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Financial Inclusion-Inclusive Growth Link: Evidence from the Panel of Asian Countries

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Abstract

This study examines the impact of financial inclusion on inclusive growth in selected Asian countries by using panel data from 2009–2024. The inequality-adjusted human development index (IHDI) is used as a proxy for inclusive growth, which captures both average human development and its distribution across the population. The Financial Inclusion Index is constructed using the availability, usage, and penetration dimensions. Empirical analysis employs panel unit root tests (Levin, Lin & Chu), followed by fixed-effects and random-effects estimations. The Hausman test determines the appropriate model specification. Estimated results show that financial inclusion and inclusive growth are positively and statistically significantly correlated in terms of control variables such as GDP per capita, trade openness, government spending, mobile subscriptions, and school enrollment are found to positively influence inclusive growth in both aggregated and disaggregated model, while domestic credit to the private sector shows a negative relationship in model 1 but a positive impact in the disaggregated model, indicating possible inefficiency or unequal credit distribution. Overall, the findings highlight that financial inclusion plays a significant role in fostering inclusive growth in Asian economies, primarily through improved access and effective utilization of financial services.

Keywords: Financial Inclusion, Availability, Usage, Penetration, Inequality Adjusted Human Development Index, Inclusive Growth, Asian economies

1. Introduction

Financial inclusion, which allows individuals and businesses to utilize affordable formal financial services, is essential for sustainable development and inclusive growth, especially in Asian countries, where around one billion people remain unbanked (Basnayake et al., 2024). According to the United Nations Secretary-General's Special Advocate (2013), more than 200 million small and medium-sized enterprises in developing nations are financially excluded from the economic system due to the negative impact of financial exclusion on their capacity they have to expand and compete successfully. The World Bank (2014) has identified two categories of financial exclusion: involuntary and voluntary. When someone decides not to utilize financial services because they believe they don't need them or don't follow cultural norms around financial services, this is known as voluntary exclusion. Conversely, involuntary exclusion is attributed to many factors, including low household income, distance from a financial service provider, complex documentation requirements, and market failures (Park & Mercado, 2015; Roussel et al., 2024; Umair et al., 2025). Financial Technology (Fintech) is making strides in overcoming barriers to access for financial services, yet significant challenges remain for the poor and marginalized. Policymakers and development partners are focusing on developing financial inclusion policies aimed at integrating the unbanked population into the formal financial system. This approach seeks to mitigate the adverse effects of exclusion, such as reliance on exploitative lenders, limited ability to enhance earnings, lack of protection during crises, and obstacles to future financial stability. The World Bank (2018) explains financial inclusion as giving people and companies access to certain financial tools and services, like money transfers, payment solutions, savings, credit, and insurance, which would help meet their needs, and do this responsibly and sustainably.

1.1.Financial Inclusion and Inclusive Growth

Inclusive growth encompasses not just rapid economic expansion but also equitable opportunities for all sectors and marginalized groups (Marc et al., 2022; Hussain et al., 2024; Arshi et al., 2025). The Asia-Pacific region is notably diverse, featuring both high-income economies like Singapore and Japan and significant digital divides (Basnayake et al., 2024). Current advancements in Digital Financial Inclusion (DFI), notably through mobile banking and internet technologies, present new opportunities for providing services to underserved regions lacking traditional banking facilities. The Theory of Finance and Growth emphasizes that financial intermediaries enhance resource allocation by lowering transaction and information costs, while System Theory suggests that increased financial inclusion can positively impact various economic, financial, and social systems, leading to improved national performance and stability (Audi & Ali, 2022; Hussain et al., 2024; Naeem et al., 2025; Iqbal et al., 2025; Anus et al., 2025).

The concept of inclusive growth is closely linked to Financial Inclusion through both theory and evidence from many countries (Sharma & Kukreja, 2013). Financial inclusion enables entrepreneurs to receive credit and access services to start and grow their leveraged enterprises (Marc et al., 2023; Osuma, 2024; Longston et al., 2025; Ditta et al., 2025). In fact, financial inclusion mobilizes additional resources for productive use by creating a wider deposit base for financial institutions (Chandran, 2011; Sajid & Ali, 2018; Farras et al., 2025; Rafique et al., 2025). Financial inclusion creates opportunities for a broader range of individuals, including those who have never been banked or have been unable to utilize bank services, to participate in the formal financial system; this is vital for sustainable economic growth and for ensuring all sections of society benefit from such growth. The relationship between financial inclusion and inclusive growth should be examined to determine how best to promote social justice, economic stability, and poverty reduction in order to improve the overall quality of life for all individuals and in all segments of society (Sarma and Pais, 2011; Ali & Rehman, 2015; World Bank, 2014; Marc et al., 2025). Improving the understanding of the connection between financial inclusion and inclusive growth will enable policymakers to formulate more effective strategies to achieve equitable and sustainable economic development by aligning changes in the financial sector with these broader goals.

The study adds to the body of knowledge by creating a financial inclusion index for measuring the relationship between financial inclusion and inclusive growth in selected Asian economies over the period of 2009-2024. The employment of the Inequality-Adjusted Human Development Index (IHDI) in measuring growth allows us to take account of the effects that growth has on distribution, and which are largely ignored in the finance-growth literature and to do this by considering the three components of financial inclusion (availability, usage, and penetration). The disaggregation of financial inclusion into these three components provides a direct response to calls within the finance-growth literature to employ greater mechanism-based analysis and provides the types of policy-relevant evidence that will assist developing and emerging economies in aligning financial sector development with equity-oriented objectives for their economies.

The rest of the paper is structured as follows. The literature review and the theoretical framework are presented in Section 3. Section 4 describes the data and methodology. The results and discussion are presented in Section 5, and a summary of our findings and their policy implications is provided at the end of Section 6.

2. Theoretical Framework

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This study integrates Financial Intermediation Theory and Institutional theory to explain the association between financial inclusion and inclusive growth, proxied by the Inequality-Adjusted Human Development Index (IHDI), across selected Asian countries. The Financial Intermediation Theory states that financial institutions allow for a reduction in transaction costs and lessen information asymmetries, which leads to greater efficiency in capital allocation (Diamond, 1984; Levine, 1997). Therefore, when more households and firms have access to financial services through financial inclusion, they can invest their money, consume smoothly, and manage risks, leading to greater economic development overall. While financial inclusion does help alleviate poverty by increasing access to credit and savings (Beck et al., 2007), it may create initial inequality if there are differences in how different income groups gain access to those financial services (Greenwood & Jovanovic, 1990). According to Institutional Theory, financial inclusion's effectiveness is also contingent upon quality of governance and strength of the institutions in place (North, 1990). Strong institutions may aid in enhancing overall financial inclusion outcomes because they provide regulatory guidance to protect consumers and to mitigate elite capture, while weak institutions tend to create barriers for different groups to access services and may, therefore, perpetuate inequality (Rajan & Zingales, 2003; Demirguc-Kunt, A. et al., (2018). The empirical evidence supports that institutional quality determines how financial development affects economic outcomes and income inequality. Overall, the relationship between the two theories indicates that when supported by solid institutional frameworks for equitable access to financial services and the efficient operation of the financial system, financial inclusion encourages Inclusive growth.

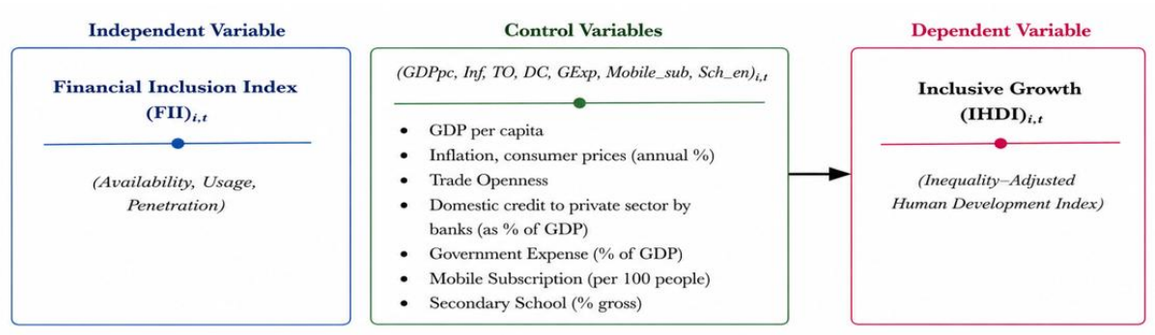

Figure 1: Research Framework

3. Literature Review

There have been many recent publications that have convinced many economists and policymakers that financial inclusion has a significant effect on inclusive growth. However, there is no single globally accepted definition of financial inclusion. The first two early contributions to defining financial inclusion were those made by Leyshon and Thrift (1995), where they define financial inclusion as being the opposite of financial exclusion. Financial exclusion processes limit poor and disadvantaged social groups from obtaining access to the financial system because they do not have sufficient accessibility, collateral, credit history, and social connections. From these challenges, delivering better policy to the poor sector through reducing the barriers to finance created by both price and non-price sources. (Demirgüç-Kunt et al., 2008; Chandran and Manju, 2010) has been identified as an important step towards achieving financial inclusion, which is itself a multi-faceted concept. There are three dimensions of financial inclusion (Amidizic et al., 2014); Availability (the ability of a recipient to access a service), Usage (the number of ATMs, bank branches, households with deposits, and households with loans) and Quality (how well a financial product meets the customers' needs).

Since 1990, financial inclusion has been recognized by many governments and their central banks as a subject of importance. For example, in India, financial inclusion refers to the process of making methods for accessing financial services and borrowing from banks at affordable prices available to the poor (Rangrajan Committee, 2013). Reyes (2010) describes how being able to use a variety of financial service, such as loans, saving accounts, insurances, pensions, payments as well as financial education and consumer protections, is important for allowing for many more people to use the financial system - especially in Peru. Sarpong and Amponsah (2022) explain that only 32.8% of adults in Sub-Saharan Africa have an account at a bank and people living in the most extreme levels of poverty have the highest proportion of people living under extreme poverty, providing evidence of the need for financial inclusion as a priority area for government policy.

Dixit and Ghosh (2013) examined several states in India and found that those with high levels of financial inclusion had higher GDP per capita and literacy rates. There was no significant correlation between states having higher levels of financial inclusion and having higher levels of unemployment. Similarly, Abor et al. (2018) found that households were less likely to fall below the poverty line when they had access to mobile phones and financial institutions in Ghana, with this evidence being at the 1% significance level.

Although there is a lot of evidence available, there remain contradictions and shortages. According to Rahman (2024), energy poverty is a moderating factor resulting in weak effect of financial inclusion on economic growth. Furthermore, it is common for researchers to apply inconsistent definitions when differentiating between the formal and informal financial institutions (Khalid et al., 2025' Eshun & Kocenda, 2025; Khan et al., 2025). Mishra et al. (2024) explains that many of the available publications are lacking in terms of theory, that only a limited number of countries have been studied, and that authors use predominately quantitative, regression-based methods for their studies.

Some of the latest research on the application of digital finance in support of inclusive development includes a review by Sanjaya and Nursechafia (2016) on digital access and its influence on financial inclusion in Indonesia. They found that although digital accessibility is highly associated with an increase in financial inclusion, there are still structural and psychological barriers preventing access to financial inclusion for many Indonesians. They further stated that financial inclusion has a significant relationship with human development, and as more people have access to financial services, this will lead to continued inclusive growth.

Overall, the literature proposes that financial inclusion generally promotes development outcomes, but its effectiveness depends on usage intensity, institutional quality, and digital infrastructure. This study contributes to the literature by addressing three key gaps. First, it employs a cross-country panel framework for 20 Asian economies, reducing aggregation bias found in single-country studies. Second, it uses the Inequality-Adjusted Human Development Index (IHDI) as a proxy for inclusive growth, capturing both development and distributional dimensions. Third, it disaggregates financial inclusion into availability, usage, and penetration, allowing for a more precise understanding of transmission channels. These complements exist theoretical frameworks by empirically testing how financial intermediation mechanisms operate under different institutional conditions.

4. Model, Data and Research Methodology

4.1.Econometric Model

The study formulated two econometric models to investigate the relationship between financial inclusion and Inclusive Growth. Financial inclusion is used in both aggregated and disaggregated forms. Each model examines a different channel through which financial inclusion may affect an individual's socioeconomic wellbeing. The reasoning behind estimating financial inclusion models with both overall and disaggregated financial dimensions is to determine whether the overall improvement in financial inclusion, or a particular dimension of financial access and usage, is more relevant. Both models are estimated using a balanced panel of data for selected Asian countries, covering the period of 2009–2024. The study used the inequality-adjusted human development index as the proxy of inclusive growth, which is used as the dependent variable The financial inclusion indicators which include Availability dimension, Penetration Dimension and Usage Dimension with other explanatory variables are used as independent variables. Model 1 describes the relationship between financial inclusion and inclusive growth, in which Inclusive growth $IHDI_{i,t}$ is the dependent variable, and the Financial Inclusion Index (F II) is the independent variable. The model also includes important control variables, including inflation (Inf), domestic credit (DC), GDP Per Capita (GDP), expenditures (Exp), mobile subscription (mob_sub), school enrolment and ($school\_enro_{i,t}$), allowing the model to capture influences of a wider macroeconomic and institutional process related to the outcome of inclusive growth.

$$IHDI_{i,t} = \beta_0 + \beta_1 fII_{i,t} + \beta_2 GDP_{i,t} + \beta_3 Inf_{i,t} + \beta_4 TO_{i,t} + \beta_5 DC_{i,t} + \beta_6 Exp_{i,t} + \beta_7 mob\_sub_{i,t} + \beta_8 school\_enro_{i,t} + \mu_{it} + \mu_{it}$$

Model 2 estimates the disaggregated impact of the financial inclusion sub-domains; $IHDI_{i,t}$ is the dependent variable, and the Availability Dimension, Usage Dimension, and Penetration Dimension are used as independent variables. The model includes the same control variables as in Model 1

$$IHDI_{i,t=}\beta_0 + \beta_1 AD_{i,t} + \beta_2 UD_{i,t} + \beta_3 PD_{i,t} + \beta_4 \text{GDP} + \beta_5 Inf_{i,t} + \beta_6 TO_{i,t} + \beta_7 DC_{i,t} + \beta_8 exp_{i,t} + \beta_9 mob\_sub_{i,t} + \beta_{10} school\_enro_{i,t} + \mu_{it}$$

4.2.Data, Sample and Variables

the study uses a balanced panel dataset covering 20 selected Asian countries between 2009 and 2024. Azerbaijan, Afghanistan, Armenia, Bhutan, Bangladesh, China, Georgia, India, Indonesia, Japan, Jordan, Kyrgyz Republic, Myanmar, Malaysia, Pakistan, Philippines, Tajikistan, Thailand, Turkey, and Uzbekistan are among the nations.

Asian countries were selected based on their financial inclusion dynamics and IHDI development dynamic. Classification of selected Asian economies can be discussed as three tiers. First tier economies are those which are included in high financial inclusion and high IHDI category. They include Japan, China, Malaysia, Thailand and Turkey. Economies are at above national average value in terms of account ownership level (Japan offers near universal type of financial services in terms of account ownership, China is 89%, Thailand is 92%, both are among the highest in Asia; Malaysia and Turkey are in the 80s); the level of human development is "very high" or "high," which is not

significantly impacted by inequality. The level of inequality loss in Japan is very low due to universal health and education system. In fact, Thailand is the leader in ASEAN countries in terms of PHDI. Even though China has a large population, inclusion ratio is quite high. Countries are India, Indonesia, Philippines, Bangladesh, Bhutan, Jordan, Georgia, Armenia, Azerbaijan, Uzbekistan, Kyrgyz Republic.

The second tier comprises the countries which exhibit moderate financial inclusion and moderately high Inequality-Adjusted Human Development. The countries in this group include India, Indonesia, the Philippines, Bangladesh, Bhutan, Jordan, Georgia, Armenia, Azerbaijan, Uzbekistan, and Kyrgyz Republic. This tier has the widest variation in terms of the countries included. While India has narrowed the gap in financial access (the account ownership in the country has reached almost 80% due to Jan Dhan/digital ID), the country remains burdened by income and education inequalities as far as IHDI is concerned. If we analyze the data for IHDI and account ownership for Indonesia, Philippines, and Bangladesh, we will see that their mid-range account ownership of approximately 50 – 75% correspond to their "medium human development" statuses. Another notable fact is that the evolution of financial inclusion in the Europe and Central Asia region is very dynamic, as is visible through the increase in the ownership of bank accounts from 44% to 78% in the period of 2011-2021. This rapid growth was beneficial for the Caucasus and Central Asian states like Georgia, Armenia, Azerbaijan, Uzbekistan, and Kyrgyz Republic. Despite accounting for 15% in Armenia, income inequality continues to be high in the region, with the IHDI figures for these countries being medium. Jordan and Bhutan also belong to this group, as they demonstrated high level of access to the formal sector and low levels of inequality, which negatively affect the results of their development in general.

The third category of nations consists of those with comparatively low financial inclusion and low inequality-adjusted human development. Included in this group are Pakistan, Myanmar, Tajikistan, and Afghanistan. Pakistan, along with the other three countries in this group, has the lowest scores in this regard and is the weakest in regard to the two indicators. The gender and urban-rural gap is significant, as Pakistan has one of the lowest levels of account ownership (30 %) and also one of the lowest IHDI scores in South Asia (IHDI 0.364). The ongoing war situation in Myanmar has hampered its human and financial development. Tajikistan is performing worse than the other Central Asian states according to both indicators because of its weak institutions and large dependence on remittances. Finally, the record low score in both indicators belongs to Afghanistan, which has no access to the financial services at all (especially since there are restrictions on women opening accounts and working) and whose IHDI figure is the lowest in South Asia (about 0.32 vs. HDI about 0.50).

Table 1: Definition and data sources of variables

Variable Notation	Variable Name	Variable Description	Data Source
IHDI	Inequality-adjusted human development index	A composite statistic used to assess a nation's performance in human development	World Bank
FII	Financial Inclusion Index	It is an index and generated by using the methodology of Omar and Inaba (2020)	Index generated through AD, UD, and PD
GDP	GDP per Capita	GDP per capita is the real gross domestic product divided by population U.S. dollars.	WDI
Inf	Inflation, consumer prices (annual %)	Annual percentage change in Consumer Price Index (CPI)	WDI
TO	Trade Openness	The change is the proportion of the value of imports and exports to the actual GDP for that particular year.	WDI
DC	Domestic credit to private sector by banks (as % of GDP)	Domestic credit to the private sector is a financial resource provided by financial organizations to the private sector.	WDI
Exp	Government Expense (% of GDP)	The percentage of GDP that the government spends on public services, social programs, infrastructure, and debt repayment.	WDI

Mob-sub	Mobile Subscription (per 100 people)	A public mobile phone service that connects to PSTN via cellular technology.	WDI
School_enr	Secondary School (% gross)	The net enrollment rate is the proportion of children of official school age who are enrolled in school to the population of the same official school age.	WDI

4.3.Construction of the Financial Inclusion Index

To empirically examine the impact of financial inclusion on Inclusive growth, this study constructs a financial inclusion index (FII) which adapts previously established methodologies devised by Sarma (2008), Demirgüç-Kunt et al. (2018), Camara & Tuesta (2014), and Omar & Inaba (2020).

The index is based on three main dimensions that represent how people access formal financial services; these include: (1) availability (availability of financial services); (2) usage (actual use of financial services), and (3) penetration (how extensive the use is across a population).

The availability component examines the availability of financial services at banks and ATMs per 100,000 people, respectively. These data points illustrate how accessible formal financial services are for an individual. The usage component consists of the percentage of adults using borrowing from a formal financial institution in the past 12 months or receiving digital payments in the past 12 months; these data points give an idea of the intensity of financial services utilization across the population, as well as the reasons behind this utilization. Finally, the penetration component comprises the number of deposit accounts held with banks per 1,000 adult persons and the number of depositors per 1,000 young persons, respectively. Penetration shows the extent to which people maintain long-term relationships with their bank or banks. The composite index provides a comprehensive and comparable measure of financial inclusion across countries and overtime.

Indicators are selected based on three criteria: (i) theoretical relevance to the conceptual definition of each dimension, (ii) data availability across countries and over time, and (iii) comparability across diverse financial systems.

Table 1: Indicators and Weighting Structure of the Financial Inclusion Index (FII)

Dimension	Indicator	Data Source	Indicator Weight	Dimension Weight
Penetration	Number of deposit accounts per 1,000 adults	Financial Access Survey by the IMF	0.70	1.00
	Number of depositors per 1,000 adults	Financial Access Survey by the IMF	0.30	
Availability	Commercial bank branches	Financial Access Survey by the IMF	0.70	0.60
	Atm per 100,000 adults	Financial Access Survey by the IMF	0.30	
Usage	Number of borrowers per 1,000 adults.	Country Surveys / Global Findex	0.50	0.50
	Number of loan accounts per 1,000 adults.	Country Surveys / Global Findex	0.50	

Source: Author's construction based on Sarma (2012) and adapted from Omar and Inaba (2020)

4.4.Normalization

To ensure comparability across indicators estimated in divergent units, each indicator is normalized using a min–max transformation (Sarma, 2012). The normalized score for indicator $i$is:

$$d_{i,k,t} = w_i \left(\frac{A_{i,k,t} - m_i}{M_i - m_i} \right)$$

where $A_{i,k,t}$is the observed value of indicator $i$for country $k$in year t, $m_i$is the lower bound (set to 0), $M_i$is the upper bound (set using a high percentile benchmark to reduce outlier influence), and $w_i$is the indicator weight (Sarma, 2012; Omar & Inaba, 2020).

4.5.Distance-based aggregation

Let the achievement vector be $X = (d_1, d_2, d_3)$, with worst point $O = (0,0,0)$and ideal point $W = (w_1, w_2, w_3)$. Two normalized distances are computed (Sarma, 2012):

Distance from the worst point:

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}}$$

Inverse distance from the ideal point:

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}}$$

The composite Financial Inclusion Index is then defined as:

$$FII = \frac{1}{2}(X_1 + X_2)$$

The index is bounded between 0 and 1, where larger values represent higher financial inclusion, and the distance-based method reduces the possibility that strong performance in one dimension fully offsets weakness in another (Sarma, 2012; Omar & Inaba, 2020).

4.6.Research Methodology

The study used panel data estimation techniques for analysis. The first step in Panel data estimation is to test the statistical properties of the variable series. Since financial data unit roots and violates the assumptions of zero mean and constant variance and covariance of the ordinary least squares method. Therefore, testing data stationarity is a very important step before doing any empirical analysis. The study has used the Levin, Lin & Chu panel unit root tests. The study has examined the unit root problem for individual intercept and trend. In addition, the research utilized the panel regression analysis, which provides reliable tools for analyzing complicated relationships through data richness from multiple perspectives and overcoming limitations posed by standard statistics. Because of the use of FE and RE models, panel regression analysis delivers important observations that facilitate the process of decision-making by scientists regarding data analysis techniques. The FE model is used to control all unobserved characteristics of influence that are constant across time for a certain unit, etc. The RE model is slightly different because, although it also involves the individual effects being considered, RE presupposes that they are not related to the independent variables but rather can be regarded as random variables that are taken from some distribution, which makes it more effective than the FE model when the assumption of independent effects is met. Finding out whether the unobserved individual- specific effects are correlated with the independent variables, researchers may prefer one of two models. The FE model has stronger performance in case of correlation, while the RE model may be utilized in case of absence of correlation. One of the most common specification tests in panel data analysis is the Hausman test, which is mainly used to allow researchers to differentiate between the FE and RE when conducting panel data analysis.

5. Results and Discussion

Results and discussion have been divided into three sub-sections; first subsection discusses the descriptive statistics of the data. The second subsection describes the results of panel unit root analysis; third subsection presents the results of panel regression analysis.

For the selected Asian countries from 2009 to 2024, this section presents descriptive statistics for each variable. We use many variables, namely Inclusive growth (IHDI) Financial Inclusion index (FII), Inflation (Inf), Trade, GDP per capita (GDP), Domestic credit to pvt. sector (DC), Govt. Expenditure (Exp), Mobile Subscription (Mob_Sub), Secondary School Enrolment (Sch_en), Availability Dimension (AD), Usage Dimension (UD), and Penetration Dimension.

Table 3 shows the correlation values between the IHDI, the FII, the three dimensions of fii (Availability, Usage, and Penetration), and the other macroeconomic indicators and socioeconomic variables that serve as control variables. The correlation matrix gives us an idea about the strength and the direction of the association between the variables and serves as a preliminary check for multicollinearity.

The correlation value between IHDI and FII indicates that there is a moderately high positive correlation between financial inclusion and inequality-adjusted human development. At this point, we can conclude that the more developed countries in terms of financial inclusion are also more developed in terms of inequality-adjusted human development. As for the positive relationship, such a result can be understood as an effect of financial inclusion on making financial resources accessible and financing educational and health expenses, helping in consumption smoothing.

The dependent variable has shown a positive correlation with each of the dimensions of financial inclusion. It should be noted that the strongest correlation is associated with Availability dimension of financial inclusion, whereas the weakest correlation is associated with Usage dimension of FIA. Overall, the results demonstrate that the higher the level of access to financial services, participation in financial networks, and use of financial services, the higher the level of human development according to IHDI.

There is a considerable positive correlation between IHDI and GDP, this means that higher GDP goes with greater inequality-adjusted human development. In the same way, the relationship between IHDI and DC indicating a positive correlation in which efficient financial sector development goes with higher human development.

Among the other independent variables, mobile subscription has the strongest positive correlation with IHDI, signifying greater access to mobile communication services and services that these mobile technologies make possible. Mobile technology connects users with information, allows for communication, and access to digital financial services, information about job opportunities, education, and other socioeconomic activities.

The Trade openness variable also has a positive correlation with IHDI, which indicates a moderate positive relationship. This makes it possible to assume that improved integration into international trade might lead to higher levels of inequality-adjusted human development. School enrollment also has a positive correlation with IHDI, which is weaker.

Table 2: Results of Financial Inclusion and Inclusive Growth

Variable	Mean	SD	Min	Max	Skewness	Kurtosis	Jarque-Bera	Prob	Obs
IHDI	0.56	0.15	0.27	0.85	-0.25	2.13	13.45	0.0012	320
FII	0.35	0.22	0.03	0.81	0.42	1.88	25.84	0.000	320
Inf	5.62	7.07	-6.81	72.31	5.15	42.45	22000	0.000	320
TO	73.83	40.14	14.57	202.0	0.99	3.32	53.05	0.000	320
GDP	5567.81	7592.62	374.38	37976.63	3.12	12.65	1759	0.000	320
DC	57.10	49.29	0.54	194.31	1.22	3.39	81.14	0.000	320
Exp	22.882	10.043	2.926	59.485	1.129	4.374	93.21	0.000	320
Mob_Sub	101.477	33.034	1.032	183.599	-0.115	3.120	0.893	0.6399	320
Sch_en	1.097	1.773	0.000	9.523	3.135	12.150	1641	0.000	320
AD	0.402	0.281	0.014	1	0.662	2.386	28.36	0.000	320
UD	0.312	0.281	0.001	1	1.015	3.125	55.1	0.000	320
PD	0.37	0.259	0.005	1	0.593	2.323	24.87	0.000	320

Table 3: Results of Pearson Correlation Matrix

Variable	IHDI	FII	Inf	TO	GDP	DC	Exp	Mob_Sub	Sch_en	AD	UD	PD
IHDI	1.000											
FII	0.626	1.000										
Inf	-0.173	0.078	1.000									
TO	0.366	0.020	-0.144	1.000								
GDP	0.621	0.551	-0.070	-0.104	1.000							
DC	0.616	0.535	-0.281	0.176	0.726	1.000						
Exp	0.088	0.035	0.004	-0.051	0.022	0.128	1.000					

Mob_Sub	0.671	0.576	-0.180	0.322	0.391	0.538	-0.118	1.000				
Sch_en	0.294	0.322	0.151	0.104	0.100	0.039	0.086	0.180	1.000			
AD	0.639	0.846	-0.022	0.070	0.654	0.635	0.060	0.611	0.323	1.000		
UD	0.492	0.737	-0.027	0.049	0.236	0.457	0.340	0.434	0.355	0.705	1.000	
PD	0.572	0.950	0.159	-0.022	0.544	0.447	-0.044	0.493	0.264	0.689	0.559	1.000

Inflation (Inf) has a negative correlation with IHDI, meaning that higher inflation leads to a lower level of inequality-adjusted human development. It may concern the negative impact of inflation on purchasing power, household welfare, and the ability of people to obtain necessary goods and services. The correlation is weak positive in the case of government expenditure (Exp), which has a correlation with IHDI, showing that there is a very limited bivariate correlation between the variables.

The correlation matrix reflects some positive relations between FII and development-related variables. FII correlates with mobile subscriptions, school enrollment, GDP, and domestic credit. These relations show that the influence of financial inclusion increases in countries that develop economically and socially, in terms of the development of the financial system, connectivity, and educational involvement.

The three components of financial inclusion correlate with other indicators of development. AD is correlated with GDP, domestic credit, mobile subscription, and school enrolment. UD is also positively correlated with Mobile subscription, school enrolment, GDP, and domestic credit. PD has the following correlations with GDP, domestic credit, Mobile subscription, school enrolment. All these relations illustrate that the variety of dimensions of financial inclusion demonstrates correlations with various indicators of development.

The aggregate FII exhibits strong correlations with a number of its component dimensions, characterized by FII with AD, FII with UD, and FII with PD. Overall, the three dimensions exhibit positive correlated. However, the correlations between the aggregate FII and its dimension should be understood about how the Financial Inclusion index was constructed rather than as manifestations of some unknown phenomenon. The aggregate model and the three separate dimension models should not be included in one regression model to avoid multicollinearity. The impact of FII should be estimated separately for the aggregate model and for the one built around measures of AD, UD and PD.

The correlation matrix shows initial evidence proving positive connections between various elements of financial inclusion and those of the inequality-adjusted human development index. IHDI is positively associated not only with the aggregate model of financial inclusion but also with each of its three dimensions as well as the economic indicators like GDP, domestic credit, mobile subscriptions, level of economic openness and schooling. Inflation has a negative effect on IHDI, while expenditure has a weak positive effect. This suggests that financial inclusion and broader economic and social development may be positively correlated with higher IHDI. Nonetheless, the evidence is based on a correlation analysis which does not prove causality in this relationship; hence the need for panel data regression.

Table 4 displays the results of the panel unit-root test based on the Levin, Lin, and Chu (LLC) test for the variables used in the inequality-adjusted human development model regardless of whether the stationary characteristics of the variables were examined before estimating the panel regression models. The alternative hypothesis of the LLC test suggests that the variables are stationary, whereas the null hypothesis asserts the existence of a unit root, indicating non-stationarity.

According to the outcomes, it can be inferred that all the selected variables are stationary at the level, given that the null hypothesis of a unit root is rejected at the 1% level of significance. Hence, according to the results, it can be stated that the application of the variables as a measurement in the IHDI model does not lead to the problem of level non-stationarity and eliminates the possibility of spurious regression relationships in further empirical studies.

Table 4: Results of Panel Unit Root Test

Variables	Levin, Lin & Chu	Decision	Variables	Levin, Lin & Chu	Decision
IHDI	-5.6915*	I(0)	GDP	13.6099*	I(0)
FII	10.7525*	I(0)	Exp	11.5117*	I(0)
DC	-5.7180**	I(0)	TO	-11.1451*	I(0)

Sch_en	-17.3001**	I(0)	AD	-15.5244**	I(0)
Inf	-14.9430*	I(0)	UD	-11.4349**	I(0)
Mobile_sub	-12.0863*	I(0)	PD	13.0833**	I(0)

Most of the panel series contained a trend and intercept; stationarity was analyzed using a trend and intercept. The second column in the table provides the outcomes of the LLC panel unit root test whereby all variables are stationary using I (0). The computed LLC value has been compared with the tabulated values, which were determined using the asymptotic Chi-square distribution. A few variables were I (0) at the 1% significance level, and others were I (0) at the 5% level.

5.1.Empirical Results on Financial Inclusion and Income Inequality

Table 5 presents the results of panel regression, in which the two equations have been evaluated by the fixed-effects model. The impact of the composite Financial Inclusion Index (FII) is explored in Equation 1, while Equation 2 separates financial inclusion into its various components (Availability dimension (AD), Usage dimension (UD), and Penetration dimension (PD). Both regression equations are statistically confirmed, as proven by the F-tests 74.41 and 75.67 for each of the equations respectively at 1 % significance level. R-squared with 0.5791 and 0.5484 emphasise that the equations account for approximately for 57.91 and 54.84 percent of the overall variation in IHDI respectively.

Moreover, the results given in Equation 1 explain that financial inclusion has a substantial influence. The FII is statistically significant.

Also, according to Equation 2, there are three main components of financial inclusion, and all of them have a positive influence on the indicator of IHDI. The coefficient for the Availability dimension (AD) is statistically significant at 5% significance level. Hence, it means that the rising level of finance availability has a positive impact on the increase of IHDI.

Table 5: Estimated Results on Financial Inclusion and Income Inequality

Variables	IHDI	IHDI
FII	0.1180672***	—
AD	—	0.0434891**
UD	—	0.0326201**
PD	—	0.0983534***
INF	-0.0002279*	-0.0001596*
TO	0.0000857*	0.0001148**
GDP	0.00000390**	0.00000156**
DC	-0.0000520	0.0000441
Expense	0.0001750*	0.0000792*
Mob_Sub	0.0002645***	0.0002620***
Sch_en	0.0009223	0.0009073
C	0.4697363***	0.4714012***
Chi-square	19.92	5.83
Fixed/Random	Fixed Effects	Fixed Effects
R-square	0.5791	0.5484
F-statistics	74.41***	75.67***

Observation	320	320

The Usage dimension (UD) is statistically significant at the 1% level of significance. Positive value indicates a correlation between usage of financial services and high index of human development. The conclusion is that regular use of formal financial services results in improvement of individual human development with the help of better financial management by households and organizations.

The Penetration dimension (PD) is the most substantial among three dimensions at the same time. Besides, the coefficient has a statistically significant value at 1%. This means there exists a positive correlation between financial penetration and values of IHDI. A relatively large value of the coefficient indicates that larger coverage of population by financial services would result in better human development.

Inflation (INF) acted negatively in both models, which means that increase in price level leads to decrease in IHDI. It can be inferred that there is a relationship between price instability and the problems observed in inclusive human development The value of trade openness (TO) has a positive coefficient in both models, statistically significant at 10% level and at 5% level. In both cases GDP value has positive coefficient at 5% level. The findings mean that high GDP value positively correlates with IHDI. This is synchronized with the commonly accepted view that high economic performance gives countries sufficient resources for developing human welfare. Domestic credit coefficient (DC) has no significance in both equations.

The Government expenditure (Exp) has a positive coefficient in both equations which are statistically significant at the significance level of 10%. Both equations show that mobile subscriptions (Mob_Sub) perform positively at the 1% confidence level. This means that higher mobile connectivity contributes positively to the increase in IHDI. Mobile connectivity helps to gain access to relevant information as well as digital services, job opportunities, and education to be accessed more easily, and an inclusive process. Coefficients of school enrollment (Sch_en) are positive. Positive sign corresponds with the expectations as far as education is concerned, although the fact that this indicator is not statistically significant means that school enrollment does not have an independent effect on IHDI in these models. The above-mentioned results are sufficient to conclude that there is a significant relation between financial inclusion and inclusive growth. The value of the aggregated FII is positive and has a high significance. Additionally, its components such as Availability, Usage and Penetration also have positive and statistically significant coefficients. Among those components, Penetration has the highest coefficient, followed by Availability and Usage.

5.2.Results of Cross-Sections Intercepts

Table 6 shows the fixed country effects estimates from a fixed-effects regression analysis. Uzbekistan serves as the reference country in the table. These coefficients show the unobserved and time-invariant specific effects of each country on IHDI, controlling for the independent variables used. The country-specific effects of each country in relation to Uzbekistan have been presented through these coefficients. Empirical results, it is evident that the country-specific effects among the Asian countries vary considerably. In terms of country-specific coefficients, Armenia turns out to be the country with the highest positive coefficient among the selected Asian countries, followed by Azerbaijan and Jordan. These indexes show that these countries, in comparison with Uzbekistan, have higher country-specific effects on IHDI compared to the fixed independent variables of the model. Georgia, Philippines, Myanmar and Kyrgyz Republic also show positive country-specific effects when compared with the reference country.

Table 6: Cross-Sections Intercepts

Countries	Coefficients	Countries	Coefficients
Azerbaijan	0.1235269	Jordan	0.1228321
Afghanistan	-0.1734494	Kyrgyz Republic	0.0706009
Armenia	0.1334689	Myanmar	0.0785471
Bangladesh	-0.0906461	Malaysia	-0.0610131
Bhutan	-0.1101928	Philippines	0.0924407

China	0.0659825	Pakistan	0.0265805
Georgia	0.1029905	Tajikistan	-0.1628855
Indonesia	0.0024841	Turkey	0.0506927
India	-0.1197071	Thailand	0.0428106
Japan	0.0527555	Uzbekistan	Reference country

In general, country-specific fixed impact shows significant differences among countries, and this difference is not accounted for by the observable independent variables. This change may be a result of unobservable and time-invariant factors, such as institutions, historical conditions, demographic structures, socioeconomic indicators, and development pathways. By using fixed country effect, we have accounted for the unobservable factors and arrived at coefficients for financial inclusion and independent variables from the internal variations in each country over time. A positive coefficient indicates that the country has higher specific effects, while a negative coefficient indicates lower.

6. Conclusion and Policy Recommendations

The purpose of this study is to examine the financial inclusion and inclusive growth as measured by the Inequality-Adjusted Human Development Index (IHDI). The results show that there is a positive and significant relationship between financial inclusion and inclusive growth. In addition, financial inclusion dimensions, such as availability, use, and penetration of financial services also provide inclusive growth. Other variables like trade openness, GDP growth rate, government spending, mobile subscriptions, and GDP per capita, demonstrate positive impact, while domestic credit impact on income inequality is found to be negative. The main reason is that in Asian economies, access to credit is not be evenly distributed.

These findings lead to the following policy implications. Policymakers should focus on increasing access to dependable and reasonably priced financial services, with a focus on underserved and rural communities. All people and communities can more easily engage completely in their nation's economy by strengthening the financial infrastructure, which includes digital financial platforms and banking networks (inclusive development). Policies should promote the use of financial services. Programs for increasing financial literacy, digital payment systems, and financial products designed specifically for low-income consumers can help increase meaningful participation in the financial system. The evidence also shows that domestic credit has a negative effect and thus highlights the need for a more equitable distribution of credit. Governments and financial institutions should create targeted credit schemes for small enterprises, vulnerable households, and marginalized groups to facilitate inclusive outcomes from credit expansion. Ultimately, continued investment in digital connectivity and public investment in social and development program activities complement financial inclusion efforts and create a stronger effect on inclusive growth. In summary, this research demonstrates that financial systems that are effective and accessible are critical in promoting inclusive human development.

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