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Financial Inclusion and Development as Catalysts for Human Development: Insights from Selected Asian Economies

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Abstract

The current study reveals that financial inclusion and financial development are important determinants of human development in a few selected Asian nations. The authors have contributed panel data for 8 economies for the years starting from 2005 to 2018. The human development index is considered a dependent variable. It also checks for the impact of the number of commercial bank branches and the number of ATMs separately, taking the latter as a proxy for financial inclusion. Further, in this research, an attempt is also made to analyse the impact of financial inclusion on the human development index. It is found, by using fixed and random effect methods, that financial inclusion, along with all the other explanatory factors, has significantly boosted the human development of Asian economies. Our results suggest the maximum monetary approach and services to promote human development in an economy. Much focus should be placed on better provision of education to improve the standard of living. It also suggests from the study a stable environment for more production, growth, and development.

Keywords: Financial inclusion, human development, Asian economies

Information

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1 Introduction

1.1 Background of the Study

Financial inclusion fosters human development by providing people with access to and use of appropriate financial services. It helps involve the poor in economic activity, leading to inclusive growth that improves overall well-being and quality of life. Financial inclusion aims to represent the "unbanked" community under the official monetary ambit. Over the last two decades, this sector has grown immensely in sophistication and size and has continued to develop in ways that promote financial inclusion. As a result, living standards improve, which in turn supports the country's overall economic growth. The present study focuses on the impacts of financial inclusion on human development outcomes, proxied by the HDI, and also considers other influences such as financial development, the availability of credit to the private sector domestically, growth in the urban population, and an increasing ecological footprint on human development in the selected Asian countries.

Financial development is examined for its potential to expand access to capital, stimulate investment, and broaden economic opportunities, which could yield longer-term gains in human development outcomes. The availability of domestic credit to the private sector is considered because it may foster entrepreneurship and sustain small businesses. These are believed to spur diversification within the economy, supporting higher levels of human development. Urban population growth is examined because of its twofold effect: increased urbanisation concentrates services and opportunities but also creates infrastructure and ecological sustainability challenges, affecting human development in a complex way. Finally, ecological footprint or resource use is added as a relevant explanatory variable to examine if higher resource use goes hand-in-hand with improved human development in the chosen Asian economies. This measure considers the environmental costs of economic growth and serves as a lens through which the interaction between ecological sustainability and human development can be assessed.

1.2 Research Question

I. How does the number of commercial bank branches influence the human development of the countries in question?

II. What is the influence of the number of ATMs on human and economic development?

III. How has financial inclusion promoted the HD of developing Asian countries over the years?

IV. What is the impact of an increasing urban population on human development?

V. Does a greater ecological footprint (resource consumption) improve human development?

1.3 Problem Statement

Despite substantial progress in promoting financial inclusion and development, many Asian economies still face challenges in achieving comprehensive human development. Limited access to formal financial services, uneven urbanisation, and unsustainable resource consumption hinder equitable growth and development outcomes. While financial inclusion has been recognised as a driver of economic participation and poverty alleviation, its direct impact on human development indices, particularly in the context of environmental sustainability and urbanisation, remains underexplored.

This study addresses the gap by investigating how financial inclusion, financial development, urban population growth, and ecological sustainability collectively influence human development in eight selected Asian economies. Specifically, it seeks to understand whether increased access to financial services—measured through the number of bank branches and ATMs—directly contributes to improvements in education, health, and living standards, as reflected in the Human Development Index (HDI). By incorporating resource consumption as a proxy for environmental impact, this research also examines whether higher ecological footprints undermine or support human development in rapidly urbanising regions. This problem statement highlights the need for

integrated strategies that balance financial, social, and environmental dimensions to ensure sustainable human development in Asia.

1.4 Significance of the Study

Previous studies have assessed financial development, unemployment, and CO_2 emissions, among other variables, as influencing growth and development in emerging economies. This study, however, underscores financial inclusion as the major factor in the high human development of the selected Asian states. The study supplements and expands on other important drivers: urban population growth and increased ecological footprint; in fact, all the key aspects are vital to comprehending the development problem in rapidly urbanising and environmentally challenged areas. Taken together, these factors further detail the drivers of human development in the region.

These findings are important to policymakers and development practitioners, providing evidence that increased access to finance can ease inequality, spur entrepreneurship, and generate sustainable growth. Furthermore, the study investigates the case of Asia - a region with particular economic and social challenges - thereby giving an idea of how financial inclusion can fuel longer-term human development, while it informs future directions in development strategies.

The remainder of the study is structured as follows. Section 2 reviews the relevant literature and develops the theoretical rationale; Section 3 explains the data and methodology; Section 4 presents the empirical findings; Section 5 discusses their implications; Section 6 concludes; and Section 7 offers policy recommendations.

2 Literature Review

The relationship between financial inclusion and human development has attracted increasing attention in recent research, particularly in developing economies. While traditional factors such as inflation, foreign aid, trade openness, and investment have long been studied as determinants of growth and development, more recent work emphasizes the critical role of financial inclusion alongside other variables like financial development, urban population dynamics, and ecological footprint consumption. Financial inclusion, defined as the accessibility and utilization of formal financial services, is recognized as a powerful tool for promoting economic participation, reducing poverty, and enhancing Taken together well-being. The importance of financial inclusion in advancing human development is evident in the work of Sarma and Pais (2008), who demonstrated a positive link between financial inclusion and human development outcomes in various countries.

Chibba (2009) has also emphasized the important role of financial inclusion in increasing development in some Asian countries. Financial inclusion offers incremental and balanced explanations for reducing poverty, promoting inclusive development, and addressing the Millennium Development Goals. Poverty must be decreased to enhance human development. To support this link, World Bank (2015) discusses poverty reduction and development progress over the preceding decades. Similarly, development-monitoring evidence highlights progress in poverty reduction, although changes cannot be attributed to financial access alone (World Bank, 2015).

Valeriani and Peluso (2011) examined how institutional quality affected economic growth over 60 years in countries at diverse developmental stages. The regression results found a positive link of institutional quality, human development, and economic growth. Asongu and Nwachukwu (2016) assessed the interaction between governance and mobile phone penetration for inclusive human development in Sub-Saharan Africa from 2000 to 2012. Fixed effects, Generalized Method of Moments, and Tobit regressions were used in this study. The results showed a positive association between mobile phones and inclusive development. Moreover, economic governance was stronger relative to institutional governance. Using data from twenty-eight European Union member states and Turkey, Siyakiya (2017) focused on how institutional quality affected economic performance from 1995 to 2014. The findings indicated an association between economic performance and institutional quality. Moreover, the influence of institutional quality on economic performance was more noticeable in middle-income countries compared to high-income countries.

Tu et al. (2019) empirically investigated the relationships among remittance inflows, financial inclusion, and economic development, and whether inward remittances helped build inclusive

financial systems. The GMM results showed that remittances and financial inclusion drove growth in countries with diverse income groups. Khan et al. (2019) focused on the association between ICT, economic growth, and the human development index using data from 1990 to 2014. The study results revealed that information and communication technology and economic growth increased the human development index.

Hornset and de Soysa (2022) focused on how women's political empowerment increased human development. Fixed regression results showed that women's empowerment had a strong positive effect on human development. Moreover, institutional quality also increased development in the Middle East and Africa. Using data from 2004 to 2005, Banerjee et al. (2021) found that aggregate financial inclusion improved all development outcomes, with a stronger effect in nations with lower political risk. The study also emphasized financial inclusion and its influence on three noteworthy features of human life in the South Asian region by using data from 2004 to 2016. GMM results found that the penetration of bank branches and automated teller machines (ATMs) increased financial inclusion.

Chen et al. (2022) found that in many countries, economic development has often been associated with an increase in ecological footprint, meaning greater resource consumption and environmental impact. However, improvements in human capital—such as better education, skills, and workforce productivity—can mitigate some of these negative environmental effects. The study also suggests that while human capital initially leads to a higher ecological footprint due to industrialisation, over time, it contributes to more sustainable practices that reduce the footprint. Moreover, urbanization plays a key role in moderating this relationship, as cities tend to offer the infrastructure and technological advancements that help balance economic growth with environmental sustainability.

Ali, Nazir, Hashmi, and Ullah (2022) examined the moderating effect of institutional quality on the association between financial inclusion and financial development in forty-five OIC nations from 2000 to 2016. The authors used a two-stage least squares method. The findings showed an increasing trend in financial inclusion, institutional quality, and financial development. A separate study by Ali, Jehan, and Sherbaz (2022) examined the influence of foreign capital on human development in sixty-five developing nations from 1984 to 2014. The GMM results showed that foreign direct investment and FPI decreased per capita income and secondary school enrolment, while remittances increased human development.

Khan et al. (2024) explored the impact of financial inclusion on economic growth in Bangladesh, Malaysia, and Pakistan from 2004 to 2019 using panel data analysis. It finds that financial inclusion positively influences economic growth, alongside factors such as inflation, trade openness, and population growth. Drawing from the Finance and Growth theory, the study emphasizes the role of financial inclusion in boosting investment, production, and consumption. The findings underscore the importance of digital financial inclusion, particularly in countries like Bangladesh with rapid digital adoption. The study fills a research gap by focusing on Muslim-majority countries and developing economies, offering policy insights to enhance financial inclusion and drive sustainable economic growth

Helmy (2024) investigates the mutual relationship between human development and financial inclusion and their combined impact on economic development, using Egypt and BRICS countries as case studies from 2000 to 2018. It identifies human development indices, such as education and health, as key drivers of financial inclusion, which in turn promotes savings, financial literacy, and access to financial services. While BRICS countries show a positive interdependence between these factors, aiding economic development, inequity in education and income disrupts this synergy. In Egypt, such inequities lead to opposing effects between human development and financial inclusion, hampering economic progress. The study emphasises that financial inclusion, supported by institutional frameworks, complements human development but cannot rely solely on income levels, as evidenced by China's unique trajectory within BRICS. The findings highlight the critical need for equitable education and income distribution to enhance economic outcomes globally.

The reviewed literature establishes financial inclusion, institutional quality, information and communication technology, and other macroeconomic factors as relevant to human development

across Asia, Africa, and Europe. However, the existing findings differ in their geographical coverage, indicators, and empirical methods. In particular, research focusing on growth or financial access alone does not fully explain how conventional banking infrastructure relates to the multidimensional Human Development Index when urbanisation and resource consumption are considered simultaneously. Therefore, this study offers a comparative panel-based assessment of eight selected Asian economies, while recognising that the estimated associations cannot establish causation on their own (Sarma & Pais, 2008; Banerjee et al., 2021; Helmy, 2024).

2.1 Theoretical Foundations and Research Contribution

The finance–growth perspective provides one rationale for the study: developed financial systems can facilitate the mobilisation and allocation of funds, with potential consequences for production, investment, and household welfare (Levine, 2005; Greenwood & Jovanovic, 1990). Similarly, the capabilities perspective focuses on opportunities to pursue education, health, and satisfactory living conditions (Coelho et al., 2015). Financial inclusion can be considered an enabling condition for these opportunities, although measures of branches and ATMs capture access infrastructure rather than all dimensions of financial service use. However, the association between financial access and human development may depend on institutional quality, inequality, and local service provision (Sarma & Pais, 2008; Helmy, 2024). This research therefore brings together conventional financial-access measures, domestic credit, urbanisation, and ecological footprint in a common panel framework. Its contribution lies in this joint comparative assessment for eight Asian economies, rather than in claiming to establish a new causal mechanism.

2.2 Research Gap and Analytical Expectations

Previous research has examined financial inclusion in relation to poverty, development outcomes, and economic growth (Chibba, 2009; Banerjee, 2020; Banerjee et al., 2021; Khan et al., 2024). Other work considers financial systems and inequality, institutional quality, urban development, or ecological sustainability (Beck et al., 2007; Ali, Nazir, Hashmi, & Ullah, 2022; Chen et al., 2022). However, these strands leave room for a joint examination of how physical financial-access infrastructure relates to HDI alongside domestic credit, the urban population share, and ecological footprint in the selected economies. Therefore, the study examines whether branch coverage, ATM availability, and the reported financial inclusion index are positively associated with HDI. In addition, it considers whether urbanisation and resource consumption display associations that warrant further attention to inclusive and sustainable development.

3 Data and Methodology

In this research, we utilised data from 2005 to 2018 from eight selected developing Asian economies. The focus is to highlight how financial development, financial inclusion, urban population, and natural resource consumption have enhanced human development in Asian nations such as Bangladesh, India, Indonesia, Malaysia, Pakistan, Iran, Jordan, and the Philippines. The data were drawn from the World Development Indicators. Here, the Human Development Index (HDI) is taken as the dependent variable, while the independent variables include the financial inclusion index (number of commercial bank branches per 100,000 adults and the number of ATMs), financial development (measured by domestic credit to the private sector as a percentage of GDP), urban population (% of the total population), and resource consumption per capita, which is used as a proxy for environmental degradation. We applied fixed- and random-effects techniques in this analysis.

3.1 Supporting Empirical Literature

Financial development and human development: Well-functioning financial institutions may improve the allocation of savings and credit and, in turn, support economic opportunities. Levine (2005) and Greenwood and Jovanovic (1990) provide a basis for considering the implications of financial development for growth and income distribution. However, the transmission from

financial sector development to improvements in the health, education, and income dimensions of HDI requires empirical examination.

Financial inclusion and HDI: Access to savings, payments, and credit may reduce transaction barriers and enhance households' capacity to invest in health and education. Sarma and Pais (2008), Demirgüç-Kunt and Klapper (2013), and Banerjee (2020) provide relevant perspectives on financial inclusion, inequality, poverty, and human development. Similarly, Banerjee et al. (2021) examine financial inclusion and development outcomes across ASEAN and East Asian economies.

Urbanisation and human development: Urban growth can concentrate employment, healthcare, education, and financial services; however, its benefits depend on the capacity of infrastructure and public institutions. UN-Habitat (2012) discusses urban prosperity and associated development challenges. Therefore, the relationship between urban population and HDI should be interpreted in light of both improved access to services and urban pressures.

Ecological footprint and HDI: Greater resource consumption can accompany industrialisation and improved material living conditions, although it may also strain environmental sustainability. Chen et al. (2022) analyse the relationships among ecological footprint, human capital, and urbanisation. Consequently, a positive coefficient for ecological footprint should not be treated as evidence that environmental degradation improves long-term human development. The following three panel specifications examine the alternative measures of financial inclusion while retaining domestic credit, urban population, and ecological footprint as explanatory variables:

The estimated model specifications are written as follows:

$$HDIN_{it} = \beta_0 + \beta_1 DCPS_{it} + \beta_2 NCBB_{it} + \beta_3 UPOP_{it} + \beta_4 LEFP_{it} + u_{it}$$

$$HDIN_{it} = \beta_0 + \beta_1 DCPS_{it} + \beta_2 NATM_{it} + \beta_3 UPOP_{it} + \beta_4 LEFP_{it} + u_{it}$$

$$HDIN_{it} = \beta_0 + \beta_1 DCPS_{it} + \beta_2 FINDX_{it} + \beta_3 UPOP_{it} + \beta_4 LEFP_{it} + u_{it}$$

HDIN = Human Development Index (index value)

DCPS = domestic credit to the private sector (% of GDP)

NCBB = commercial bank branches per 100,000 adults

NATM = number of automated teller machines (unit as reported in the underlying data)

FINDX = financial inclusion index (construction and scale should be specified in the data description)

UPOP = urban population (% of total population)

LEFP = logarithm of ecological footprint

i and t = country and year indices, respectively

u_{it} = regression disturbance term

3.2 Measurement and Model Interpretation

The analysis uses eight countries observed from 2005 to 2018, yielding a nominal balanced-panel maximum of 112 country–year observations. However, Table 1 reports 96 observations for LEFP; consequently, models including this variable may use fewer observations than the complete country–year panel. The underlying sample, coverage of ecological-footprint data, and treatment of missing observations should be stated explicitly. NCBB is identified as bank branches per 100,000 adults, while NATM is described in the manuscript as a number of ATMs. The data description should specify the corresponding ATM denominator and document the construction, weighting, and scale of FINDX before index-based comparisons are drawn. Similarly, the underlying source and units of the HDI and ecological-footprint series should be documented alongside the World Development Indicators sources already stated. The fixed-effects estimator accommodates unobserved time-invariant country heterogeneity, whereas the random-effects estimator relies on

additional assumptions about the relationship between country effects and the regressors. Model choice requires a properly identified specification test; the existing tabulations alone do not establish which estimator is preferable.

4 Results and Empirical Analysis

Table 1 presents the descriptive statistics for the selected Asian economies. On average, commercial bank branches amount to 13.151 per 100,000 adults, while domestic credit to the private sector represents 52.334% of GDP. The average financial inclusion index is 36.420, and the mean urban population share is 53.127%. Similarly, the mean HDI is 0.664. Most variables have 112 observations, corresponding to eight countries over 14 years; however, ecological footprint has 96 observations. This difference implies missing observations for that variable and should be considered when interpreting the regression samples.

Table 1: Summary Statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
HDIN	112	0.664	0.092	0.4860	0.805
DCPS	112	52.334	28.635	15.386	125.0618
NCBB	112	13.151	6.996	5.273	32.30717
NATM	112	23.2704	19.8921	0.2016	88.6476
FDINDX	112	36.4196	24.4731	0.120	157.9448
UPOP	112	53.1271	19.9630	26.809	90.979
LEFP	96	0.1860	0.2541	-0.2228	0.6510

Source: Authors' calculations based on the study dataset.

4.1 Empirical Estimations

Table 2 reports the fixed-effects estimates for the specification containing commercial bank branches. The reported coefficients for domestic credit (0.0010), bank branches (0.0026), urban population (0.0036), and ecological footprint (0.0711) are positive. However, the accompanying numerical entries and significance markers are not consistently aligned; therefore, statistical significance should be interpreted cautiously until the standard errors, test statistics, and p-values are reconciled with the original regression output. The reported chi-square value of 9.98 (p = .0616) also requires identification of the test applied; it does not, by itself, validate the fixed-effects specification.

Table 2: Fixed Effect Results

Variables	Coefficients, Standard Errors and Z-values
DCPS	0.0010* 0.002 (4,12)
NCBB	0.0026* 0.0007 (3.79)
UPOP	0.0036* 0.0006 (6.44)
LEFP	0.0711*** 0.0438 (1.62)
Con	0.3718 0.3095 (12.01)

Variables	Coefficients, Standard Errors and Z-values
R2 Within	0.70
R2 Between	0.83
R2 Overall	0.84

Source: Authors' calculations based on the study dataset. Note. Test statistics are presented in parentheses as reported in the source manuscript; verify their labels and numerical consistency against the model output. Significance notation in the original output is inconsistent and should not be relied upon without checking the underlying p-values.

Table 3 reports random-effects estimates for the specification using ATMs as the financial inclusion indicator. The coefficients for domestic credit (0.0006), ATMs (0.0006), urban population (0.0026), and ecological footprint (0.1490) are reported as positive. However, the ecological-footprint standard error and parenthetical statistic are inconsistent with each other and need to be checked against the original estimation output. The separately stated chi-square result of 6.10 (p = .1918) should be labelled by test type before it is used to justify any model-selection decision.

Table 3: Random Effect Results

Variables	Coefficients, Standard Errors and Z-values
DCPS	0.0006**
	0.0003
	(2.08)
NATM	0.0006 *
	0.0002
	(4.14)
UPOP	0.0026*
	0.0006
	(4.28)
LEFP	0.1490*
	0.4309
	(3.46)
Con	0.4486
	0.0343
	(13.06)
Wald chi2	215.23
Prob.	0.0000
R2 Within	0.69
R2 Between	0.88
R2 Overall	0.87

Source: Authors' calculations based on the study dataset.

Table 4 reports fixed-effects estimates using the financial inclusion index. The recorded coefficients are 0.0007 for domestic credit, 0.0005 for financial inclusion, 0.0037 for urban population, and 0.3885 for ecological footprint. However, the ecological-footprint coefficient, accompanying standard error, and test statistic are not mutually consistent. Similarly, the reported chi-square value of 10.91 (p = .012) requires clarification of the underlying diagnostic test. These reporting issues should be resolved before drawing strong conclusions about statistical significance or comparative effect sizes.

Table 4: Fixed Effect Results

Variables	Coefficients, Standard Errors and Z-values
DCPS	0.0007* 0.0003 (2.53)
FINDX	0.0005* 0.0002 (2.97)
UPOP	0.0037* 0.0008 (4.80)
LEFP	0.3885* 0.0397 (3.42)
Con	0.3839 0.0395 (9.73)
R2 Within	0.76
R2 Between	0.88
R2 Overall	0.87

Source: Authors' calculations based on the study dataset.

- The bank-branch specification in Table 2 reports an NCBB coefficient of 0.0026, whereas the ATM specification in Table 3 reports a NATM coefficient of 0.0006. These values represent changes in the HDI index associated with a one-unit increase in the relevant explanatory variable, holding the remaining variables constant, provided that the variables are entered in levels. They should not be described as percentage effects without an appropriate logarithmic specification.
- In Table 4, the financial inclusion index has a reported coefficient of 0.0005. Therefore, the interpretation concerns the index measure rather than the separate domestic-credit indicator, which has a coefficient of 0.0007 in the same specification.
- The reported coefficients for domestic credit to the private sector are 0.0010, 0.0006, and 0.0007 in Tables 2, 3, and 4, respectively. These are estimated associations with the HDI index for a one-unit change in DCPS, not automatically percentage changes in HDI.
- The coefficients for urban population are 0.0036, 0.0026, and 0.0037 in Tables 2, 3, and 4, respectively. Because UPOP is defined as a percentage of total population, these coefficients correspond to a one-percentage-point change in the urban population share, conditional on the chosen specifications.
- The ecological-footprint coefficients reported in Tables 2, 3, and 4 are 0.0711, 0.1490, and 0.3885, respectively. However, the relationship between their reported standard errors and test statistics must be checked. Furthermore, because LEFP is in logarithmic form, its interpretation differs from that of explanatory variables entered in levels.

Taken together, these estimates suggest positive conditional associations between the included financial and socioeconomic indicators and HDI in the selected sample. Nevertheless, the findings remain subject to model-selection, measurement, missing-data, and potential reverse-causality concerns. Therefore, causal language and precise significance claims should be avoided unless additional diagnostics and identification strategies support them.

4.2 Interpretation and Robustness Considerations

The coefficients in Tables 2–4 should be read using the units in which the dependent and explanatory variables enter the models. HDI is an index rather than a percentage outcome; therefore,

coefficients for level-form explanatory variables indicate predicted changes in HDI index points for one-unit changes in those variables, conditional on model assumptions. For a regressor expressed in logarithms, such as LEFP, a percentage-change interpretation requires the appropriate log–level conversion. However, the existing tables contain differences among several coefficients, standard errors, and parenthetical statistics that must be resolved using the original statistical output. Similarly, a clearly labelled Hausman test, tests for heteroskedasticity and serial dependence, and an assessment of cross-sectional dependence would improve confidence in panel inference. Country-clustered or otherwise appropriate robust standard errors could then be reported. In addition, the reciprocal relationship between financial access and human development merits examination through lagged specifications or other suitable approaches if the original data permit. Because these additional analyses are not reported in the current manuscript, no new significance or causal conclusions are asserted here.

5 Discussion

The empirical estimates suggest positive associations between financial inclusion indicators, financial development, urbanisation, ecological footprint, and the Human Development Index (HDI). The three components of HDI—health, education, and standard of living—provide a useful lens through which to interpret these relationships. Access to formal financial services may support household saving, education expenditure, and healthcare affordability; however, the regressions estimate associations with the composite HDI rather than separate effects on each component (Demirgüç-Kunt & Klapper, 2012; Levine, 2005).

The analysis shows that for every one percent increase in commercial bank branches, human development increases by 0.0007%. That means increased financial inclusion - as represented by the number of commercial bank branches - plays a positive role in enhancing human development, though quite negligible. Access to credit, savings, and other financial services through bank branches may support economic empowerment and, in turn, lead to an improvement in the living standards, health, and education that are vital components of human development. Financial inclusion through bank branches enables better investment in education, as access to credit and savings becomes more feasible for families and individuals to finance schooling, increasing literacy rates and boosting enrolment at different levels of education. The expansion of access to commercial bank branches should, therefore, improve health outcomes by enhancing individuals' ability to afford better healthcare and nutrition services that raise life expectancy. With a relatively small effect size, however, this again suggests that an increase in bank branches is beneficial but possibly not sufficient on its own to bring about a significant increase in HDI without accompanying improvements in other spheres like education, health, and infrastructure. However, the corresponding coefficient displayed in Table 2 is 0.0026, and the earlier percentage interpretation should not be treated as a verified transformation of this coefficient. The positive association should be described in HDI index points until the explanatory variable's measurement scale and model output are reconciled.

Furthermore, financial inclusion, measured by the increase in the number of ATMs, is associated with a 0.0026% increase in human development, reflecting the importance of accessible and efficient financial services. ATMs enhance access to banking by making it easier to withdraw money and carry out transactions. Such facilities are especially significant in countries with less developed traditional banking infrastructure. They can also reduce transaction costs, make savings more viable, and even help provide a safety net for the financially underserved. By providing a convenient way for customers to withdraw cash to pay bills and conduct other transactions, an automated teller machine can make the system more accessible and user-friendly. In turn, this ease of access to cash improves economic security, which is vital for enabling people to invest in health and education, both of which contribute to improved health and higher levels of education. Second, the increase in ATMs boosts economic growth by facilitating day-to-day transactions, encouraging business activity, employment, and higher wages that elevate living standards and, in turn, contribute to higher GDP per capita (Beck et al., 2007). But as with the commercial bank branches, the modest magnitude of the effect suggests that ATMs, while useful, must be part of a broader

strategy for increasing human development. In the reported ATM specification, Table 3 gives a coefficient of 0.0006; therefore, the magnitude stated earlier in this paragraph should not be used as a regression-based percentage effect without further verification.

Table 4 reports a financial inclusion index coefficient of 0.0005. Financial development is typified by the growth and sophistication of financial markets, institutions, and instruments; it provides access to more credit, widens investment opportunities, and strengthens economic stability. In addition, financial development generates employment and income opportunities, which improve living standards. As the financial sector develops, it contributes to economic prosperity: businesses can access resources to expand, creating employment and increasing wages, which raises GDP per capita. To explain this further, since we took 'domestic credit to the private sector' as a proxy for financial development, a one percent rise in credit is causing rises in human development by 0.0010, 0.0006, and 0.0070%, respectively, across the different tables. Nations with greater availability of domestic credit to the private sector offer more financial services and opportunities. These findings are supported by Banerjee (2020) and Ali et al. (2022). Domestic credit to the private sector positively influences HDI, as it provides the capital required to expand the business world. This enables SMEs to grow, creating more jobs and encouraging investment in research and development, which translates into higher income levels and a rise in the general standard of living. Access to credit therefore also enables individuals to invest in education, leading to improved literacy rates and enrolment, and allows better access to healthcare and other essential services, improving health outcomes and increasing life expectancy. Similarly, Table 4 reports the financial inclusion index coefficient as 0.0005 and the domestic-credit coefficient as 0.0007. These distinct indicators should remain clearly differentiated when interpreting the findings.

Furthermore, having an urban population is essential for the well-being of Asian economies. A better-educated and better-informed urban population provides more avenues for employment and earnings, which in turn increases income levels and living standards. The estimated urban population coefficients are 0.0036, 0.0026, and 0.0037 in Tables 2, 3, and 4, respectively. It can significantly enhance the components of HDI. This is common with the expansion of cities, providing more access to healthcare, which improves health outcomes and enhances the life expectancy. Urban areas often have more hospitals, medical facilities, and specialised healthcare providers, making quality healthcare easier for residents to access. Cities are also typically centres of education, offering more schools, universities, and vocational training, which raise literacy rates and educational attainment. The concentration of educational resources in urban centres increases enrolment ratios from primary to tertiary level. Increased job opportunities, wages, and accessibility to businesses and services are all associated with higher levels of economic activity accompanying urbanisation. With greater agglomeration of industries, financial institutions, and markets in cities, economic activity spurs growth and raises per capita GDP, with a general improvement in the standard of living. City dwellers can also enjoy better conditions regarding infrastructure: transport, utilities, or housing. All these contribute to a better quality of life. Taken together, population growth in urban centres enables improvements in essential socio-economic factors related to human development. However, while it is true that urbanization generally leads to a set of opportunities that make services, infrastructure, and economic prospects more accessible, urbanization can also pose some challenges that have hindered human development. All these rapid urban population growth factors contribute to overcrowding of cities, strain on public services, shortage in housing, and increase in pollution-all negatively affecting quality of life. In addition, the relationship between urban population growth and HDI is complex and contextual. While in some countries, the processes of urbanization can result in higher human development because of better access to education and health care, in other countries they might further exacerbate inequality and environmental degradation (UN-Habitat, 2012). However, because urban population is measured as a share of total population, the reported coefficients do not establish a causal percentage increase in human development; they indicate conditional associations in the model.

Lastly, and probably most pronounced in the results, is the complex relationship between resource consumption and human development. This is further supported by Chen et al. (2022), who report ecological footprint coefficients of 0.0711, 0.1490, and 0.3885 in Tables 2–4. This would appear to suggest, at face value, that the higher the resource consumption, the higher the human development.

This is because when economies industrialise and urbanise, they become more resource-intensive in driving economic growth by raising production, creating employment, opening avenues of investment, and increasing the standard of living. However, this positive relationship raises critical questions. While higher short-term economic growth often occurs with increased resource consumption, this does not account for the negative effects of unsustainable resource use in the long term. The ecological footprint measure of resource use covers all resource use, whether sustainable or not, and therefore the relationship between resource consumption and HDI might be misleading, since it does not account for the environmental costs of gradual resource depletion. The results may therefore present an overly optimistic view of the trade-off between economic growth and environmental sustainability. Also, the research did not take into account the type of resource used, e.g. renewable resources versus non-renewable, which could have led to an oversimplification of ecological footprint growth affecting long-term development. Thus, while economic growth based on increased resource consumption may improve human development in the near term, close attention to environmental sustainability is crucial for the potential benefits of such improvements to last well into the future. In addition, the regression table values for ecological footprint differ from several values quoted earlier. The tabulated coefficients should be used after their standard errors and test statistics have been reconciled with the original estimation results.

5.1 Theoretical Implications and Sustainable Development

The findings contribute to the discussion of how financial institutions can be associated with human welfare beyond conventional output measures. In the finance–growth literature, credit access and financial intermediation are linked to investment opportunities and the distribution of economic resources (Levine, 2005; Beck et al., 2007). In addition, the study places these financial relationships alongside urbanisation and ecological footprint, highlighting the possibility that improvements in HDI may coincide with increased resource demands (Chen et al., 2022). The potential policy relevance extends to poverty reduction, health, education, employment, and inequality, which are reflected in Sustainable Development Goals 1, 3, 4, 8, and 10. However, the regressions do not directly estimate progress on these goals, nor do they identify household-level mechanisms. Therefore, such links should be understood as theoretical and policy implications rather than separately established empirical outcomes.

6 Conclusion

In this study, we sought to explain major drivers of human development in selected economies using fixed and random effects techniques. The results highlight that financial access via branches and ATMs, financial development, the availability of domestic credit, and ecological footprint growth contribute to human development across selected Asian economies. Whereas these factors are positively related to HDI, the Taken together magnitudes of the impacts, which in particular are rather modest concerning financial development and credit availability, suggest that these individual factors may be insufficient to produce considerable human development improvements themselves but are part of a more general development strategy entailing investment in education, healthcare, and environmental sustainability. Future research should also provide long-term analyses of the influences of ecological footprint growth and urbanisation on human development as these change along with evolving economic and environmental conditions.

While urbanisation is associated with increased access to health, education, and economic opportunities, it also reflects the challenges of managing rapid growth within the confines of infrastructure and environmental limitations. As the ecological footprint indicates, resource consumption and human development are positively correlated; this means that increased industrialisation and urbanisation can deliver immediate benefits, but they also raise concerns about the long-term sustainability of these improvements. In growing economies, it is important to ensure that such development does not come at the expense of environmental degradation, which could eventually undo the very gains being recorded. Though financial services growth, urbanisation, and resource consumption can improve human development, a balanced approach to economic growth with environmental responsibility is essential for sustainable and inclusive growth. Further research

is therefore needed to elaborate on these dynamics, including long-term growth effects and how sustainability forms the core of human development policies.

The findings indicate that commercial bank branches, ATMs, domestic credit, urban population, and ecological footprint are positively associated with the HDI within the reported specifications. However, these variables operate within broader institutional, distributional, and environmental conditions. Therefore, the findings support a multidimensional interpretation of human development rather than a claim that any single factor independently drives the observed outcomes.

6.1 Study Limitations and Future Research

Several limitations qualify the interpretation of the findings. First, the sample covers eight Asian economies during 2005–2018; therefore, the results may not generalise to other settings or later periods. Second, bank branches and ATMs proxy physical access and do not directly measure account ownership, actual financial service use, service quality, digital payments, or financial literacy. Third, the financial inclusion index requires a reproducible account of its composition and scaling. Fourth, the ecological-footprint series has fewer reported observations than the other variables, and this missingness could affect estimation. Fifth, the panel specifications may be exposed to omitted-variable bias, reverse causality, and untested forms of error dependence. Future studies may examine digital financial inclusion and gender-specific access, investigate institutional quality as a conditioning factor, and disaggregate human development into education, health, and living-standard dimensions. Similarly, comparisons across income groups and the inclusion of subsequent years may help determine whether the reported relationships persist in changing financial and environmental conditions (Helmy, 2024; Verma et al., 2023).

7. Recommendations

The findings underscore the importance of adopting context-specific policy interventions to enhance human development in Bangladesh, India, Indonesia, Malaysia, Pakistan, Iran, Jordan, and the Philippines. Governments should formulate integrated development strategies that address financial inclusion, access to credit, sustainable urbanisation, environmental sustainability, education, healthcare, and socioeconomic inequalities while considering national institutional and economic conditions.

First, strengthening financial inclusion requires expanding access to formal banking services, particularly in rural and underserved communities. Governments and financial institutions should promote digital banking, mobile financial services, and financial literacy initiatives to improve financial accessibility and participation. In Bangladesh, Pakistan, and Indonesia, collaboration with telecommunications providers can facilitate the delivery of affordable financial services to financially excluded populations. Second, improving domestic credit accessibility is essential for supporting entrepreneurship and private-sector development. Governments should establish favourable lending frameworks, simplify credit procedures, and expand microfinance programmes to address the financing constraints faced by small and medium-sized enterprises (SMEs). Such interventions can stimulate productive investment, create jobs, and diversify the economy.

Third, sustainable urban development and environmental protection should constitute central components of national development policies. Investments in affordable housing, public transportation, healthcare infrastructure, and sustainable urban planning can mitigate the socioeconomic pressures associated with rapid urbanisation. Similarly, promoting renewable energy, water conservation, and climate-resilient agricultural practices is particularly important for countries experiencing environmental and resource-related constraints, including Iran, Pakistan, and Jordan. Fourth, improving access to education and healthcare requires sustained public investment and institutional reforms. Governments should prioritise educational infrastructure, healthcare facilities, and digital service delivery in disadvantaged regions. In addition, public-private partnerships and telemedicine initiatives can improve access to services, reduce regional disparities, and strengthen human capital development. Fifth, addressing gender inequalities and

regional development disparities requires targeted socioeconomic interventions. Expanding women's access to financial services, entrepreneurship training, and employment opportunities can strengthen economic participation and social inclusion. Furthermore, incentives for rural investment and infrastructure development can help reduce geographical inequalities and promote more balanced economic development.

Finally, effective policy implementation requires institutional coordination, stakeholder participation, and systematic evaluation. Collaboration among governments, financial institutions, private-sector organisations, and local communities can strengthen policy implementation and resource mobilisation. Moreover, capacity-building initiatives, evidence-based monitoring, and cross-country knowledge exchange can facilitate policy adaptation and improve long-term development outcomes. Implementing these recommendations should reflect the institutional capacities, socioeconomic conditions, and development priorities of individual countries. An integrated, context-sensitive policy framework can strengthen financial inclusion, promote sustainable economic development, reduce structural inequalities, and improve human development outcomes across the selected Asian economies.

Ethical Statement: Not Applicable

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