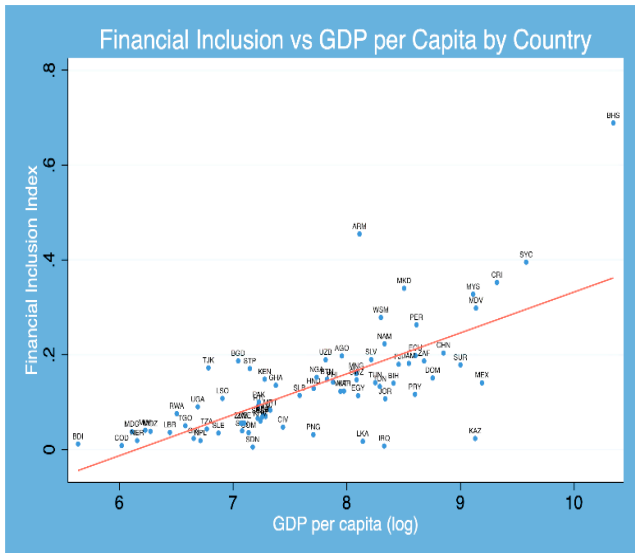
- Improve Financial Inclusion: a 1-unit increase in the fi positively affects long-run Economic growth by 19.07%.
- Foreign Direct Investment has a short-run positive effect but negatively impacts long-run growth. Policymakers need to prioritize human capital and digital as well as strengthen institutional function.

Annex A.

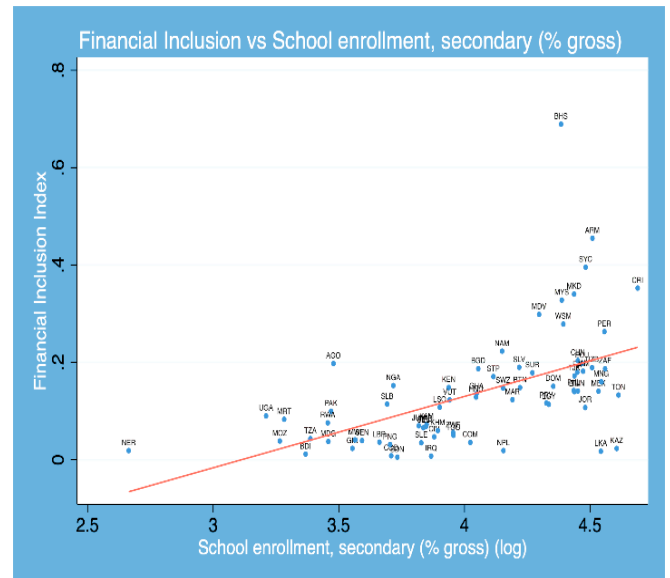
Figure 1. The trend of Financial inclusion index across AFI members



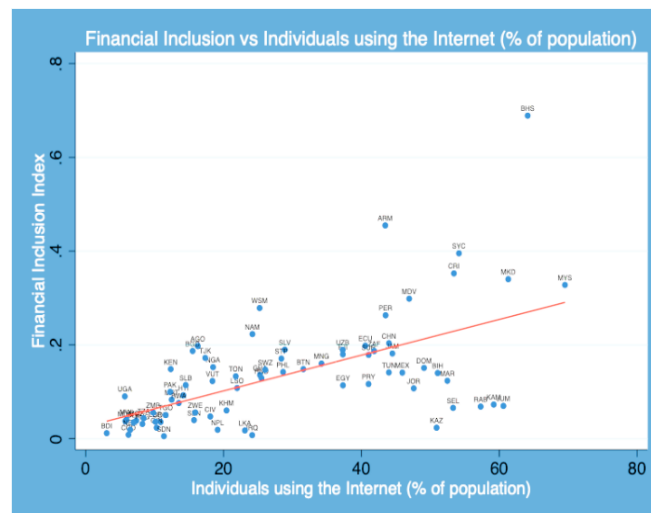
**Figure 2. GDP per capita income and financial inclusion**



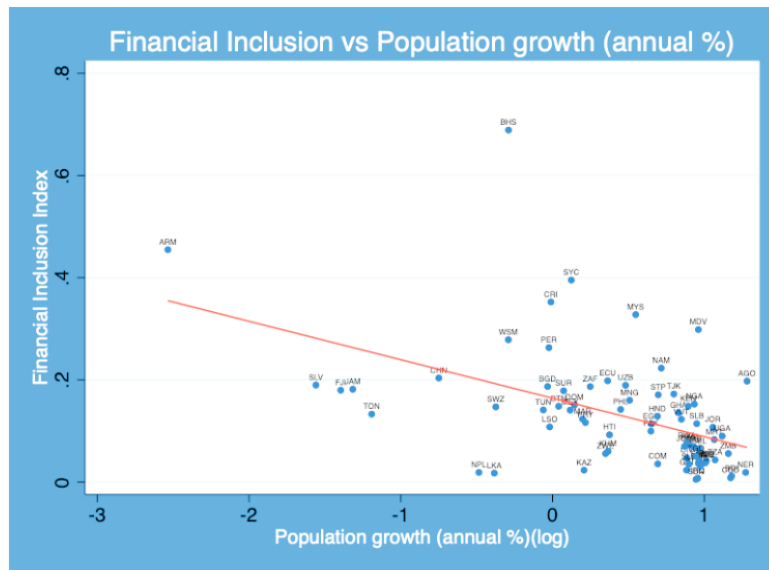
**Figure 3. Secondary school enrollment and financial inclusion**



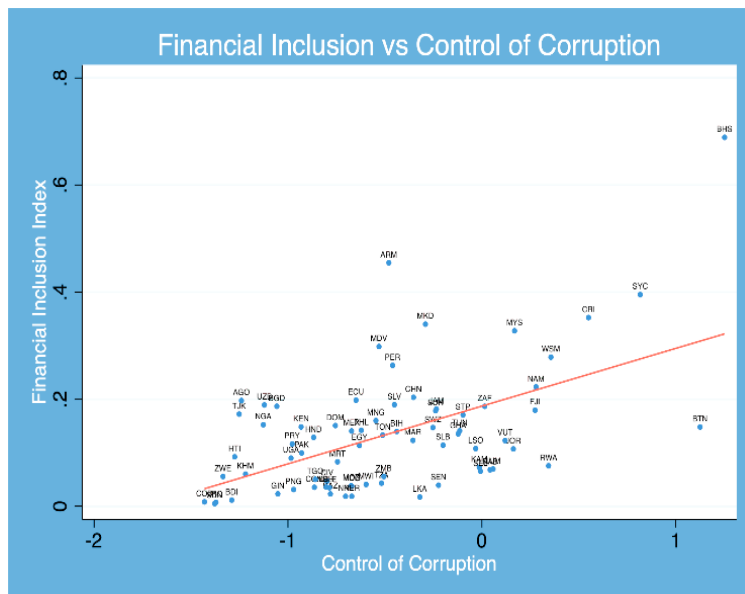
**Figure 4. Internet usage and financial inclusion**



**Figure 5. Population growth rand financial inclusion**



**Figure 6. Better control of corruption and financial inclusion**



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### Appendix A: List of countries included in the sample

**African Financial Inclusion Policy Initiative (AFPI):** Angola, Burundi, Comoros, Democratic Republic of the Congo, Côte d’Ivoire, Eswatini, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe Senegal, Sierra Leone, South Africa Tanzania Togo Uganda Zambia Zimbabwe.

**Eastern Europe and Central Asia Policy Initiative (ECAPI):** Armenia, Bosnia and Herzegovina, Kazakhstan, Mongolia, North Macedonia, Tajikistan, Uzbekistan

**Financial Inclusion Initiative for Latin America and the Caribbean (FILAC):** The Bahamas, Costa Rica, Dominican Republic, El Salvador, Haiti, Honduras, Jamaica, Mexico, Paraguay, Peru, Suriname.

**South Asia Region Financial Inclusion Initiative (SARFI):** Bangladesh, Bhutan, Maldives, Nepal, Pakistan, Sri Lanka.

**Arab Region Financial Inclusion Policy Initiative (ARFIPI):** Egypt Arab Rep., Iraq, Jordan, Mauritania, Tunisia, Morocco.

**Pacific Islands Regional Initiative (PIRI):** Fiji, Samoa, Seychelles, Solomon Islands, Tonga, Vanuatu, Papua, New Guinea.

## Appendix B. Description of variables and source

Variables	Measurement	Source
Composite financial inclusion index ( <i>fii</i> )	Composite financial inclusion index consists of penetration availability and usage dimensions of financial inclusion which is computed by following the methodology proposed by Sarma (2012)	International monetary fund. The financial inclusion index is constructed by author.
GDP per capita ( <i>ln_gdppc</i> )	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2015 U.S. dollars.	WDI
Trade (% of GDP) ( <i>ln_tradeopen</i> )	Trade is the sum of exports and imports of goods and services. This indicator is expressed as a percentage of Gross Domestic Product (GDP) which is the total income earned through the production of goods and services in an economic territory during an accounting period.	WDI
Secondary school enrollment ratio (% gross) ( <i>ln_scenrollte</i> )	Gross enrollment ratio is the ratio of total enrollment regardless of age to the population of the age group that officially corresponds to the level of education shown.	WDI
Inflation rate (annual %) ( <i>ln_inflation</i> )	Annual percentage change in the average consumer price index	WDI
Control of corruption: Estimate ( <i>contcorrupt</i> )	Control of corruption identifies a public power is exercised for private gain including both petty and grand forms of corruption (estimate gives the country's score from appr. – 2.5 (weak) to 2.5 (strong)).	WDI
Gross capital formation (constant)	Gross capital formation includes acquisitions less disposals of produced assets for purposes of fixed capital formation inventories or valuables. This indicator is expressed in	WDI

2015 US\$) ( <i>ln_grosscap</i> )	constant prices meaning the series has been adjusted to account for price changes over time. The reference year for this adjustment is 2015.	
Individuals using the Internet (% of population) ( <i>induseinternet</i> )	Individuals who have used the Internet (from any location) in the last 3 months.	WDI
Population growth ( <i>ln_popgrowth</i> )	Annual population growth rate	WDI
Rule of law ( <i>rule</i> )	Rule of law reflects the extent to which agents have abided by the rules of society (estimate of governance ranges from appr. – 2.5 (weak) to 2.5 (strong)).	WDI
Govt. expenditure ( <i>ln_govexp</i> )	General government final consumption expenditure as a percentage of GDP )	WDI
Mobile users ( <i>lnmobile</i> )	Mobile cellular subscribers per 100 people	WDI

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