

DO DIGITAL PAYMENTS DRIVE ECONOMIC GROWTH? EVIDENCE FROM DEVELOPING COUNTRIES



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ABSTRACT

Background: Digital payments have expanded rapidly in recent decades, driving a global shift from cash to cashless transactions and supporting economic efficiency, financial inclusion, and economic recovery. However, their growth remains uneven, with developed countries experiencing stable adoption due to advanced infrastructure, while developing countries face more volatile expansion driven by structural limitations and varying levels of digital readiness.

Purpose: This paper aims to examine the impact of digital payment instruments specifically credit cards, debit cards, and e-money on economic growth in developing countries. Additionally, the study aims to assess the role of key macroeconomic factors, including inflation, population growth, and internet penetration, in influencing economic growth.

Design/methodology/approach: This study uses panel data from five developing countries Argentina, Brazil, India, Indonesia, and Turkey over the period 2013–2022. Static panel is used and the result indicates that the Fixed Effects Model (FEM) is the most appropriate specification.

Finding/Result: Results show that the growth of digital payments enhance economic growth in the developing countries. In detail, credit cards and e-money positively affect economic growth. Additionally, an increase in population growth and internet penetration reduces economic growth.

Conclusion: Empirical results show that credit cards and e-money positively contribute to economic growth. In detail, e-money transactions grow faster than the other digital payment instrument across developing countries, although adoption varies due to differences in digital infrastructure, financial inclusion, and macroeconomic stability.

Originality/value (state of the art): This study will contribute to the literature by expanding the determinants of economic growth by considering the rise of digital payments.

ARTICLE INFO

Keywords:

credit cards, digital payments, debit cards, economic growth, e-money, developing countries

How to Cite: Lestari, D. P., Anggraeni, L., & Dilla, S. (2026). Do digital payments drive economic growth? Evidence from developing countries. *Indonesian Journal of Fintech, Banking and Financial Services*, 1(1),1.

INTRODUCTION

Digital payments have rapidly expanded in the 21st century alongside the proliferation of technology-based payment instruments, driving a global shift from cash to cashless transactions. Evidence from global reports shows a steady increase in cashless payment adoption accompanied by a decline in cash usage (G4S Global, 2018), as governments worldwide promote

digital financial transformation (Patra & Sethi, 2024). Importantly, the transition to cashless systems does not eliminate physical cash entirely but instead minimizes its use by providing more efficient, technology-driven alternatives (Kumari & Khanna, 2017).

International forums led by the IMF and World Bank in 2022 and 2024 highlight the critical role of digital payments in supporting economic recovery

and advancing financial inclusion, particularly in developing economies. These forums emphasize the importance of secure and efficient payment systems, as well as the provision of technical and financial assistance to strengthen digital infrastructure (Adrian & Pesme, 2023; Nayak et al. 2025). Financial technology (FinTech) further accelerates this process by expanding access to financial services, thereby fostering economic growth and improving economic efficiency (Zhang, 2024).

Digital payments have increasingly complemented and partially replaced traditional paper-based payment systems (Scholnick et al. 2008), facilitating transactions between consumers and businesses while also enhancing government revenue and overall economic performance (Hasan et al. 2012). Moreover, the development of cashless payments intersects with multiple perspectives, including banking, financial economics, macroeconomics, monetary economics, and regulatory frameworks (Tee & Ong, 2016; Zandi et al. 2016; Mushkudiani, 2018).

However, the growth of digital payments differs significantly between developed and developing countries. Advanced economies benefit from well-established infrastructure and regulatory frameworks, including EMV technology, biometric authentication, and open banking regulations such as PSD2, which contribute to stable and consistent growth in digital transactions. In contrast, developing countries face more volatile growth due to infrastructural limitations, such as inadequate point-of-sale (POS) terminals, unreliable internet access, and underdeveloped mobile payment systems (World Bank, 2024). The COVID-19 pandemic further exposed these disparities. Developing countries experienced a significant decline in digital payment growth in 2020 (-11.93%) due to limited investment capacity during the crisis, followed by a strong recovery in 2021 (24.89%) driven by accelerated digital adoption (World Bank, 2024). This rebound was largely supported by the increased use of e-wallets, mobile banking, and other digital financial services, underscoring the transformative role of digital payments in modern economies.

Research on the impact of digital payments on economic growth has gained increasing attention in recent years, driven by rapid technological innovation in payment systems. While these innovations create significant opportunities to enhance efficiency and growth, they

also pose challenges that depend on each country's ability to adapt and respond effectively. In many developing countries, the adoption of digital payments remains suboptimal, as economies are still heavily reliant on cash-based transactions. Furthermore, a large proportion of the population remains unbanked, limiting access to digital payment instruments and hindering financial inclusion (Annan et al. 2024). Table 1 highlights a clear contrast between developing and developed countries in digital payments from 2013–2022. Developed countries show consistently higher transaction values with stable but low growth, while developing countries experience more volatile yet higher growth rates. Despite fluctuations, developing countries demonstrate strong expansion potential, whereas developed countries reflect market maturity. Notably, the sharp decline in developed countries in 2022 alongside continued growth in developing countries suggests a shifting dynamic, emphasizing the growing importance of digital payments in emerging economies.

Empirical findings on the relationship between digital payments and economic growth remain mixed and context-dependent. For instance, Noman et al. (2023) find that, in the long run, various payment instruments including cards, e-money, credit transfers, and cheques positively and significantly influence economic growth, although short-run effects differ across instruments. Similarly, Grzelczak and Pastusiak (2020) report that card and transfer payments positively affect economic growth in both Central and Eastern Europe and Western Europe, albeit with variations across payment types. Wong et al. (2020) show that debit card usage significantly promotes growth in OECD countries, whereas credit cards and e-money have no significant effect. In contrast, Tran and Wang (2023) find a negative relationship between digital payment instruments (credit cards, debit cards, and e-money) and economic growth in G20 countries and Vietnam.

Despite this growing body of literature, most studies predominantly focus on developed economies, where digital payment systems are already well-established and supported by robust infrastructure. Consequently, evidence from developing countries where digital payment adoption is less mature, more volatile, and constrained by structural limitations remains limited. This gap highlights a critical research urgency: understanding how digital payments influence economic growth in developing countries is essential

for designing effective policies that promote financial inclusion, strengthen digital infrastructure, and support sustainable economic development.

METHODS

This study employs secondary data in the form of panel data, which combines cross-sectional and time-series data. The cross-sectional data consist of five developing countries, namely Argentina, Brazil, India, Indonesia, and Turkey. The time-series data are annual observations covering the period from 2013 to 2022. The data are obtained from the World Bank and the Bank for International Settlements (BIS).

In this paper, we test whether digital payments influence economic growth in developing countries using panel data analysis. Panel data combine cross-sectional and time-series information, offering more informative observations, reducing multicollinearity, and improving estimation efficiency (Firdaus, 2020). This study employs three standard panel data approaches: Pooled Least Squares (PLS), Fixed Effects Model (FEM), and Random Effects Model (REM). Model selection

is conducted using the Chow test, Hausman test, and Lagrange Multiplier (LM) test. The results indicate that the Fixed Effects Model (FEM) is the most appropriate specification (Table 2).

This study adopts the empirical model proposed by Pang et al. (2022) and Wong et al. (2020). The panel regression model is specified as follows:

$$GDPG_{it} = \beta_0 + \beta_1 CC_{it} + \beta_2 DC_{it} + \beta_3 EMONEY_{it} + \beta_4 INF_{it} + \beta_5 POP_{it} + \beta_6 IP_{it} + \epsilon_{it}$$

where $GDPG_{it}$ is the real GDP growth in country i at time t as the proxy of economic growth, CC_{it} represents the growth of credit card transactions, DC_{it} represents the growth of debit card transactions, and $EMONEY_{it}$ denotes the growth of e-money transactions. These are the proxy of digital payment which sourced from the Bank for International Settlements (BIS), consistent with Wong et al. (2020). Moreover, INF_{it} is the inflation rate, POP_{it} is the population growth rate, and IP_{it} denotes internet penetration which are used as the proxy of macroeconomic variables and obtained from the World Bank, following Pang et al. (2022).

Table 1. Transaction Value (Million USD) and Growth (%) of Digital payments in Developed and Developing Countries. 2013–2022

| Year | Developing Countries | | Developed Countries | |
|------|----------------------|------------|---------------------|------------|
| | Value | Growth (%) | Value | Growth (%) |
| 2013 | 322 | 22.90 | 4.146 | 1.62 |
| 2014 | 352 | 9.32 | 4.214 | 1.64 |
| 2015 | 593 | 68.47 | 4.287 | 1.73 |
| 2016 | 595 | 0.34 | 4.363 | 1.77 |
| 2017 | 612 | 2.86 | 4.443 | 1.83 |
| 2018 | 625 | 2.12 | 4.527 | 1.89 |
| 2019 | 606 | -3.04 | 4.621 | 2.08 |
| 2020 | 636 | 4.95 | 4.723 | 2.21 |
| 2021 | 735 | 15.57 | 4.840 | 2.48 |
| 2022 | 774 | 5.31 | 3.606 | -25.50 |

Source: BIS (2025)

Table 2. Results of model selection tests

| Test | Probability | Decision |
|--------------|-------------|------------------------------------|
| Chow Test | [0.0000]*** | Reject H_0 (Fixed Effects Model) |
| Hausman Test | [0.0076]** | Reject H_0 (Fixed Effects Model) |
| LM Test | [1.0000] | Do not reject H_0 (Pooled OLS) |

Notes: [**] Denotes significance at 5%. [***] Denotes significance at 1%

Hypothesis Development

Theoretical background on the relationship between Digital Payments and Economic Growth

The relationship between digital cashless payments and economic growth can be explained using the diffusion of innovation theory introduced by Everett Rogers. This theory describes how new technologies are adopted over time within a social system, influenced by factors such as perceived complexity and ease of use (Grzelczak & Pastusiak, 2020; Intani & Rikumahu, 2020). Digital cashless payments represent a technological innovation in the payment system that enhances convenience, security, and efficiency, thereby encouraging wider adoption.

Theoretically, digital payments influence economic growth through three main transmission channels (Wong et al. 2020). First, through the consumption channel, digital payments facilitate smoother and faster transactions, including access to credit, which increases household consumption and stimulates aggregate demand. Empirical evidence shows that increased use of electronic payments can significantly boost private consumption and contribute to GDP growth (Zandi et al. 2013). Second, through the investment channel, digital payments reduce transaction and operational costs for businesses (Hasan et al. 2012). Lower costs improve efficiency, enable business expansion, and encourage higher levels of investment, which in turn support economic growth. Third, through the government expenditure channel, digital payments improve transparency and traceability of transactions, reducing the size of the shadow economy (Schneider & Williams, 2013; Kumari & Khanna, 2017). This enhances tax collection efficiency, increases government revenue, and allows for greater public spending, which stimulates aggregate demand and economic activity. Overall, digital payments are expected to promote economic growth by improving efficiency, fostering financial inclusion, and strengthening economic transparency through multiple transmission channels.

Evidence on the impact of Digital Payments on Economic Growth

Empirical studies on the relationship between digital (cashless) payments and economic growth show mixed results, with clear differences between developed and developing countries. Using data from 27 CPPI

countries, Pang et al. (2022) find that only e-money significantly promotes economic growth overall, while debit and credit cards are insignificant. However, when disaggregated, debit and e-money positively affect growth in developed countries, whereas no significant impact is observed in developing countries, suggesting weaker transmission mechanisms in less mature financial systems.

Similarly, Wong et al. (2020), focusing on 15 OECD countries, report that only debit card transactions have a positive and significant effect on economic growth, while credit cards and e-money remain insignificant. In contrast, Tran and Wang (2023) find negative and significant effects of debit, credit, and e-money transactions on growth in G20 countries and Vietnam, indicating that rapid digitalization may not always translate into immediate economic gains.

Evidence from advanced economies further supports the positive role of digital payments. Noman et al. (2023) show that in G7 countries, digital payment instruments (cards, e-money, and transfers) positively influence economic growth in the long run. Likewise, Grzelczak and Pastusiak (2020) find that card payments and transfers are positively associated with growth in European countries, although the significance of specific instruments varies across regions.

In summary, empirical evidence shows that the impact of digital payments on economic growth in developing countries remains mixed and often weaker than in developed economies. From a theoretical standpoint, digital payments are expected to promote economic growth by increasing transaction efficiency, lowering transaction costs, enhancing transparency, and supporting financial inclusion (Wong et al. 2020; Tran & Wang, 2023). In developing countries, these mechanisms are particularly important, as digital payments can facilitate the integration of unbanked populations into the formal financial system and stimulate economic activities.

Although prior studies suggest that the impact of digital payments in developing countries may be insignificant or inconsistent (Pang et al. 2022; Tran & Wang, 2023), the rapid expansion of fintech, mobile payments, and digital financial services is expected to strengthen their role in supporting economic growth. As digital ecosystems mature, the contribution of cashless payments is likely to become more pronounced. Based

on the empirical and theoretical arguments above, this study proposes the following hypotheses:

H1: Digital payments (cashless payment instruments) have a positive and significant effect on economic growth in developing countries

H1a: E-money, debit card, and credit card have a positive and significant effect on economic growth in developing countries

RESULTS

Overview of Digital Cashless Payments in Developing Countries

An overview of the development of digital payment adoption in developing economies is illustrated in Figure 1 where it presents the total transaction value of digital cashless payments across selected countries over the period 2013–2022. Based on Figure 1, credit card transactions dominate in most countries, particularly in Brazil and Turkey. Brazil records the highest value, with credit transactions reaching approximately USD 2.6 million, followed by debit transactions at around USD 1.5 million and e-money at roughly USD 0.1 million. Turkey follows with credit transactions of about USD 1.8 million, while debit and e-money remain significantly lower at approximately USD 0.3 million and near zero, respectively.

Brazil and Turkey record the highest values of digital cashless payment transactions among the observed

developing countries, driven mainly by the dominance of credit and debit cards. In Brazil, this is supported by policies such as the Desenrola program and regulations that lower debit transaction costs, which encourage greater participation in the formal financial system and increase household consumption (Pacheco, 2023; Castro et al. 2023; Araújo & Souza, 2012). Similarly, in Turkey, high inflation leads consumers to rely more on credit cards to maintain purchasing power, thereby stimulating consumption and economic growth (Çoşkun et al. 2022; Kahveci & Gurgur, 2025).

In India, credit transactions amount to around USD 0.9 million, with debit transactions at approximately USD 0.7 million and e-money at about USD 0.2 million, indicating a more balanced distribution across instruments. India demonstrates a more inclusive and comprehensive growth in digital cashless payments, with the highest e-money transactions and strong usage of both debit and credit cards among the observed developing countries. This is largely driven by the Unified Payments Interface (UPI), which enhances ease of use, interoperability, financial inclusion, and cost efficiency. The World Bank reports that UPI transactions accounted for approximately 50% of India’s nominal GDP in 2022 (Sharma, 2023), while empirical evidence shows that a 1% increase in UPI transaction volume contributes about 0.03% to GDP growth (Bansal et al. 2024). Additionally, the Pradhan Mantri Jan Dhan Yojana program has expanded financial inclusion by providing access to basic banking services, thereby increasing account ownership and encouraging the use of debit cards (Unnamalai, 2015).

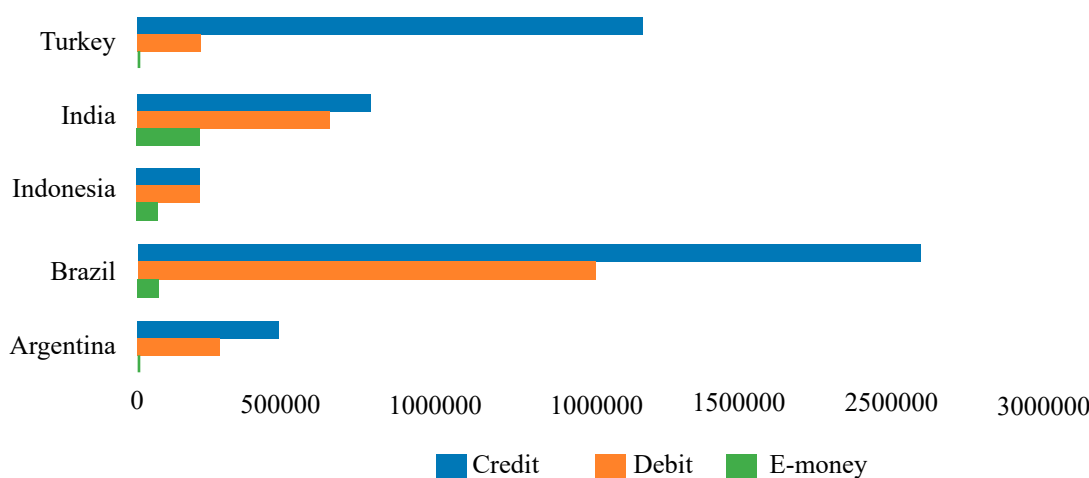


Figure 1. Total value of digital cashless payment transactions in developing countries, 2013–2022 (million USD) (BIS, 2025)

Meanwhile, Indonesia and Argentina exhibit relatively lower transaction values. Indonesia records credit and debit transactions of roughly USD 0.2 million each, with e-money at around USD 0.1 million. Argentina shows credit transactions of about USD 0.5 million, followed by debit at approximately USD 0.3 million, while e-money remains negligible. In Indonesia, limited financial inclusion and the dominance of conventional banks restrict credit and debit card usage, although e-money is growing rapidly due to fintech expansion and initiatives such as GNNT and QRIS (World Bank, 2021; IMF, 2024). Similarly, Argentina’s digital payment adoption remains low due to weak fintech penetration, low financial literacy, and lack of trust. Economic instability, particularly hyperinflation, has shifted consumer preference toward credit-based solutions such as BNPL rather than e-money (Finnovista et al. 2022; Nacucchio, 2024).

Overall, these patterns suggest that traditional cashless instruments particularly credit and debit cards still dominate in developing countries. However, the gradual increase in e-money transactions, especially in countries like India and Indonesia, reflects an ongoing digital transition, albeit at a relatively modest scale compared to more established payment methods.

The impact of Digital Payments on the Economic Growth in Developing Countries

The empirical finding will be focusing on the impact of Digital Payments on economic growth in developing countries, which is provided in Table 3. As mentioned in the methodology section, we have estimated several models, including Pooled Least Squares (PLS), Fixed Effects Model (FEM), and Random Effects Model (REM). The model selection tests indicate that the Fixed Effect Model (FEM) is the most appropriate specification. The Chow test rejects the null hypothesis at the 5% significance level, suggesting that FEM is preferred over the Pooled Least Squares (PLS) model. Similarly, the Hausman test results support the use of FEM over the Random Effect Model (REM). Although the LM test indicates a preference for PLS, the overall evidence from the Chow and Hausman tests justifies the selection of FEM for this study (Table 2). Furthermore, the classical assumption tests show that the model is free from heteroskedasticity and autocorrelation, as the probability values exceed the 5% significance level. These results confirm that the estimated model is statistically reliable and satisfies the necessary assumptions (Table 4).

Table 3. Regression testing the impact of digital payments on economic growth in developing countries

| Variable | Coefficient | Probability |
|----------------------|-------------|-------------|
| Credit cards | 0.186478 | [0.000]*** |
| Debit cards | -0.00196 | [0.926] |
| E-money | 0.00784 | [0.088]* |
| Inflation | 0.07329 | [0.493] |
| Population | -9.22347 | [0.011]** |
| Internet Penetration | -0.15710 | [0.001]*** |
| Constant | 17.06567 | [0.002]*** |

R-squared: 0.8066

Prob (F-statistic): 0.0000

Notes: [*] Denotes significance at 10%. [**] Denotes significance at 5%. [***] Denotes significance at 1%

Table 4. Results of classical assumption tests

| Test | Probability |
|-------------------------|-------------|
| Heteroskedasticity Test | [0.0672]** |
| Autocorrelation Test | [0.4816] |

Notes: [**] Denotes significance at 5%.

Table 3 presents the estimation result of Equation (1) relating to the impact of digital payments on the economic growth and the other determinants. Firstly, credit cards have a positive and significant impact on economic growth at the 1% level, with a coefficient of 0.186, implying that a 1% increase in credit card transactions raises economic growth by 0.186% (*ceteris paribus*). This effect operates through enhanced liquidity and expanded access to credit, which stimulate consumption, investment, and aggregate demand (Hasan et al. 2012; Grigoli & Sandri, 2021; Zandi et al. 2016). Additionally, credit cards support small business financing, facilitating expansion and improving cash flow (Zinman, 2014), thereby contributing to overall economic growth and increased fiscal capacity in developing countries (Escribano & Han, 2015; Mukui et al. 2020).

Secondly, e-money has a positive and statistically significant effect on economic growth at the 10% level, with a coefficient of 0.008, indicating that a 1% increase in e-money transactions increases economic growth by 0.008% (*ceteris paribus*). This effect operates through improved liquidity, faster and lower-cost transactions, and enhanced efficiency, which stimulate consumption and aggregate demand (Lalita et al. 2024; Christianti, 2024; Givelyn et al. 2022). Additionally, e-money promotes financial inclusion by facilitating savings and micro-investment, while reducing transaction costs and tax evasion through better digital traceability (Khairin et al. 2023; Amzuica et al. 2023). These mechanisms support investment, increase government revenue, and ultimately contribute to economic growth in developing countries.

Turning to control variables, population growth has a negative and statistically significant effect on economic growth at the 5% level, indicating that an increase in population growth reduces economic growth (*ceteris paribus*). This finding suggests that rapid population growth, when not accompanied by improvements in human capital quality, can hinder economic performance and lead to overpopulation (Tariq et al. 2024; Febryani & Kusreni, 2017). Consistent with the Solow growth model, excessive population growth reduces capital per capita as population expands faster than capital accumulation, thereby lowering productivity and slowing economic growth. In addition, internet penetration exhibits a negative and statistically significant effect on economic growth at the 1% level implying that an increase in internet

penetration is associated with a decline in economic growth (*ceteris paribus*). This result indicates that, in developing countries, internet usage is predominantly oriented toward non-productive activities and is further constrained by digital inequality and limited digital literacy, thereby reducing its contribution to value-added economic outcomes (Bakari & Tiba, 2020; Meah, 2012). Moreover, insufficient access to high-speed broadband infrastructure limits engagement in digital economic activities, such as e-commerce and remote work, ultimately weakening the potential of internet penetration to foster economic growth (Signé, 2023).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study concludes that e-money exhibits a higher transaction growth compared to credit and debit cards across developing countries, although adoption patterns vary significantly. Countries such as India and Brazil demonstrate higher adoption rates, supported by robust digital infrastructure and inclusive policy frameworks, whereas Argentina, Indonesia, and Turkey face structural challenges, including macroeconomic instability, limited financial inclusion, and security concerns, which hinder optimal utilization of digital cashless payments.

Furthermore, the panel regression results reveal that credit cards and e-money exert a positive and statistically significant impact on economic growth, while population growth and internet penetration negatively and significantly affect economic performance. These findings highlight the heterogeneous effects of digital payment instruments and underscore the importance of supportive institutional and structural conditions in maximizing their contribution to economic growth in developing countries.

Recommendations

In light of these findings, several policy implications emerge. Strengthening digital payment infrastructure and expanding financial inclusion should be prioritized through simplified and secure access to credit card and e-money services, supported by effective regulation and enhanced supervisory capacity to mitigate financial and cybersecurity risks. Additionally, improving human

capital quality and promoting the productive use of the internet are crucial to maximizing its economic benefits. Future research should consider a broader sample of countries and account for income-level heterogeneity to generate more comprehensive insights.

FUNDING STATEMENT: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST: The author declares no conflict of interest.

DECLARATION OF GENERATIVE AI STATEMENT: During the preparation of this work the authors used ChatGPT in order to check grammar and polish text. After using this tool/service, the authors reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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