



Unified payment Interface (UPI) and Inclusive growth: A correlation and regression study of India's progress towards Sustainable Development Goals (SDGs) through UPI

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Abstract

Unified payment interface (UPI) has been identified as a key tool of digital revolution in India. However, it also plays an important role in achieving United Nation's Sustainable Development Goals (SDGs) in India. This study investigates whether poverty reduction (SDG 1), Industrial growth (SDG 9), Income inequality (SDG 10) and economic growth (SDG 8) have any impact on the growth of digital financial inclusion and growth in India through UPI. Correlation and regression analysis was done on panel data from 2016-17 to financial year 2024-25. UPI transaction volume was taken as a proxy for measuring the growth of UPI while poverty rate, Gini coefficient, Index of Industrial Productivity and GDP growth rate (%) were taken as proxies for measuring the advancement of SDGs. The analysis revealed that social factors like poverty rate and income inequality plays a key role in expansion of digital finance while macro economic factors such as Industrial growth and Gross Domestic productivity do not have significant influence on UPI or digital financial expansion.

Keywords: Banking system, commercial banks, depositors, likert scale, bangladesh

Introduction

Digitalization of financial systems has changed the landscape of modern economies. The introduction of UPI by National Payment Corporation of India in 2016 can be considered as a landmark change in transforming the Indian market to a digital one. Within a few years of its initiation, UPI has grown into an important payment platform that is altering transaction behavior, financial inclusion patterns and operational efficiency of small scale businesses in India. Digital payment systems are closely linked with the broader agenda of sustainable development. The United Nation's Sustainable Development Goals (SDGs) emphasize on inclusive growth, poverty reduction, reduced inequality and sustainable industrial development. However empirical evidence remains limited for validation of these relationships.

The Indian economy can be considered as a perfect case for examining macro economic implications of digital finance. The rapid growth of UPI transaction volume and value coincides with measurable shifts in income distribution, industrial output and aggregate economic performances. Variables such as Gini Coefficient (income inequality proxy), Gross Domestic Product (economic growth proxy), Index of Industrial Production (Industrial growth proxy) and poverty rate (Poverty reduction proxy) aligns with SDG 1 (poverty reduction), SDG 8 (Decent work and economic growth), SDG 9 (industry, Innovation and Infrastructure) and SDG 10 (Reduced inequality). The correlation and regression analysis statically can validate quantitatively the effect of UPI growth on achievement of SDGs in India.

Digital finance can smooth the functioning of economic activities and facilitate expansion of industries. Such ease of doing business can lead to higher employment and income opportunities which further the growth of economy. It promotes and encourages self employment which is very much essential for a developing nation like India. UPI is a revolution in digital banking environment in India which has grown and is still growing because of its ease of use and acceptability. This study is based on statistical associations

between UPI growth and SDG proxies in India using correlation and regression analysis. It tries to enquire whether UPI transaction volume can explain the variations in Gini Coefficient, GDP growth rate, IIP and poverty rate over a period of 10 financial years (from 2016-17 to 2025-26). The study aims to contribute towards the growing literature of digital finance and its contribution towards sustainable development.

Literature review

Economic growth can be positively associated with digital finance. This has been proved by evidences from studies across various economies. A study of 101 countries from 2014-2019 found that there is significant association between digital payment and economic growth as the former can increase the GDP per capita by reducing informal employment and encouraging smooth flow of economic activities. (Aguilar *et al*, 2024) [1]. Thus we can consider digital finance as a catalyst for higher economic performance and expansion of financial services.

Research studies on financial inclusion across 84 countries shows that digital finance can compliment traditional finance and foster economic growth. (Siti Nurazira *et al*, 2024) [9]. Improved access to digital finance contributes to increased affordability and greater inclusion of banking which is demonstrated by studies on Asia-Pacific region. (Dananjani Basnayake *et al*, 2024) [2]. Such results highlight the broader macroeconomic relevance of digital finance.

Empirical investigation found that expansion of digital finance is linked to reduction in poverty level. Provincial data in China indicates digital finance inclusion can alleviate poverty. (Chien Chiang Lee, 2023) [6]. Digital finance inclusion contributes to poverty reduction and inclusive growth has been stated across various reports using comprehensive panel data. (Motlanalo Kgodiso Moshoeane *et al*, 2025) [5]. Increasing financial access and opportunities for income enhancement by digital financial services can help to break multidimensional poverty traps. (Zhimin Duan, 2024) [4].

In a cross country panel investigation of emerging economies, low level of income disparity can be associated with expanded financial technology adoption. This indicates the fact that digital financial services can help to bridge gaps between different income groups. (Margaret Rutendo Magwedere *et al*, 2025) ^[7]. Digital financial inclusion can help to narrow down urban rural income gaps by developing industrial structure and increasing opportunities of income generation. Studies on BRICS nation states that there is a negative impact of digital financial inclusion on income inequality which brings technological innovation and infrastructural development. (Mohd Suhrab *et al*, 2025) ^[8]. Evidences from China indicate that digital financial inclusion helps to enhance industrial structures and support rural income growth. (Changoun Wen *et al*, 2024) ^[10]. There has been considerable research that has established links between digital finance and macroeconomic outcomes. But most of the studies do not focus on a specific nation's digital payment system (such as UPI for India). Previous research work tends to examine broad measures of digital financial inclusion or payment adoption across countries or provinces. There remains a gap in literature concerning how growth of digital payment platforms correlate with macro economic variables such as GDP, inequality of income, reduction of poverty and industrial output within a single country.

Theoretical background

“Sustainable development is development that meets the needs of present without compromising the ability of future generations to meet their own needs”- Bruntland report
The Sustainable Development Goals (SDG) are built on three pillars theory which states that a development process can be considered as sustainable if it satisfies the following three dimensions:

1. Economic viability: generation of wealth and employment
2. Social Equity: provides and satisfies human rights, gender equality and fair distribution of resources
3. Environmental protection: preserving bio diversity and atmospheric stability

The need for SDGs arose at the Rio G20 conference where it was decided to have a successor of Millennium Development Goals (MDG) as the MDGs were too much focused on wealth creation and ignored the sustainability of economy. The decision to develop SDGs involved millions of citizens and all member states of United Nations. SDGs made sure that economic growth and welfare is achieved without compromising equality and environment. It aims to create a safe operating space by integrating environmental limits into economic planning. SDG exists to create business responsibility towards rational use of factors of production and keeping in mind to reduce the damage of development. SDGs such as poverty reduction, industrial and infrastructural growth, income equality and economic growth can be achieved and maintained if businesses have proper awareness about sustainability.

UPI and SDGs

Unified Payment Interface (UPI) developed by National Payment Corporation of India (NPCI) in 2016 and regulated by Reserve Bank of India (RBI) is a real time interbank digital payment platform that enables peer to peer (P2P) and

peer to merchant (P2M) transactions through mobile platforms. Since its introduction, it has significantly contributed to the development and accessibility of digital banking in India. Apart from being an important driver for expansion of digital banking in India, UPI has proved to be an important tool of economic expansion of India. Because of its ease of use, 24 x 7 access and transparency of transactions it has contributed handsomely towards the growth of economic activities in India.

UPI and SDG 1 (no poverty)

UPI helps to promote financial inclusion, improves income security and helps micro businesses to conduct their business with ease. With the help of UPI, dependence on cash and costly infrastructure for business reduces. It supports the growth of income earning opportunities by increasing transparency of transaction, access to required credit and expansion of business customer base. As a result UPI can strengthen pathway to poverty alleviation and inclusive economic growth.

UPI and SDG 10(reduced inequality)

UPI has reduced dependence on physical bank branches as a result of which geographical inequality to access financial services has been narrowed down. UPI cost structure has minimum or zero transaction cost as it allows conducting economic transactions without any financial burden. With creation of financial footprints informal workers and small entrepreneurs can have access to formal credit channels which reduces income gaps created by financial exclusion. Hence UPI has been aligned with SDG 10 as it expands financial access, lowers transaction barriers, increases economic participation and improves access to capital.

UPI and SDG 8 (Economic growth)

UPI reduces the friction of everyday transaction as it doesn't require costly machines or complex arrangements. A smart phone linked to bank account is sufficient. This has lowered operational barriers. Micro entrepreneurs mostly depend on quick cash rotations which helps them to manage expenses and sustain operations. This contributes to improved productivity of enterprises. Improved access to credit helps many micro businesses operators to expand their businesses which results in more employment generation and better income opportunities. When supported by complimentary policies of government UPI can strengthen foundations of SDG 8 by enhancing productivity, encouraging entrepreneurship and contributing to inclusive economic growth.

UPI and SDG 9 (Industry, Innovation and Infrastructure)

A reliable payment system is crucial for smooth business operations. When transactions are settled quickly, micro and small business can manage their supply chains efficiently. This helps in the growth of overall business ecosystem and strengthens digital connectivity. UPI offers exactly what is required for achievement of such advancements and supports growth of startups. UPI contributes to modern financial infrastructure that supports industrial expansion. UPI aligns with SDG 9 by strengthening digital infrastructure, encouraging innovation in financial technology and facilitates smooth industrial transactions across the economy.

Data and Methodology

The source of data for this paper is mainly from secondary sources.

For estimation of income inequality the value of Gini coefficient for the same time period (from financial year 2016-17 to 2024-25) is taken. For estimation of poverty rate the poverty rate percentage in India is taken for the above mentioned time period. Index of Industrial Productivity in India is taken to estimate the growth of industrial productivity for the same time period and for measuring the value of economic growth the Gross Domestic Productivity (GDP) percentage is taken from financial year 2016-17 to 2024-25. In case of Gini coefficients the data from financial year 2016-17 to 2024-25 have been collected from World Bank historical data and estimates by Ministry of Statistics, India. For Index of Industrial Production the data were collected from Government data sets and rate of Gross Domestic Productivity (GDP) were collected from official MoSPI estimates, press releases and government releases for financial years 2016-17 to 2024-25. The data for poverty rate has been collected from latest available consumption based estimates and projections as well as from World Bank available data. UPI transaction volume for the same period has been collected from data set released by NPCI. Simple correlation and regression analysis has been performed using MS Excel on the available data where UPI expansion has been taken as a dependent variable while Gini coefficient, IIP, Poverty rate and GDP has been taken as independent variable separately.

Analysis and results

Simple regression and correlation analysis on UPI transaction volume from financial year 2016-17 upto 2024-25 as dependent variable and poverty rate as independent variable for the same time period indicates a statistically significant relationship between the two variables. The regression coefficient for poverty rate was found to be -1216.83 ($p = 0.0012$) indicating that for every 1% increase in poverty rate the UPI transaction volume decreases by 1216.83 units. These findings suggest that poverty rate is a strong predictor of UPI transaction with correlation coefficient of 0.796.

A linear regression and correlation analysis taking GDP% as an independent variable and UPI transaction volume as dependent variable reveals the value of R square of 0.0583. This indicates that 5.8% variations in UPI transactions can be explained by GDP growth rate. Hence we can deduce that GDP growth rate as an insignificant predictor of UPI transactions.

When Index of Industrial Production (IIP) was taken as an independent variable for the same time period then the value of R square came to 0.1089 which signifies that around 10.9% of variations in UPI volume is explained by IIP. This again like GDP growth rate proves to be a non significant predictor of UPI and both of them (GDP and IIP) have a very insignificant influence on UPI transactions in India.

The Gini coefficient which is taken as a proxy for income inequality is taken as an independent variable for the same purpose then the value of R square came to 0.4501 which means that around 45% variance of UPI transactions in India can be related to Gini Coefficient. F value came to 0.0479 (less than 0.05) which again states that the influence of Gini coefficient on UPI transactions is statistically significant.

Policy Recommendations

The analysis study shows that social welfare indicators (Poverty and inequality) are real drivers of UPI volume on the other hand macro growth indicators such as GDP and Industrial growth have almost no measurable impact. The high predictive power of Poverty rate (aligned with SDG 1) and Gini coefficient (SDG 10) indicates that UPI is deeply rooted in social equity rather than macro economic expansions. The weak statistical values between UPI and GDP growth (aligned with SDG 8) and IIP (aligned with SDG 9) suggests that traditional trickle down economic growth is insufficient. Policy focus therefore must shift from aggregate economic metrics towards targeted poverty alleviation and income disparity as outlined by United Nations SDG 2030 framework.

Conclusion

The statistical analysis confirms that UPI transactions volume is driven by socio economic factors rather than high level macro economic aggregates. The poverty rate stands as single most critical element ($R^2 = 0.795$, p value = 0.0012) demonstrating the fact that as poverty decreases in India, digital financial inclusion increases. This aligns directly with SDG 1 suggesting that poverty alleviation is the most effective tool for enriching digital financial inclusion in the economy. The significant impact of Gini coefficient (p value = 0.0479) highlights that income inequality (SDG 10) acts as a structural barrier for digitalization of economy.

The study also found that GDP growth rate (p value = 0.531) and IIP (p value = 0.385) have no statistical significance over UPI transaction volume. This creates a “Macro digital paradox” which states that while economy may have expanded at national level, this growth does not automatically translate into digital financial inclusion unless it is accompanied by reductions in poverty and income inequality. Therefore from this study we can conclude that digitalization of financial economy can only be achieved in India if policies focusing on social welfare are enacted and executed properly.

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