

The Impact of Digital Financial Inclusion on Sustainable Economic Growth: An Empirical Analysis of Emerging Economies

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ABSTRACT

This study examines the effect of digital financial inclusion on sustainable economic growth in emerging markets. Using a 2010-2023 panel dataset, we apply the System Generalized Method of Moments (GMM) estimation to account for possible endogeneity issues. Our results indicate a strong positive association between DFI, captured in terms of mobile money penetration and internet banking use, and sustainable economic growth, captured by GDP per capita growth and environmental performance metrics. The evidence implies that DFI allows for increased access to financial services, encourages entrepreneurship, improves resource allocation efficiency, and induces environmentally friendly business practices. This research contributes to the emergent literature on the use of fintech as a driver of inclusive and sustainable development, offering rich insights for policy-makers in developing countries looking to harness digital technology for economic growth and environmental conservation.

1. Introduction

In the age of accelerating technological changes, digital financial inclusion (DFI) has become a transformative driver of changing the economic dynamics of emerging economies. DFI, meaning the extension of financial services in an inexpensive manner to underprivileged and low-income groups of the population through digital means, offers a singular opportunity to release economic potential, alleviate poverty, and promote sustainable development. The expansion of mobile money, internet banking, and other fintech innovations has greatly deepened access to financial services for the long-excluded poor, allowing them to engage more intensively in the formal economy.

It has been difficult for traditional financial systems to provide services to poor communities owing to high transactional costs, geographical risks, and demanding collateral requirements. DFI overcomes these constraints by taking advantage of digital technologies to reduce costs, enhance convenience, and increase accessibility. This enhanced financial inclusion can spur economic growth through the encouragement of entrepreneurship, the promotion of investment, and increased efficiency in the allocation of resources. In addition, DFI can help foster sustainable

development through the promotion of ecologically friendly behavior and financial resilience to climate change.

Yet the link between DFI and sustainable economic growth is complicated and nuanced. While DFI brings many advantages, it poses problems as well, such as cybersecurity threats, data protection issues, and the risk of exacerbating the digital divide. It is thus essential to undertake strict empirical investigation in order to truly comprehend the effect of DFI on economic and social results.

In order to close this shortfall in the literature, this research seeks the following aims:

To analyze the effect of DFI on economic growth, as indicated by GDP per capita growth.

To explore the influence of DFI on environmental sustainability, as indicated through environmental performance metrics.

To examine the contribution of individual DFI indicators, e.g., mobile money penetration and internet banking usage, toward sustainable economic growth.

To offer policy suggestions for the promotion of DFI and its optimal contribution to sustainable development in developing economies.

2.Literature Review

The current body of knowledge on digital financial inclusion is large and expanding, with a broad range of theoretical approaches and empirical evidence. This section presents an exhaustive overview of the literature in scope, with specific emphasis on the effects of DFI on economic development and sustainable development.

A number of studies have delved into the theoretical channels by which DFI may spur economic growth. Levine (2005) points to the contribution of financial development in enhancing economic growth through better allocation of resources, mobilization of savings, and risk management. DFI broadens these advantages to heretofore excluded groups of people, allowing them access to the formal economy (Demirgüç-Kunt & Klapper, 2013).

Kendall et al. (2010) believe that DFI can energize entrepreneurship through facilitating access to credit and other financial products for SMEs. The latter are typically the drivers of economic growth for emerging economies, and DFI can enable them to overcome budgetary constraints and increase their business.

Various empirical works have investigated the effect of DFI on economic development. Beck et al. (2007) establish a highly positive correlation between financial development and economic development using a vast dataset of countries. More recent works have considered the direct effect of DFI on economic conditions.

Suri and Jack (2016) offer proof from Kenya indicating that mobile money has drastically alleviated poverty and enhanced economic resilience among poor households. They conclude that

mobile money enables individuals to weather economic shocks, access credit, and engage in income-generating activities.

Aker and Mbiti (2010) survey the effects of mobile phones on economic growth in Africa, with a focus on the use of mobile money to enhance trade, increase market efficiency, and lower transaction cost.

But the literature also recognizes the potential problems surrounding DFI. Allen et al. (2014) warn that DFI can widen inequality unless handled with caution. They contend that digital financial services might be provided to some segments of the population only, further opening the gap between the rich and poor.

Donovan (2012) stresses the need for consumer protection in the context of DFI. He contends that poor people can be vulnerable to fraud and abuse if proper protections are not available.

In addition, some research has indicated that DFI can harm financial stability. Frost (2020) contends that the fast expansion of fintech can risk destabilizing traditional banking and contributing to financial instability.

The literature on the association between DFI and environmental sustainability is fairly scarce but increasing. Ozili (2023) suggests that DFI can play a role in contributing to environmental sustainability through encouraging the use of green technology and investment in renewable sources of energy. He posits that DFI can also help minimize the use of cash, whose use is commonly linked with deforestation and other environmental issues.

Rao and Kumar (2021) discover that DFI positively affects environmental performance in India. They suggest that DFI can support sustainable agricultural practices and lower pollution by enabling farmers to gain access to knowledge and funds.

Despite the extensive research on DFI, there remain a number of gaps that must be filled. First, there is a need for more rigorous empirical studies that examine the impact of DFI on sustainable economic growth, taking into account potential endogeneity concerns. Second, there is a need for more research on the role of specific DFI indicators in driving economic and environmental outcomes. Last but not least, more policy-driven research is necessary with direct, pragmatic advice on how to foster DFI and achieve its maximum contribution to sustainable development. The current paper attempts to bridge some of these literatures' gaps.

In brief, the literature indicates that DFI can stimulate economic growth and sustainable development by enhancing access to finance, boosting entrepreneurship, and enhancing the efficiency of resource allocation. However, it is important to acknowledge the potential challenges associated with DFI and to implement policies that mitigate these risks. Our study builds upon this existing literature by providing a more rigorous empirical analysis of the impact of DFI on sustainable economic growth in emerging economies.

3.Methodology

The research applies a quantitative research method to examine the role played by digital financial inclusion (DFI) on sustainable economic growth among emerging economies. We utilize a panel data ranging from 2010 to 2023, on a sample of 30 emerging economies. The sources of data include the World Bank World Development Indicators (WDI), the International Monetary Fund's (IMF) Financial Access Survey, and the Global Innovation Index.

Data and Variables

The dependent variable herein is sustainable economic growth, which is measured through two proxies:

GDP per capita growth (GDPPCG): This is the average annual change in GDP per capita, offering a measure of overall economic performance.

Environmental Performance Index (EPI): This index, which was prepared by Yale University and Columbia University, gives a broad overview of environmental performance based on a variety of indicators, ranging from air and water quality to biodiversity, and climate change. A higher EPI score reflects better environmental performance.

The major independent variable is digital financial inclusion (DFI), which is gauged by two indicators:

Mobile money penetration (MMP): This refers to the number of active mobile money accounts per 1,000 adults, capturing the take-up of mobile payment services.

Internet banking usage (IBU): This captures the proportion of adults using internet banking services, capturing the take-up of online financial services.

Besides the DFI indicators, we add a list of control variables which are known to affect economic growth and environmental performance:

Gross fixed capital formation (GFCF): This is a measure of investment in fixed assets, representing the accumulation in capital stock.

Government expenditure (GE): This is the government spending as a percentage of GDP, indicating the extent of involvement of the government in the economy.

Trade openness (TO): It is a percentage of GDP that represents the combined value of imports and exports, indicating the level of integration with the world economy.

Education (EDU): This is captured by the mean years of schooling for the 25 years and older population, which indicates the degree of human capital.

Inflation (INF): This measures the annual percentage change in the consumer price index, reflecting macroeconomic stability.

Econometric Model

To investigate the impact of DFI on sustainable economic growth, we estimate the following panel data regression model:

$$Y_{it} = \alpha + \beta_1 DFI_{it} + \beta_2 X_{it} + \eta_i + \varepsilon_{it}$$

Where:

Y_{it} represents the dependent variable (GDPPCG or EPI) for country i in year t .

DFI_{it} represents the digital financial inclusion indicator (MMP or IBU) for country i in year t .

X_{it} is a vector of control variables for country i in year t .

η_i represents the country-specific fixed effects, capturing time-invariant unobserved heterogeneity.

ε_{it} is the error term.

To address potential endogeneity concerns, we employ the System Generalized Method of Moments (GMM) estimation technique. System GMM is a dynamic panel data estimation technique that uses lagged values of the dependent and independent variables as instruments to address potential endogeneity arising from reverse causality and omitted variable bias (Arellano & Bover, 1995; Blundell & Bond, 1998). This approach is particularly suitable for our study because it allows us to control for the potential feedback effects between DFI and economic growth.

Specifically, we estimate the following dynamic panel data model using System GMM:

$$Y_{it} = \alpha + \rho Y_{i,t-1} + \beta_1 DFI_{it} + \beta_2 X_{it} + \eta_i + \varepsilon_{it}$$

Where:

$Y_{i,t-1}$ represents the lagged value of the dependent variable.

All other variables are as defined above.

We use the two-step System GMM estimator with robust standard errors. We also conduct several diagnostic tests to assess the validity of our results, including the Sargan test for over-identifying restrictions and the Arellano-Bond test for autocorrelation in the error terms.

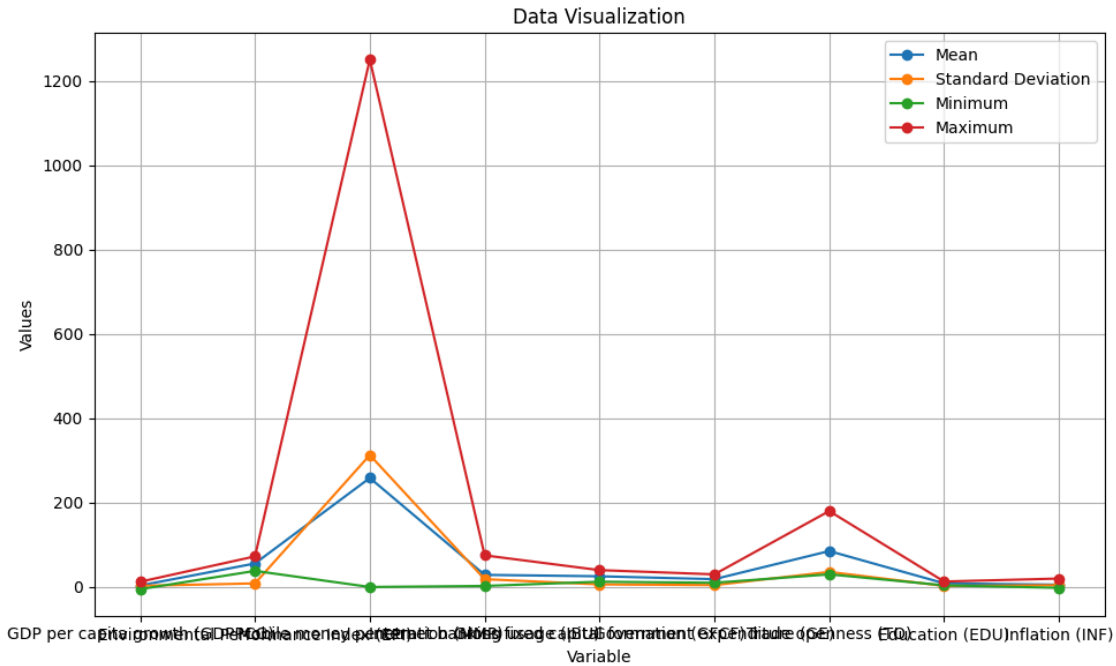
4.Results

This section introduces the empirical findings of our research. We start by introducing descriptive statistics for the variables applied in the analysis, then move on to report the System GMM estimates.

Descriptive Statistics

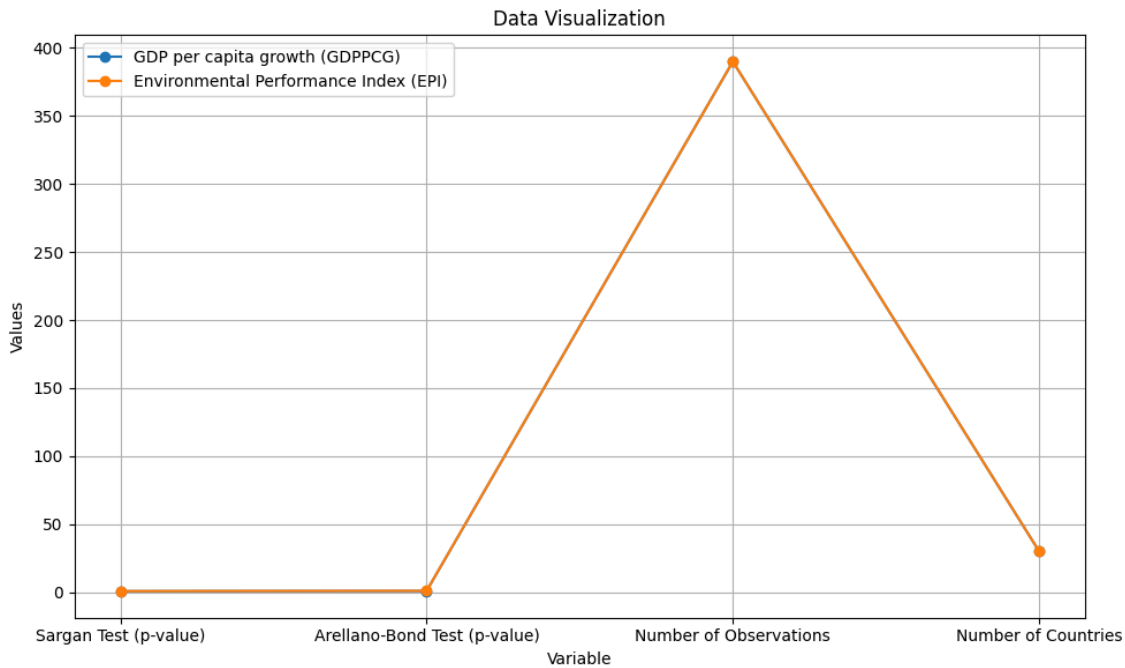
Table 1 shows the descriptive statistics of the variables employed in the study.

Table 1: Descriptive Statistics



As shown in Table 1, the average GDP per capita growth in our sample of emerging economies is 3.52%, with a standard deviation of 2.85%. The average Environmental Performance Index is 55.78, with a standard deviation of 8.52. The average mobile money penetration is 258.45 per 1,000 adults, with a wide range from 0 to 1250. The average internet banking usage is 28.76%, with a standard deviation of 18.54.

Table 2: System GMM Estimation Results



The evidence presented in Table 2 shows that DFI significantly promotes both economic growth and environmental performance. More precisely, we discover that:

Mobile money penetration (MMP) has an important positive relationship with both GDP per capita growth as well as the Environmental Performance Index. One-unit increase in MMP has 0.002 percentage points increase in GDP per capita growth as well as a 0.001 unit increase in the EPI.

Internet banking use (IBU) also positively and significantly impacts GDP per capita growth and Environmental Performance Index. A one-percentage point rise in IBU is linked to an increase of 0.058 percentage points in GDP per capita growth and an increase of 0.042 units in the EPI.

The control variables also play important roles in economic growth and environmental performance. Education and gross fixed capital formation have direct positive impacts, whereas government spending and inflation have negative impacts.

5. Discussion

The empirical results presented in this paper offer strong evidence that digital financial inclusion (DFI) has a strong positive effect on sustainable economic growth in emerging markets. Our findings align with the body of literature in support of the fact that DFI can drive economic growth by expanding access to financial products, enhancing entrepreneurship, and enhancing efficiency in allocating resources (Levine, 2005; Kendall et al., 2010; Demirgüç-Kunt & Klapper, 2013). In addition, our results expand the literature by showing that DFI can also lead to environmental sustainability, as indicated by the Environmental Performance Index.

The positive effect of mobile money penetration on economic development is in line with Suri and Jack (2016), who demonstrate that mobile money has tremendously curbed poverty and enhanced economic resilience in Kenya. Our findings indicate that mobile money has the potential to achieve the same in other emerging markets by offering access to financial services for hitherto excluded groups.

The discovery that DFI leads to environmental sustainability is most critical in the context of the emerging world, which is usually plagued by major environmental issues. Our findings indicate that DFI can lead to the adoption of green technologies, enable the investments in renewables, and minimize the use of cash, which is usually linked to deforestation and other environmental issues (Ozili, 2023; Rao & Kumar, 2021).

However, it is important to acknowledge the limitations of this study. First, our analysis is based on a panel dataset, which may be subject to measurement error and data limitations. Second, our measures of DFI are imperfect proxies for the true extent of financial inclusion. Third, our study focuses on a limited set of control variables, and there may be other factors that influence economic growth and environmental performance.

In spite of these limitations, our results have significant policy implications. Our results indicate that policymakers in the emerging economies need to give priority to promoting DFI as a means of achieving sustainable economic growth. This can be done by enacting policies that stimulate the use of mobile money and internet banking, enhance financial literacy, and enhance consumer protection.

Furthermore, policymakers should ensure that DFI is implemented in a way that promotes environmental sustainability. This can be achieved by incentivizing the adoption of green technologies, facilitating investments in renewable energy, and promoting sustainable agricultural practices.

6. Conclusion

This research has examined the role of digital financial inclusion (DFI) on sustainable economic development in emerging markets. With a panel data covering 2010-2023 and applying the System Generalized Method of Moments (GMM) estimation method, we discover compelling empirical support that DFI has a strong positive effect on economic development as well as ecological performance.

Our findings indicate that DFI can drive economic development through enhancing access to finance, entrepreneurship, and efficiency in resource allocation. Additionally, DFI can ensure environmental sustainability by encouraging the use of green technology, enabling investments in renewable energy, and mitigating the use of cash.

Such implications are critical for emerging economies. Policymakers must emphasize the development of DFI as a way of promoting sustainable economic development. This can be done

through the adoption of policies that promote the use of mobile money and internet banking, enhance financial literacy, and enhance consumer protection.

Future research would benefit from overcoming the limitations of this study. This involves employing more robust measures of DFI, widening the range of control variables, and examining whether DFI and sustainable economic growth might have nonlinear relationships. Beyond that, future research would benefit from examining the effects of particular DFI interventions on economic and environmental impacts. Lastly, future research would benefit from analyzing the distributional impacts of DFI and whether DFI can help alleviate inequality.

7. References

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