Volume: 26, Issue: 1
Page: 233-247
2023

International Journal of Science and Business

Journal homepage: ijsab.com/ijsb

Unlocking the Path to Inclusive Growth: Examining the Impact of Financial Inclusion in Developing Economies

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Abstract

This empirical research study explores the influence of financial inclusion (FI) on long-term economic growth within a dataset comprising 50 developing countries over the period from 2010 to 2022. Sustainable per capita economic growth, defined as an annual growth rate of a minimum of 7%, serves as a representative measure for sustained economic growth, while the growth rate of branches of bank and ATMs per 0.1 million people functions as a proxy for FI. Employing panel data models, our findings suggest a positive correlation between FI and sustained economic growth, although this relationship does not attain statistical significance. We also employ robust endogeneity-consistent estimation techniques, including the two-step system and differenced Generalized Method of Moments (GMM) approaches, and our results consistently indicate that financial inclusion, as measured by bank branches and ATM outreach, does not appear to be a significant driver of economic growth. Consequently, central banks and governments are encouraged to formulate and implement more effective strategies and initiatives aimed at enabling greater access and utilization of financial services among unbanked populations, with the potential to yield tangible benefits from financial inclusion and consequently foster higher growth rates in developing nations.

IJSB
Accepted 10 September 2023
Published 16 September 2023
DOI: 10.58970/IJSB.2179

ISSN: 2520-4750 (Online) 2521-3040 (Print)

Keywords: *Financial Inclusion, Economic Growth, GMM, Panel Data, Developing Countries.*

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Introduction

Consistent and enduring economic expansion represents a crucial foundation for promoting inclusive growth and constitutes a central aim embedded in the 2030 Agenda for Sustainable Development. This objective is intimately tied to Sustainable Development Goal 8 (SDG 8), which underscores the imperative of attaining sustainable and more inclusive economic growth, fostering full-employment, and augmenting national macroeconomic productivity. The efficacy of initiatives aimed at enhancing financial inclusion (FI) in realizing sustained economic growth has garnered substantial interest among policymakers, particularly due to the interplay of these factors with several of the Sustainable Development Goals established in 2015. Financial inclusion (FI) serves as a potent catalyst for reducing extreme poverty and fostering economic prosperity, as acknowledged by the World Bank, and it constitutes one of the fundamental building blocks of the global sustainable development agenda, as articulated by the Global Partnership for Financial Inclusion in 2017. The concept of FI, which entails ensuring the availability and usage of formal financial products and services provided by both banks and non-bank entities, has gained increasing importance in both academic research and policy formulation. Despite a notable increase in the percentage of adults worldwide opening financial accounts with institutions or mobile financial service providers – rising from 56% to 69% between 2014 and 2017 – there remain 1.7 billion unbanked adults globally as of 2017. The access to financial services, including digital financial solutions such as mobile and internet banking, point of sale services, e-payments via credit and debit cards, and other fintech innovations, presents numerous potential developmental advantages. These benefits include encouraging savings (Aportela, 1999), empowering women (Ashraf et al., 2010), facilitating entrepreneurial investment in productive projects (Dupas and Robinson, 2013), enhancing living standards in terms of health, business investment, and education (World Bank and AfDB), and unlocking the potential for sustained economic growth (Hariharan and Marktanner, 2012; Sahay et al., 2015; Sharma, 2016). While several studies have highlighted the advantages of FI for both individuals and economies, comprehensive and robust empirical evidence remains limited (Kunt et al., 2017). Furthermore, the connection between financial development assistance for international trade activities and FI initiatives, as well as their combined impact on achieving sustainable inclusive growth, remains an unexplored area in economic research. The primary motivation for conducting this study stems from the absence of prior research that specifically incorporates FI in the pursuit of SDG 8, target 8.1.1. The existing body of literature has consistently deliberated on how to better align FI with SDG-8, which emphasizes inclusive economic growth. However, the empirical research landscape still lacks clarity when it comes to understanding the relationship between FI and economic growth in developing economies. Moreover, while the theoretical literature on the efficacy of FI has seen substantial growth in recent years, empirical investigations into the impact of various facets of FI on economic growth are still relatively scarce and in their early stages, as pointed out by Kunt et al. (2017). Consequently, when it comes to empirical studies at the intersection of FI and growth, there is a notable absence of concrete evidence. Hence, there exists a compelling imperative to empirically scrutinize the effectiveness of FI initiatives in promoting inclusive economic growth as part of the broader endeavor to achieve the Sustainable Development Goals. To steer our research, we shape the subsequent inquiries: (a) What economic ramifications arise from the presence of FI in fostering enduring economic advancement within developing nations? and (b) Does FI indeed play a substantial role in driving the achievement of inclusive economic growth as delineated by SDG 8? Guided by these research inquiries, our central aim revolves around delving into the consequences of FI concerning the realization of both sustained and inclusive economic growth. This endeavor unfolds through our analysis of panel data sourced from 50 developing economies, spanning

the timeframe from 2010 to 2022. The chosen timeframe of 2010 to 2022 for our study is primarily based on data availability of the selected variables of FI. Data accessibility is a critical factor that influences the selection of timeframes. During our research planning, we found that comprehensive and reliable data for financial inclusion and economic growth indicators across 50 developing economies was consistently available for this particular period. Therefore, we opted for the 2010-2022 timeframe as it allowed us to conduct a robust and comprehensive analysis using the most up-to-date and consistent data sources. While this timeframe is primarily driven by data considerations, it aligns with our research objectives, which are focused on understanding the consequences of FI on sustained and inclusive economic growth within developing nations, in accordance with the broader context of the Sustainable Development Goals (SDG 8).The study's structure is as follows: next, the comprehensive review of literature, addressing gaps and outlining expected contributions; then, data definition and sources, revealing stylized facts; followed by empirical specification and strategy, detailing methodologies; moving on to empirical findings, presenting insights and outcomes; concluding with a summary of key findings and pertinent policy recommendations for stakeholders in financial inclusion and economic growth.

Review of Literature, Literature Gap and Expected Contributions

The current body of research concerning the macroeconomic relationship between financial inclusion (FI) and economic growth is relatively scarce and lacks extensive empirical substantiation. Additionally, there is a noticeable void in the literature when it comes to directly examining the connection between FI and SDG Target 8.a. While numerous studies, whether conducted within specific countries or encompassing multiple nations, have identified a favorable association between FI and economic growth (Balele, 2019; Chatterjee, 2020; Huang et al., 2021; and Ozili et al., 2023), the depth of comprehension in this area remains somewhat limited. For example, Kim et al. (2018) employed advanced econometric methodologies to explore the link between FI and economic growth across 55 OIC countries, ultimately discovering positive impacts of FI indicators on economic growth. Nwafor and Yomi (2018) studied the Nigerian context and found that FI significantly increased GDP growth. These studies, among others, underscore the potential benefits of FI, yet the literature lacks a comprehensive examination of its broader macroeconomic impact. Numerous significant research endeavors have enriched our comprehension of the positive connection between FI and economic growth. For instance, Onaolapo (2015) delved into a study within Nigeria, revealing a substantial positive correlation between FI and economic growth while underscoring FI's pivotal role in poverty alleviation. Similarly, Sharma (2016) explored the interplay between various facets of FI and India's economic growth, unveiling affirmative contributions from each dimension. In a broader context, Sahay et al. (2015) scrutinized cross-country data, culminating in the conclusion that FI exerts a positive influence on growth, albeit with the caveat that this impact hinges on the depth of financial development. Collectively, these investigations coalesce around the notion that FI can serve as a potent catalyst for economic advancement, nurturing entrepreneurship, and bolstering overall growth. Nevertheless, it is crucial to acknowledge that a subset of studies has surfaced with contrasting findings, spotlighting a negative nexus between FI and growth within specific contexts. Naceur and Samir (2007), for instance, unearthed a detrimental impact of bank development on economic growth in the MENA region, positing that an underdeveloped financial system may impede growth prospects. Additionally, Van der Werff et al. (2013) discerned that heightened levels of confidence in government and banking institutions fostered greater FI, with the favorable outcomes of FI being contingent upon non-financial social factors. Menyelim et al. (2021) investigated this relationship in 48 Sub-Saharan African countries from 1995 to 2017,

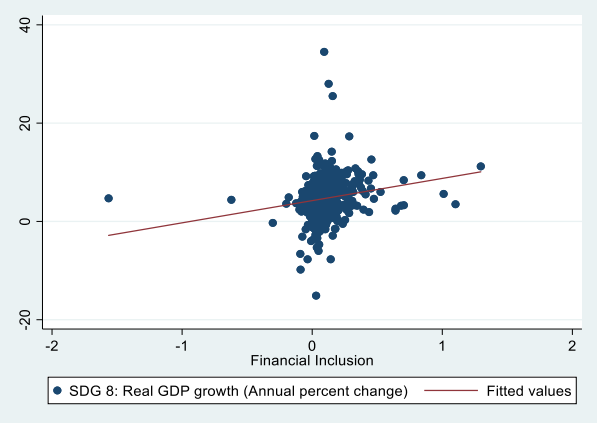
using financial access indicators as proxies for financial inclusion. They discovered a negative effect of financial inclusion on the connection between income inequality and economic growth. In a different context, Maune (2018) explored how financial inclusion moderates the trade-growth relationship in Zimbabwe. Their study revealed a negative impact of financial inclusion and trade openness on economic growth in Zimbabwe. Similarly, Nwisienyi and Obi (2020) investigated the relationship in Nigeria from 2004 to 2018, using the ARDL bounds test and ECM, and they found that financial inclusion, as measured by the number of borrowers from commercial banks per 1,000 adults, had a negative effect on economic growth. Lastly, Chiwira (2021) examined the connection between financial inclusion and economic growth in the Southern African Development Community (SADC) from 1995 to 2015, employing the ARDL model, and reported a negative and long-run relationship between financial inclusion and economic growth in the SADC region. These findings serve as a reminder that the relationship between FI and economic growth is both context-dependent and multifaceted, warranting nuanced consideration. Thus, the literature on the advantages of financial inclusion in accelerating economic growth in developing countries is constrained by limited data availability and a lack of comprehensive empirical investigations. Specifically, there has been a dearth of studies examining the intricate relationship between financial inclusion, other macroeconomic factors such as foreign capital, foreign direct investment, inflation, and financial development, in conjunction with the Sustainable Development Goal (SDG) 8 indicator. This research contributes significantly to the empirical literature by shedding light on the effectiveness of FI as a factor for sustained growth, aligning with the 2030 Agenda for Sustainable Development by the United Nations and the Agenda for Addis Ababa Action. By addressing these research gaps, this study aims to provide valuable insights into the role of FI in achieving long-term economic development and sustainability in developing nations.

Data Definition, Sources and the Stylized Fact

Data and Data sources

In the context of our research, we evaluate sustainable economic growth based on United Nations Sustainable Development Goal (SDG) 8. This goal encompasses the overarching aims of achieving continuous economic growth, full employment, and maximal economic productivity. SDG 8 comprises a set of 12 distinct targets, denoted as Target 8.1 through 8.10, 8.a, and 8.b. In our analysis, we specifically concentrate on SDG Target 8.1 as a representation of sustained and inclusive economic growth. We define this target as sustainable economic growth per capita, which is characterized by an GDP growth rate of at least 7%, per year, in Least Developed Countries (LDCs). The measurement indicator used for SDG Target 8.1, as endorsed by the United Nations Development Programme (UNDP), is the annual growth rate of real GDP per capita. Traditionally, in previous research studies, FI has been assessed using metrics such as the total number of bank branches per one hundred thousand adults and the total number of ATMs per 100,000 adults (as exemplified in studies like Sahay et al., 2015). However, our study takes a distinctive approach by utilizing the annual growth rate of the combined total number of bank branches and ATMs per 0.1 million adults as a surrogate measure for FI. This unique perspective allows us to examine the relationship between FI and sustainable economic growth in a novel light. We provide a visual representation of the relationship between FI and SDG 8.1, which represents real GDP growth. Figure I showcase this correlation using a dataset encompassing all 50 countries (as detailed in Appendix A) over the period spanning from 2010 to 2022. In this illustration, the y-axis represents the dependent variable, SDG 8, denoting economic growth measured as the yearly rate of change in real GDP.

Figure I Stylized Fact between FI and SGD 8 (Economic Growth)



Data source: FAS, IMF and Author's Calculation

The regression fitted line in Figure I reveals a discernible upward trend, underscoring a notable association between the increased inflow of FI and the enhancement of the SDG 8 indicator within developing economies. In simpler terms, as the indicator of FI experiences growth, there is a positive correlation with economic growth, as measured by SDG 8. This graphical representation serves as an initial economic rationale for our subsequent econometric analysis, suggesting that the expansion of FI can be a catalyst for fostering economic growth in these developing nations. Our analysis incorporates several control variables to account for various economic factors. Aid for trade (AFT) is defined as the annual growth rate of total disbursements of AFT through trade policy and regulations channels. Foreign direct investment (FDI) is proxied by the net inflow of FDI as a percentage of GDP. Domestic investment (INV) is represented by gross fixed capital formation as a percentage of GDP. Money supply (MS) is indicated by the annual rate of broad money supply. Inflation rate (INF) is measured by the yearly GDP deflator. Domestic credit (DC) is proxied by domestic credit extended to the private sector as a percentage of GDP by financial institutions. Data for SDG Target 8.1 indicators is acquired from the UN SDG Database. Details concerning total aid disbursements for trade policy improvement are compiled from the OECD Creditors Reporting System (CRS) database. Information regarding FI is extracted from the Financial Access Survey (FAS) conducted by the International Monetary Fund (IMF). Data pertaining to the control variables are obtained from the World Development Indicators (WDI) available within the World Bank database.

Empirical Specification and Strategy

This research considers the Aggregate Production Function (APF) framework to evaluate the impact of FI on growth of GDP.

$$Y_{it} = A_{it}K_{it}^{\alpha_1}L_{it}^{\alpha_2} \qquad (1)$$

Where, Y_{it}, A_{it}, K_{it}, L_{it} respectively denote the aggregate production, the total factor productivity, total capital stock and total labor of country i at year t. Following Bhagwati (1978), Balasubramanya et al. (1996), Roy and Xiaoling (2022), and Hossain et al. (2022 and 2023), FI, domestic and foreign capital, labor force and other macroeconomic factors exogenously have an impact on total factor productivity (A_{it}). Therefore, we can define,

$$\ln Y_{it} = \beta_0 + \gamma_1 \ln FI_{it} + \gamma_2 \ln Aft_{it} + \beta_1 \ln FDI_{it} + \beta_2 \ln INV_{it} + \beta_3 \ln MS_{it} + \beta_4 \ln INF_{it} + \beta_5 \ln DC_{it} + \eta_i + \mu_t + \varepsilon_{it} \qquad (2)$$

Where, lnY_{it} refers to sustained economic growth (SDG 8) proxy by yearly growth rate of real GDP per individual of country i in year t. $lnFI_{it}$ implies FI proxy by rate of growth of number of branches of bank per 0.1 million adults, $lnAfT_{it}$ implies annual growth rate of total

disbursement aid in trade policy sector by the donors, $lnFDI_{it}$ represents foreign direct investment over GDP, $lnINV_{it}$ denotes domestic investment calculated by unsing formation of gross fixed capital (GFC) over GDP, $lnMS_{it}$ is the money supply proxy by growth of broad money, $lnINF_{it}$ is the inflation rate (yearly GDP deflator) and $lnDC_{it}$ is the domestic credit (% of GDP, provided by financial sector). In the model, (η_i) is the country specific effect, μ_t is the year effect and ε_{it} is the model residuals. In our research, γ_1 represents the vector of parameters under estimation and holds our primary focus. We anticipate that the coefficient γ_1 will yield positive and statistically significant results. Drawing upon insights from economic literature, theories, and rationale, we also anticipate that the coefficients for the other control variables will exhibit positive signs, except for Inflation (INF) and domestic credit (DC). We have undertaken the estimation of the initial static specification of the growth model (as represented in Equation 2) through three distinct techniques: Pooled Ordinary Least Squares (OLS), Random Effects (RE), and either Fixed Effects (FE) regression models. It is essential to acknowledge that each of these approaches has inherent limitations, including challenges related to unobserved heterogeneity, omitted variable bias, and serial autocorrelation. In our analysis, we have diligently employed all three estimation methods, but the final selection between FE and RE is determined by the outcomes of the Hausman specification test—a critical step in our modeling process. To ensure the robustness of our findings and address potential issues such as dependence within and between cross-sections and heteroskedasticity in our static panel data model (as illustrated in Equation 4), we have additionally conducted various post-estimation tests tailored for panel data analysis. These tests provide valuable insights into the overall quality and reliability of our models. Subsequently, in an effort to mitigate concerns surrounding endogeneity and to bolster the robustness of our results obtained from the static models, we have incorporated two advanced econometric techniques: the two-step difference GMM as introduced by Arellano and Bond (1991), and the two-step system GMM method as outlined in the works of Arellano and Bover (1995) and Blundell and Bond (1998). The primary rationale behind adopting GMM estimators lies in their capacity to address the limitations associated with FE and RE estimators, effectively handling challenges such as unobserved heterogeneity, omitted variable biases, endogeneity, country-specific effects, heteroskedasticity, and autocorrelation, as articulated by Roodman (2009). Furthermore, it is important to highlight that the utilization of both difference and system GMM techniques is particularly well-suited to our panel data analysis due to the specific characteristics of our dataset, which comprises a substantial cross-section (N) of countries observed over a relatively limited timeframe (T). This strategic choice of estimation methods enhances the credibility and reliability of our empirical investigation.

Following Blundell and Bond (1998), the dynamic transformation of our static equation (2) can be written as-

$$\begin{aligned}\ln Y_{it} = {} & \phi \ln Y_{it-1} + \gamma_1 \ln AfT_{it} + \gamma_2 \ln FI_{it} + \beta_1 \ln FDI_{it} + \beta_2 \ln INV_{it} + \beta_3 \ln MS_{it} \\ & + \beta_4 \ln INF_{it} + \beta_5 \ln DC_{it} + \mu_i + \varepsilon_{it} \end{aligned} \quad (3)$$

Where, $\ln Y_{it-1}$ is the rate of GDP growth for country i in year t-1. μ_i is the unobserved country-related effects that are might be correlated with the independent variables and ε_{it} is the disturbance term that are independent across countries. To eliminate the unobserved heterogeneity (μ_i), our study shall employ first differencing of equation (2) as suggested by Arellano and Bond (1991) which is also referred to as Difference GMM.

$$\begin{aligned}\Delta \ln Y_{it} = {} & \phi \Delta \ln Y_{it-1} + \gamma_1 \Delta \ln AfT_{it} + \gamma_2 \Delta \ln FI_{it} + \beta_1 \Delta \ln FDI_{it} + \beta_2 \Delta \ln INV_{it} + \beta_3 \Delta \ln MS_{it} \\ & + \beta_4 \Delta \ln INF_{it} + \beta_5 \Delta \ln DC_{it} + \Delta \varepsilon_{it} \end{aligned} \quad (4)$$

The consistency of the estimators presented in equations 3 and 4 hinges on the validity of the moment conditions inherent to the GMM estimator. To ascertain the robustness of the GMM

estimations, we subjected them to two critical post-estimation tests: (i) we carried out the autocorrelation (AR2) test, which examines the presence of 1st-order autocorrelation and the potential existence of 2nd correlation in the residuals. (ii) Additionally, we utilized the Sargan test and/or the Hansen J-test to scrutinize the correct specification of the over-identifying restrictions. The null hypothesis in these tests posits that the variables used as instruments in the GMM frameworks are exogenous. These comprehensive assessments, encompassing both model validity and instrument reliability, ensure a robust evaluation of the soundness of our models and instruments, thereby upholding the credibility of our results.

Empirical Findings

Descriptive Statistics

Table 1 presents a comprehensive overview of the dataset utilized in this analysis. The dataset used in this paper is structured as a panel dataset encompassing 50 developing countries, spanning the period from 2010 to 2022. Notably, most of the variables in the dataset are presented in logarithmic form, with the exception of Y (representing real GDP), AFT, FI, and MS. These specific variables are represented in log-difference form, indicating their annual growth rates. This choice to employ a log-linearized empirical framework serves two primary purposes: it facilitates the interpretation of findings and helps mitigate data skewness. Upon examination of Table 1, it is evident that the standard deviation of the majority of variables within the dataset is relatively low. However, it is noteworthy that the variables MS (money supply) and DC (domestic credit) exhibit higher standard deviations. This observation underscores the need to consider the potential variability and dynamics of money supply and domestic credit when analyzing the dataset.

Table 1. Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
lnY	650	4.636154	3.67874	-15.1	34.5
lnFI	650	.0891587	.1517426	-1.565125	1.296067
lnAFT	641	0.180212	1.507176	-7.51235	6.515614
lnFDI	650	4.44861	5.325261	-37.1548	43.9121
lnINV	650	23.90848	6.48953	9.35824	48.4123
lnMS	650	15.11729	11.02558	-20.5686	86.8126
lnINF	650	6.979303	6.976232	-18.9297	80.7546
lnDC	650	42.72374	31.98723	5.0483	160.125

Correlation Matrix

Table 2 presents a correlation matrix, offering valuable insights into the relationships between various economic variables, which, in large part, align with established economic theories. Notably, we observe positive and statistically significant correlations between economic growth (Y) and key explanatory variables, namely lnFI (log of financial inclusion), lnFDI (log of foreign direct investment), lnINV (log of domestic investment), and MS (money supply), all at the 10% significance level. Conversely, domestic credit (lnDC) exhibits a negative correlation with economic growth (Y) and is also statistically significant. Furthermore, the correlation matrix reveals that the total AFT associated with trade policy and regulation, as well as the inflation rate, demonstrate relatively lower positive correlations with economic growth (Y), albeit without statistical significance. Notably, the results from the correlation matrix also highlight a positive relationship between AFT and FI. In addition, we find that money supply exhibits a positive correlation with both FI and foreign direct investment, with these findings achieving statistical significance. In nearly all cases, domestic credit (DC) displays a positive association with the other variables. However, it is essential to provide some context and justification regarding these observed relationships. The positive and significant correlations

between lnFI, lnFDI, lnINV, and MS with economic growth (Y) align with established economic theories that emphasize the role of FI, foreign investment, domestic investment, and money supply in driving economic growth. The negative correlation between lnDC and Y may be indicative of potential issues within the domestic credit market that warrant further investigation. The relatively low and statistically insignificant correlations between total AFT and inflation rate with Y suggest that these factors may have less direct influence on economic growth or could be subject to other external factors not captured in this analysis. Overall, these findings underscore the importance of considering these variables in the context of economic growth and provide a foundation for more in-depth analysis and econometric modeling to understand the causal relationships at play.

Table 2. Correlation Matrix

	lnY	lnFI	lnAFT	lnFDI	lnINV	lnMS	lnINF	lnDC
lnY	1.0000							
lnFI	0.1864*	1.0000						
lnAFT	0.0570	0.0138	1.0000					
lnFDI	0.2903*	0.0582	0.0220	1.0000				
lnINV	0.2614*	0.0569	0.0134	0.2696*	1.0000			
lnMS	0.4324*	0.2229*	0.0162	0.2431*	0.0383	1.0000		
lnINF	0.0537	0.0940*	0.0320	0.1110*	0.0808*	0.3881*	1.0000	
lnDC	0.0814*	0.1143*	0.0594	0.0722*	0.1568*	0.1985*	-0.1685*	1.0000

Notes: *, represent significance at 10%

The issue of multicollinearity can emerge when the model incorporates independent variables that exhibit strong correlations among themselves. To assess the presence of this concern, we have employed the Variance Inflation Factor (VIF) method. Our analysis reveals that all VIF values calculated for the independent variables are comfortably below the threshold of 10. Additionally, the mean VIF value across all variables stands at a low 1.13. These findings collectively indicate that multicollinearity does not pose a significant challenge within our model. In other words, the relationships among our independent variables do not exhibit troublesome levels of correlation, affirming the robustness of our analytical framework.

Hausman Specification Test

In evaluating the static growth model (Equation 2), various panel data estimation methods can be applied, including Pooled OLS, Fixed Effects (FE), and Random Effects (RE) models. Pooled OLS assumes constant country-level and time-specific effects, providing less reliable estimates compared to RE or FE models. The RE model, on the other hand, presupposes that entity-specific variations are randomly distributed and uncorrelated with the explanatory variables, making it suitable for incorporating time-invariant factors into the model. In contrast, the FE model can control for entity-specific variations, effectively absorbing time-related shocks through its intercept, while assuming that one entity's residual and constant term are uncorrelated with another entity's. If the residuals exhibit correlation, the RE model is preferred over FE, which forms the core principle of the Hausman test (Torres-Reyna, 2007). The null hypothesis (H0) of the Hausman test posits that both FE and RE estimates are consistent, but only the RE estimates are efficient, while the alternative hypothesis (H1) suggests that FE estimates are consistent, but RE estimates are inconsistent. The test results reject H0, indicating that both FE and RE estimates are not consistent, with a p-value below the 5% significance level. The chi-square statistic of 16.11 in Table 3 demonstrates this rejection. Consequently, given the significant p-value (Prob>chi2 = 0.0242) below the 5% threshold, we opt to utilize the fixed effect model in our analysis, as it proves more suitable for our research objectives.

Table 3. Hausman Specification Test

chi2(8)	=	(b-B)'[(V_b-V_B)^(1)](b-B)
	=	16.11
Prob>chi2	=	0.0242

Ho: difference in coefficients not systematic

Presentation and Discussion of Empirical Results

OLS, RE, FE and Year-FE Results for Impact of AFT and FI on SDG 8

Column 1 to 3 of Table 4 illustrates the empirical findings using Pooled OLS, RE and FE model respectively. Although FE model is more preferable for our analysis, we insert all results obtained from Pooled OLS and RE for comparison purpose. Results from Modified Wald test and Pesaran test statistics suggest that in the FE result (Column 3), there exist both heteroskedasticity and cross-sectional dependence. These two things may lead bias in the test findings for the macro panel consisting relatively longer time series data over 20 to 30 years (Baltagi 2008). Our panel is a micro panel with 13 years span so these do not create a serious problem in our estimated result. Moreover, we cluster country and use year dummy to control both heteroskedasticity and cross-sectional dependence from our regression model. Column 4 represents the fixed effect model estimation results with controlling year specific effects and clustering country option.

Table 4. Static Model Estimation Results

Dependent Variable: lnY (SDG 8: Sustained Economic Growth)

	(1)	(2)	(3)	(4)
VARIABLES	OLS	RE	FE	Year-FE
lnFI	2.056**	1.561*	0.968	0.737
	(0.854)	(0.813)	(0.833)	(0.755)
lnAFT	0.157*	0.152**	0.140*	0.127**
	(0.0824)	(0.0763)	(0.0761)	(0.0615)
lnFDI	0.0977***	0.116***	0.140***	0.136*
	(0.0250)	(0.0287)	(0.0335)	(0.0746)
lnINV	0.111***	0.100***	0.0842**	0.0964**
	(0.0202)	(0.0266)	(0.0356)	(0.0477)
lnMS	0.140***	0.130***	0.122***	0.108***
	(0.0130)	(0.0127)	(0.0131)	(0.0374)
lnINF	-0.0621***	-0.0433**	-0.0403*	-0.0792***
	(0.0194)	(0.0202)	(0.0216)	(0.0267)
lnDC	-0.00290	-0.00793	-0.0392***	-0.0257
	(0.00404)	(0.00629)	(0.0138)	(0.0196)
Constant	-0.225	0.224	2.016**	2.982**
	(0.530)	(0.695)	(0.972)	(1.114)
Observations	641	641	641	641
R-squared				
Within		0.2300	0.2384	0.3753
Between		0.4032	0.1961	0.2912
Overall	0.283	0.2779	0.2024	0.3471
Number of country	50	50	50	50
Year-FE			No	Yes
Robust SE			No	Yes

Notes: ***, ** and * are statistical significance at the 1%, 5% and 10% levels respectively**.** Figures in parentheses are t statistics.

Our argument of results is mainly based on the findings of the FE model reported in column 4. The result displays the expected relationship among sustained economic growth and important determinants of growth. The within R-squared displays that the FE model without controlling time variation (column 3) and with controlling the year effect (column 4) explain 24% and 38%

of the variation in the economic growth (lnY) respectively. In column 4 of Table 4, within the context of a fixed effect regression, the coefficient associated with financial inclusion (lnFI) - representing the annual growth rate of total bank branches and ATMs - exhibits a positive influence on economic growth in developing countries. However, it is noteworthy that this result does not attain statistical significance. Economically speaking, FI plays a pivotal role in fostering inclusive economic growth by extending access to banking services to previously unbanked populations. The establishment of additional banking outlets and ATM services facilitates convenient access to financial services, potentially leading to higher income levels, particularly among low-income groups, as exemplified in the cases of Mexico (Bruhn and Love, 2014) and the reduction of rural poverty in India (Burgess and Pande, 2005). It's important to note that the effectiveness of FI initiatives is contingent on efficient central banking policies, good governance, and institutional capabilities, as highlighted by Shahay et al. (2015). Their findings suggest that the impact of FI on economic growth, measured as the total number of commercial banks per 0.1 million people, is conditional on regulatory quality and the per capita income level of the respective country. Additionally, our analysis reveals a positive and statistically significant relationship between AFT and the growth rate of GDP (lnY) in developing countries. This finding validates the notion that development assistance targeting trade policy and regulation can assist developing nations in achieving SDG 8 by bolstering real per capita GDP growth. Specifically, a 1% increase in AFT directed towards the trade policy and regulation sector results in an average yearly growth rate increase of 0.13%, holding other factors constant. This empirical result aligns with established macroeconomic literature and theories, which posit that AFT contributes to the accumulation of physical capital and the development of enhanced productive capabilities within recipient countries, ultimately driving economic growth (Minoiu and Reddy, 2010). Moreover, it is worth noting that AFT initiatives have been found to have substantial ancillary benefits, including cost and time reductions in trade, increased export levels (Busse et al., 2012; Calì and te Velde, 2011; Helble et al., 2009), greater employment opportunities for both men and women (Gnangnon, 2018), and reduction of poverty (Durowah, 2017) in the recipient countries. These ancillary effects further contribute to sustained economic growth. Lastly, our analysis also reveals a positive and statistically significant coefficient for Foreign Direct Investment (FDI) at the 10% significance level. This implies that FDI can act as a stimulant for the sustained growth of an economy, supporting the notion that foreign investment can play a crucial role in economic development and expansion. These findings collectively contribute valuable insights to the existing literature in the field, underscoring the complex interplay between FI, AFT, and foreign direct investment in fostering sustainable economic growth in developing countries. We find positively significant effect of FDI on economic growth (lnY) which implies that FDI also can boost sustainable economic growth for the developing countries. If all else being equal, an average 10% raise in FDI inflow would direct to a 1.4% increase, on average, in the per capita real GDP growth rate. For developing countries which encounter shortage of physical capital, FDI plays as a vital source of fund that promotes economic growth (Li and Lu, 2005). Similar to FDI, an increase of domestic investment (lnINV) have positive effect of growth. The coefficient of domestic investment signifies that a 1% raise in this type of investment would increase 0.10% economic growth and this coefficient is also significant at 5% level. Barro (2013) has similar finding in their study that domestic investment encourages economic growth. Money supply is found strong significant and positive effect on growth which supports the theoretical argument that money supply promotes economic growth (Ershad and Mahfuzul, 2017; Chude and Chude, 2016). The elasticity of the money supply is 0.11, which refers that a 1% raise in money supply leads to a 0.11% raise in economic growth. Coinciding with the finding of Barro (2013), we also find negative effect of inflation rate on economic growth. The coefficient obtains high level of

significance and implies a 1% yearly rise in the average inflation rate would cut down the growth rate by 0.08% per year. The estimated coefficient of domestic credit (lnDC) is negative in all cases but significant only in column 3. If there is no any other effect, a 1% increase in domestic credit cause inclusive growth fall averagely by 0.04 percent (column 3). This finding indicates the lack of both confidences of both the government and non-government banking sectors and difficulties arising in obtaining loans and advance. But controlling year fixed effect and heteroskedasticity though the effect of lnDC is negative but it does not provide statistically significant evidence for relevant economic explanation (Column 4).

Two-step GMM Estimation with FE for Dynamic Panel Models

Table 5. Results of Dynamic Panel Data Model Estimation

Dependent Variable: lnY (SDG 8: Sustained Economic Growth)			
	(1)	(2)	(3)
VARIABLES	Fixed Effects	DIFF-GMM	SYS-GMM
lnFI	0.789	0.543	0.817
	(0.892)	(0.751)	(0.797)
lnAFT	0.132*	0.127*	0.133**
	(0.0676)	(0.0710)	(0.0648)
lnFDI	0.0945**	0.0821**	0.0537*
	(0.0391)	(0.0360)	(0.0307)
lnINV	0.0680	0.0490	0.0574**
	(0.0436)	(0.0418)	(0.0262)
lnMS	0.0978***	0.0816***	0.0855***
	(0.0272)	(0.0230)	(0.0161)
lnINF	-0.0838***	-0.0688***	-0.0612***
	(0.0286)	(0.0245)	(0.0226)
lnDC	0.132*	-0.0246	-0.00135
	(0.0676)	(0.0210)	(0.00384)
lnY (t-1)	0.254**	0.398***	0.406***
	(0.112)	(0.140)	(0.132)
Constant	2.477**		0.622
	(1.041)		(0.506)
Observations	595	544	595
R-squared	0.425		
Number of country	50	50	50
Year Dummies	Yes	Yes	Yes
F Statistic	17.44	23.43	34.34
Groups/Instruments		50/20	50/22
AR(1)		0.001	0.001
AR(2)		0.407	0.392
Sargan Test		0.348	0.459
Hansen J-Statistics		0.416	0.706

Notes: ***, ** and * are 1%, 5% and 10% statistical levels respectively; p-values are reported for AR (2) and Hansen statistics. Estimation techniques of GMM estimator is using of xtabond2 of STATA (Roodman 2009)

In our study, we employ two-step GMM estimation techniques to ensure the robustness of our results from the static model and address potential endogeneity issues. As per economic theory, FI variables are not entirely exogenous with respect to economic growth. In this context, a system GMM approach is preferred over a difference GMM approach, as it tends to yield more consistent results. Table 5 presents the outcomes of both two-step difference GMM and two-step system GMM estimations in columns 2 and 3, respectively. Column 1 of the table displays the Fixed Effects (FE) estimation results from the dynamic model. For the purposes of our subsequent discussion, we primarily focus on the findings derived from the two-step system GMM estimation results in Table 5 (column 3). The coefficients associated with all control variables, including lnAFT (log of AFT), lnFDI (log of foreign direct investment), lnINV

(log of domestic investment), lnMS (log of money supply), lnINF (log of inflation rate), and lnDC (log of domestic credit), exhibit the expected signs and are consistent with economic theory. However, our subsequent discussion primarily centers on the results obtained from the two-step system GMM estimation in Table 5 (column 3). Notably, the coefficient of the lagged GDP growth rate (lnY) exhibits the anticipated positive sign and attains statistical significance at the 1% level. This observation indicates a strong relationship between current growth rates and their past counterparts. Furthermore, all coefficients of the lagged dependent variable are below 1, suggesting the presence of robust conditional convergence, in line with existing literature and indicative of a stable dynamic process (Fayissa and Nsiah, 2008; Roodman, 2009). This lagged value of lnY (representing SDG 8: sustained economic growth), in conjunction with the instrumental variables, effectively mitigates endogeneity concerns within the model. Consistent with the static FE estimation results, the coefficient associated with FI is positive but statistically insignificant in the dynamic model. The alignment of our findings from the static models (Table 4) with those from the dynamic models (Table 5) underscores the consistency and robustness of our results across different models and estimation methods.

Conclusion and Policy Recommendations

FI has garnered significant attention as a crucial concept within the academic and policymaking communities due to its acknowledged role in advancing 10 of the 17 Sustainable Development Goals (SDGs), establishing it as a pivotal driver of inclusive growth. Nevertheless, gaining a comprehensive understanding of the specific mechanisms through which FI initiatives contribute positively to economic growth demands further empirical investigation. This study represents a pioneering effort to bridge this empirical evaluation gap by examining the impact of FI on inclusive growth (SDG 8) across a dataset encompassing 50 developing countries during the period spanning 2010 to 2022. Our approach involved using the annual growth rate of the total number of commercial bank branches per 0.1 million people as a proxy for FI, while SDG indicator 8.1.1, signifying per capita real GDP yearly growth, served as the dependent variable. While our findings do not yield statistically significant evidence of FI's direct impact on economic growth, it is essential to underscore that our observed positive effect aligns with extensive theoretical literature that supports the idea that FI fosters economic growth. The lack of statistical significance can be attributed, in part, to data availability constraints that led to the choice of bank branches and ATMs as proxies, which may not fully capture the multidimensional nature of financial inclusion, and the omission of other contextual factors that could influence the relationship. To enhance the effectiveness of FI, it is imperative to cultivate a conducive policy environment for implementing financial education programs, with a particular focus on rural areas and women. Given that nearly half of the unbanked individuals are women, around 30% of adults lack access to a bank account, and one-fifth of account holders have not engaged in any financial transactions over the past year (The Global Findex Database 2017), addressing these disparities becomes paramount. Furthermore, we employed difference and System GMM (two-step) estimation techniques to address concerns regarding endogeneity and unobserved heterogeneity, ultimately revealing a positive impact of FI on achieving sustained and inclusive economic growth. Although we did not achieve statistical significance in our analysis, the economic significance of FI as a tool for promoting inclusive growth remains undeniable, especially when effective financial policies are implemented. The implications of this research underscore the critical role of FI initiatives in developing countries as key policy instruments for fostering sustained GDP growth and attaining the SDGs. Policymakers and regulators in these economies should prioritize strategies and policies aimed at bringing unbanked populations into the financial mainstream, thus facilitating financial transactions, savings, credit access, insurance coverage, and investments. Enhanced access to

banking services and financial credits can bolster household incomes, particularly in rural areas, while simultaneously mitigating income inequality. Additionally, policymakers and regulators should actively champion financial literacy programs targeting young people, students, and predominantly rural populations. These initiatives should focus on enhancing individuals' knowledge of banking products, services, and e-banking technologies. Such proactive measures will empower individuals to fully leverage the tangible benefits of FI initiatives, ultimately contributing to the realization of the SDGs. As with any research, this study has certain limitations, which pave the way for future investigations. Our study exclusively considered the growth of the total number of bank branches and ATMs as indicators of FI. Nevertheless, the World Bank has developed additional measures of FI, although data availability is limited (spanning only three years). The prospect of data becoming available over longer timeframes offers future researchers an opportunity to delve deeper into the relationship between FI and sustained economic growth, encompassing both short-term and long-term dynamics.

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Appendix

Appendix A: List of Developing Economies

Albania	China, PRC	India	Mexico	Philippines
Algeria	Colombia	Indonesia	Moldova	Rwanda
Azerbaijan	Costa Rica	Islamic Rep. of Iran	Mongolia	Senegal
Bangladesh	Dominican Republic	Jamaica	Mozambique	Serbia
Benin	Ecuador	Jordan	Namibia	South Africa
Bolivia	El Salvador	Kenya	Nepal	Thailand
Botswana	Georgia	Kyrgyzstan	Nicaragua	Tunisia
Burundi	Ghana	Malawi	Niger	Turkey
Cambodia	Guatemala	Malaysia	Pakistan	Uganda
Cameroon	Honduras	Mauritius	Peru	Ukraine

Source: Emerging Market and Developing Economies, World Economic Outlook (WEO) Database (January, 2019), IMF

Cite this article:

Banna Banik (2023). Unlocking the Path to Inclusive Growth: Examining the Impact of Financial Inclusion in Developing Economies. *International Journal of Science and Business, 26*(1), 233-247. doi: https://doi.org/10.58970/IJSB.2179

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