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Investment-Led Growth? A Panel Data Analysis of Investment, Trade Openness, Inflation, and Private Credit in Five Developing Countries, 2010–2024

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Abstract

This study looks at what drives GDP per capita growth in five developing countries—Indonesia, Malaysia, Bangladesh, Pakistan, and Turkey—between 2010 and 2024. Unlike most research that studies investment, trade openness, inflation, and financial development separately, this analysis examines how these factors work together, especially during times of global economic uncertainty. Using balanced panel data, the study measures the combined effects of investment, trade openness, inflation, and private credit on income growth. The analysis uses a Fixed Effects model with Panel-Corrected Standard Errors to handle issues like heteroskedasticity, autocorrelation, and cross-sectional dependence. The results show that increases in investment have a clear and positive effect on GDP per capita growth, highlighting the importance of building productive capacity. Trade openness does not have a significant link to income growth. On the other hand, higher inflation and more private credit are weakly linked to slower economic growth. Overall, the findings suggest that productive capital accumulation is the main driver of economic growth in these countries, rather than trade or financial development alone. The study suggests that policies should focus on encouraging investment, boosting industrial competitiveness, and making financial systems more efficient to support steady income growth.

Keywords: *Investment, Trade Openness, Inflation, Private Credit, GDP per Capita Growth*

Abstrak

Penelitian ini membahas faktor-faktor makroekonomi yang memengaruhi pertumbuhan GDP per kapita di Indonesia, Malaysia, Bangladesh, Pakistan, dan Turki selama 2010–2024. Sebelumnya, studi lintas negara biasanya meneliti pengaruh investasi, keterbukaan perdagangan, inflasi, dan perkembangan sektor keuangan secara terpisah. Masih sedikit bukti empiris yang menilai semua variabel ini secara bersamaan, terutama di masa ekonomi global yang tidak stabil. Penelitian ini mengisi kekosongan tersebut dengan menguji pengaruh investasi, keterbukaan perdagangan, inflasi, dan kredit swasta terhadap pertumbuhan pendapatan per kapita menggunakan data panel seimbang. Analisis dilakukan dengan model Fixed Effects dan Panel-Corrected Standard Errors (PCSE) untuk mengatasi masalah heteroskedastisitas, autokorelasi, dan ketergantungan antarnegara. Hasilnya, perubahan investasi berpengaruh positif dan signifikan terhadap pertumbuhan GDP per kapita, menegaskan pentingnya pembentukan modal untuk meningkatkan

kapasitas produksi dan produktivitas. Sebaliknya, keterbukaan perdagangan tidak berpengaruh signifikan terhadap pertumbuhan ekonomi. Sementara itu, perubahan inflasi dan kredit swasta memiliki hubungan negatif yang lemah dengan pertumbuhan ekonomi. Temuan ini menunjukkan bahwa pertumbuhan ekonomi di negara berkembang lebih banyak dipengaruhi oleh akumulasi investasi produktif daripada integrasi perdagangan atau pendalaman sektor keuangan. Karena itu, kebijakan yang memperkuat investasi produktif, meningkatkan daya saing industri, dan memperbaiki efisiensi intermediasi keuangan sangat penting untuk mendukung pertumbuhan ekonomi berkelanjutan.

Kata Kunci: Investasi, Keterbukaan *Perdagangan, Inflasi, Kredit Swasta, Pertumbuhan GDP per Kapita*

Introduction

GDP per capita growth serves as a key indicator for assessing improvements in economic welfare, as it reflects an economy's ability to generate income for each individual. In developing countries, maintaining sustained income growth is a persistent policy challenge, especially amid increasing global economic uncertainty (Bank, 2025). Over the past decade, these economies have undergone significant structural transformations due to globalization, financial integration, and macroeconomic instability (Naoaj, 2023). Major events, including the global financial recovery, trade disruptions, the COVID-19 pandemic, and recent inflation shocks, have heightened uncertainty about the determinants of consistent income growth. Consequently, it is crucial to identify which macroeconomic variables most reliably support sustained GDP per capita growth in developing countries (Romadhani, 2025).

Economic theory identifies several key determinants of growth. Investment enhances productive capacity through capital accumulation and technological adoption, as emphasized in the Solow and endogenous growth frameworks (Acemoglu, 2021). Trade openness can improve economic efficiency by expanding markets, promoting specialization, and facilitating technology diffusion across countries (S. R. Behera & Rath, 2024). Inflation serves as an indicator of macroeconomic stability; high and volatile inflation tends to reduce investment incentives and weaken economic performance. Private credit reflects the depth of the financial system and its capacity to allocate resources to productive sectors. Collectively, these variables constitute important policy instruments frequently examined in the empirical growth literature (Okui & Wang, 2021).

Although extensive research has addressed these determinants, significant gaps persist in the literature. First, many cross-country studies analyze investment, trade openness, inflation, and financial development in isolation rather than assessing their combined effects within a unified empirical framework. Second, empirical studies focusing on the post-2010 period are scarce, despite the occurrence of major global shocks that may influence the relationship between macroeconomic variables and economic growth. Third, few studies employ econometric methods that adequately address common panel data issues such as

heteroskedasticity, autocorrelation, and cross-sectional dependence, which frequently occur in cross-country datasets. These limitations underscore the necessity for updated empirical analyses utilizing more robust panel estimation techniques.

The present study examines the joint effects of investment, trade openness, inflation, and private credit on GDP per capita growth using a panel dataset spanning 2010 to 2024. The analysis focuses on five developing countries: Indonesia, Malaysia, Bangladesh, Pakistan, and Turkey. These countries represent emerging economies with varying levels of trade integration, financial development, and macroeconomic stability. For instance, Malaysia and Turkey demonstrate relatively high levels of trade integration and financial depth, whereas Indonesia and Bangladesh rely more heavily on domestic investment as a primary driver of economic growth. In contrast, Pakistan has experienced greater macroeconomic volatility, particularly in terms of inflation dynamics. This variation offers a comparative context for assessing whether the determinants of economic growth function consistently across countries with differing structural characteristics.

This study utilizes annual data from 2010 to 2024 and applies a panel data methodology with a Fixed Effects specification combined with Panel-Corrected Standard Errors (PCSE). This approach corrects for heteroskedasticity, autocorrelation, and cross-sectional dependence, which frequently arise in cross-country panel datasets. Consequently, the analysis seeks to generate more reliable empirical evidence concerning the macroeconomic determinants of GDP per capita growth in developing economies.

Drawing from the theoretical framework, four hypotheses are proposed. First, investment is anticipated to exert a positive and significant effect on GDP per capita growth (H1), as capital accumulation enhances production capacity and productivity. Second, trade openness is hypothesized to positively influence economic growth by expanding markets and increasing efficiency (H2). Third, inflation is expected to negatively affect economic growth, since macroeconomic instability may discourage investment and diminish economic efficiency (H3). Finally, private credit is expected to positively impact GDP per capita growth by strengthening financial intermediation and supporting productive investment (H4).

This study advances the growth literature by providing updated cross-country evidence on the macroeconomic determinants of GDP per capita growth during a period of global economic volatility. It evaluates the simultaneous effects of investment, trade openness, inflation, and financial development within a unified empirical framework. Employing a robust panel estimation approach, the analysis addresses several econometric challenges commonly encountered in cross-country panel data. The findings offer insights for policymakers aiming to design macroeconomic strategies that promote sustainable economic growth in

developing countries.

Literature Review

GDP Growth per Capita

GDP growth per capita indicates the rise in average economic output per individual over time and is frequently employed as a proxy for assessing material welfare progress (Asyrorroji, 2025). Within the Solow–Swan neoclassical growth framework, short-term economic growth results from the accumulation of capital and labor, whereas long-term growth is attributed to technological progress or increases in total factor productivity (Acemoglu, 2020; Barro, 2021). The convergence perspective posits that countries with lower initial income levels can achieve more rapid economic growth, provided they possess sufficient savings or investment, robust institutions, and effective access to technology (Islam, 2021). Endogenous growth theory posits that economic policies and institutional structures, including openness, innovation, and the quality of financial intermediation, shape long-term growth rates by affecting productivity and the diffusion of technology.

Cross-country research conducted between 2010 and 2024 identifies GDP growth per capita as the outcome of interactions among production capacity (investment), external integration (trade openness), macroeconomic stability (inflation), and financial depth (private credit). This analytical framework aligns with the premise that global volatility and shifts in economic regimes can alter both the magnitude and direction of each factor's influence (Bank, 2023; C. Behera & Rath, 2024; Okui & Wang, 2021).

Investment and GDP Growth per Capita

In macroeconomics, investment is typically defined as the formation of fixed capital that enhances capital stock and expands production capacity. According to the Harrod–Domar model, investment serves as a primary driver of economic growth by increasing output capacity through the capital-output ratio (Laraga, 2025). Greater and more efficient investment enhances growth potential. According to Solow's model, investment raises output per worker until the economy reaches a steady state (A. D. Putra, 2025). The impact is most significant during the transition period; however, long-term growth relies more heavily on technological advancements (Ferrara, 2025). Within the endogenous growth framework, investments that enhance technology, infrastructure, and production capabilities generate productivity spillovers, resulting in more sustained effects (Oltulular, 2025).

Investment influences GDP growth per capita through several mechanisms. These include increasing labor productivity via capital deepening, expanding production capacity and efficiency, and promoting technology adoption through investment in machinery, information and communication technology, and infrastructure. Theoretically, the coefficient associated with investment is expected

to be positive. However, the positive impact of investment may be diminished if investment quality is low, such as in cases of misallocation or unproductive projects, or if financing leads to external imbalances or debt that undermines economic stability (Purnamasari, 2025).

Trade Openness and GDP Growth per Capita

Trade openness refers to the extent to which an economy engages in international trade, typically measured by the ratio of exports and imports to gross domestic product in cross-country analyses (Seyfullayev, 2022). The theory of comparative advantage posits that international trade enhances resource allocation efficiency by promoting specialization, which leads to higher levels of output and income (Monyela & Saba, 2024). According to new trade theory and endogenous growth models, economic openness promotes growth by expanding market access, increasing competition, facilitating input exchange among countries, and enabling the diffusion of technology and ideas (C. Behera & Rath, 2024).

Economic openness can increase GDP growth per capita through three primary channels: enhanced productivity via learning-by-exporting and technology transfer, market expansion and cost efficiency, and the promotion of industrial restructuring toward more competitive sectors (Safi & Maurya, 2025). Consequently, the impact of openness is widely regarded as positive (A. P. Putra et al., 2025). However, the advantages of economic openness are contingent upon specific conditions. When the export structure is dominated by high-volatility commodities or the domestic industrial base remains underdeveloped, openness may result in increased output volatility, current account pressures, or premature deindustrialization (Sari, 2025). Empirical literature highlights that the effectiveness of openness as an "engine of growth" depends on the strength of institutions, the quality of policies, and the readiness of domestic production capacity (Iftikhar, 2025; Setiawan, 2023).

Inflation and GDP Growth per Capita

Inflation serves as a key indicator of price stability and represents a primary channel through which monetary policy influences real economic activity (Fund, 2021). Theoretically, maintaining low and controlled inflation fosters business certainty, reduces risk premiums, and enhances the efficiency of investment planning (Marasanti, 2024). Conversely, high and unpredictable inflation disrupts the function of money as a measure of value, increases transaction costs, exacerbates tax distortions such as the inflation tax, and introduces uncertainty that impedes productive investment and overall productivity (Kamasa, 2022; Yotzov, 2023).

The economic growth literature frequently characterizes the relationship between inflation and growth as nonlinear or threshold-based. At low levels of inflation, the effect on growth is generally minimal. However, when inflation

exceeds a specific threshold, it tends to adversely affect growth by increasing uncertainty, impairing credit allocation, and prompting restrictive policies that reduce output. Cross-country evidence indicates that periods of high inflation are associated with weaker growth performance, particularly when inflation leads to macroeconomic volatility and disrupts financial intermediation (Azam & Khan, 2022). Consequently, the expected coefficient is typically negative, particularly when the sample includes periods characterized by inflation shocks.

Private Credit and GDP Growth per Capita

Credit extended to the private sector indicates the extent of financial intermediation and demonstrates the financial system's ability to allocate resources to productive activities. According to the Schumpeterian perspective, the financial sector facilitates innovation and economic growth by selecting productive projects, mobilizing savings, managing risk, and enabling efficient transactions (Diop, 2025). The financial development framework, as articulated by McKinnon–Shaw and subsequent scholars, posits that financial deepening, when supported by effective governance and regulation, enhances investment and productivity, ultimately fostering economic growth (Boycotts, 2022).

Empirical evidence indicates that private credit contributes to economic growth through three primary mechanisms: facilitating investment financing and business expansion, enhancing the efficiency of capital allocation by supporting more productive projects, and strengthening total factor productivity through innovation and increased production scale (Gizaw et al., 2024). This relationship typically demonstrates a positive correlation. Recent literature, however, emphasizes the potential for diminishing returns and the risks associated with excessive financial development. Specifically, excessive or poorly allocated credit expansion may elevate the likelihood of financial crises, asset bubbles, and economic instability (Ullah, 2025). The relationship between private credit and economic growth is significantly shaped by institutional quality, macroeconomic stability, and the overall condition of the banking system (Gizaw et al., 2024).

Research Methods

This study uses a quantitative econometric design with balanced panel data based on annual secondary data. The analysis unit consists of five countries (Indonesia, Malaysia, Bangladesh, Pakistan, and Turkey) as the *cross-section* dimension and observation period 2010–2024 (15 years). Thus, the panel structure is balanced with the total observations N×T = 5×15 = 75, as well as the same number of observations per country (min=avg=max=15). The dependent variable of the study is GDP growth per capita. Independent variables include investment proxied by the ratio of gross fixed capital formation to GDP, trade openness which is proxied by the ratio of trade to GDP, inflation which is measured as the annual inflation rate, and private credit which is proxied by the ratio of domestic credit to the private sector to GDP. All variables are arranged so that they can be compared

across countries and time consistently.

The empirical specification uses a panel model by incorporating time effects to control for macro shocks that are common in a given year. In general, the basic equation can be written as:$(i.year)$

$$Y_{it} = \beta_0 + \beta_1 gfcf\_gdp_{it} + \beta_2 trade\_gdp_{it} + \beta_3 inflation_{it} + \beta_4 credit\_private_{it} + \lambda_t + \varepsilon_{it}$$

Description:

Y_{it}	: GDP growth per capita
β_0	: Konstanta
$gfcf\_gdp_{it}$	: Investment
$trade\_gdp_{it}$	: Trade openness
$inflation_{it}$	: Inflation rate
$credit\_private_{it}$	: Private credit
λ_t	: Time fixed effects / dummy years
ε_{it}	: Galat/residual
Table of Contents i	: Country
Table of Contents t	: Year of observation (2010–2024).

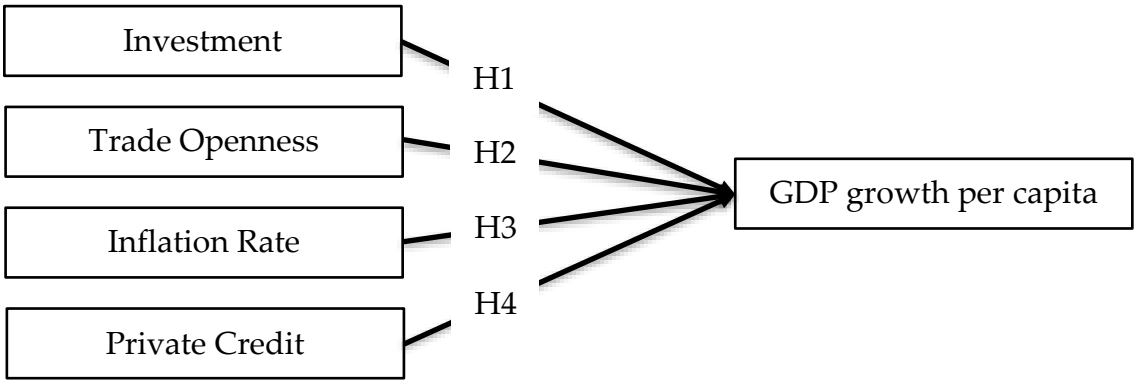
Model selection is conducted in sequential stages using formal statistical tests. The F-test evaluates the relevance of fixed effects compared to the pooled model (FE vs pooled). The Lagrange Multiplier (LM) test assesses the necessity of random effects relative to the pooled model (RE vs pooled). The Hausman test determines the consistency of the estimator by comparing fixed and random effects models (FE vs RE) (Baltagi, 2024; Le Gallo, 2023). Following the selection of the baseline model, diagnostic tests were performed on the panel data to ensure the validity of the inferences. The diagnostic tests included assessments for multicollinearity (VIF), heteroscedasticity (Modified Wald), autocorrelation (Wooldridge), and cross-sectional dependence (Pesaran CD) (Pesaran & Smith, 2021).

Diagnostic tests indicate violations of the assumptions of heteroscedasticity, autocorrelation, and cross-country dependence. Consequently, the final estimation employs the Panel-Corrected Standard Errors (PCSE) method, incorporating the Prais–Winsten transformation, an AR(1) error structure, and pairwise inter-panel correlation. This approach yields more reliable standard errors for cross-sectional time-series data. The robust model is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 gfcf\_gdp_{it} + \beta_2 trade\_gdp_{it} + \beta_3 inflation_{it} + \beta_4 credit\_private_{it} + \lambda_t + \varepsilon_{it}, \varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + e_{it}$$

The dynamics ρ_i of AR(1) are captured for each panel. All data processing and estimation are conducted using Stata 17 to ensure that replication procedures, including panel structure determination, fixed effects and random effects estimation, model selection, diagnostic tests, and panel-corrected standard error

estimation, remain consistent and transparent.
With the following models and hypotheses:



Hipotesis:
H1 : Investment has a positive and significant effect on GDP.
H2 : Trade openness has a positive and significant effect on GDP.
H3 : Inflation negative and significant effect on GDP.
H4 : *Private credit* has a positive and significant effect on GDP.

Result and Discussion

Prior to the econometric analysis, descriptive statistics are presented to summarize the distribution and variability of the variables across countries and over time (Wooldridge, 2020). These statistics facilitate the identification of differences in economic characteristics among the sample countries and assess whether the variables display sufficient variation for empirical estimation.

Table 1. Descriptive Statistics of Variables

Variable	Mean	Std. Dev	Min	Max
GDP per capita growth	3.64	2.66	-6.71	10.79
Investment (GFCF/GDP)	25.38	6.90	11.46	32.87
Trade openness	60.56	40.38	24.70	157.94
Inflation	8.97	12.03	-1.14	72.31
Private credit	53.96	36.08	11.47	133.82

The descriptive statistics indicate substantial variation in macroeconomic variables among the five countries. Trade openness and private credit demonstrate particularly large standard deviations, which suggests significant heterogeneity in trade integration and financial sector depth within the sample. Inflation also exhibits wide variability, reflecting differences in macroeconomic stability across both time and countries.

Prior to panel model estimation, correlation analysis is performed to assess preliminary relationships among variables and to detect potential multicollinearity issues.

Table 2. Correlation Matrix

Variable	GDP growth	Investment	Trade	Inflation	Credit
GDP growth	1.000				
Investment	0.3999	1.000			
Trade openness	-0.0098	-0.0311	1.000		
Inflation	-0.0101	0.0623	-0.1415	1.000	
Private credit	-0.0171	0.1273	0.9426	-0.2026	1.000

The correlation analysis reveals a moderate positive association between investment and GDP per capita growth. In contrast, the correlation between trade openness and private credit is exceptionally high ($r \approx 0.94$), indicating substantial multicollinearity between these variables. This finding aligns with the elevated Variance Inflation Factor (VIF) observed in the diagnostic tests.

The most suitable panel data model is identified by comparing three estimators: pooled ordinary least squares, fixed effects, and random effects. Model selection utilizes the F-test, the Lagrange Multiplier test, and the Hausman specification test.

Table 3. Panel Model Selection Tests

Test	Statistic	p-value
F-test (FE vs pooled)	8.64	0.0000
LM test (RE vs pooled)	0.00	1.0000
Hausman test (FE vs RE)	22.37	0.0002

The F-test rejects the pooled model, indicating significant country-specific effects. The LM test does not support the random effects model. The Hausman test confirms that the fixed effects estimator is consistent and preferred. Consequently, the fixed effects specification is adopted as the baseline model for subsequent analysis.

Several diagnostic tests are conducted to evaluate classical panel data assumptions and ensure the reliability of the regression results.

Table 4. Diagnostic Test Results

Test	Statistic	p-value
VIF	15.41	—
Modified Wald	22.94	0.0003
Wooldridge test	13.998	0.0201
Pesaran CD	-2.336	0.0195

Diagnostic results reveal violations of several classical assumptions. The detection of heteroskedasticity, autocorrelation, and cross-sectional dependence indicates that conventional fixed effects standard errors are likely to be biased. Consequently, the final estimation employs Panel-Corrected Standard Errors (PCSE) with the Prais–Winsten transformation and an AR(1) structure.

Panel unit root tests are conducted using the Levin–Lin–Chu method to mitigate the risk of spurious regression.

Table 5. Panel Unit Root Test (LLC)

Variable	Adjusted t*	p-value	Integration
GDP per capita growth	-3.8879	0.0001	I(0)
Investment	-0.5125	0.3041	I(1)
Trade openness	-2.6860	0.0036	I(0)
Inflation	-0.6165	0.2688	I(1)
Private credit	-1.1213	0.1311	I(1)

The findings demonstrate that GDP per capita growth and trade openness are stationary at the level, whereas investment, inflation, and private credit exhibit unit roots and achieve stationarity following first differencing.

Table 6. First Difference Unit Root Test

Variable	Adjusted t*	p-value
ΔInvestment	-2.9764	0.0015
ΔInflation	-2.1616	0.0153
ΔPrivate credit	-3.6834	0.0001

The results indicate that the dataset comprises both I(0) and I(1) variables. Consequently, non-stationary variables are transformed into first differences prior to estimating the final regression model.

Due to the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence, the final estimation employs Panel-Corrected Standard Errors combined with the Prais–Winsten transformation.

Table 7. PCSE Estimation Results

Variable	Coefficient	Std. Error	z	p-value
ΔInvestment	0.968	0.235	4.12	0.000
Trade openness	-0.0037	0.0054	-0.69	0.488
ΔInflation	-0.0726	0.0395	-1.84	0.066
ΔPrivate credit	-0.1086	0.0631	-1.72	0.085

$R^2 = 0.64$

Wald $\chi^2 = 8873.88$ ($p < 0.001$)

The estimation results indicate that changes in investment exert a positive and statistically significant effect on GDP per capita growth. This outcome underscores the role of capital accumulation as a key driver of economic growth in developing countries. An increase in the investment-to-GDP ratio enhances production capacity, raises productivity, and stimulates economic activity. In contrast, trade openness does not demonstrate a significant relationship with GDP per capita growth. This suggests that the advantages of trade integration depend on factors such as export diversification, institutional quality, and domestic

industrial capacity. Inflation is associated with a negative coefficient and is marginally significant at the ten percent level, aligning with the macroeconomic stability hypothesis, which posits that rising inflation increases uncertainty and reduces investment efficiency. Similarly, private credit is characterized by a negative but weakly significant coefficient, indicating that financial deepening does not necessarily lead to higher economic growth unless credit expansion is directed toward productive sectors.

The empirical results indicate that investment is the most consistent determinant of GDP per capita growth among the variables analyzed. These findings suggest that policies promoting productive investment are likely to exert a greater influence on long-term economic growth than those focused exclusively on trade liberalization or financial sector expansion.

The Effect of Investment on GDP Growth per Capita

The estimation results demonstrate that changes in investment exert a positive and statistically significant effect on GDP per capita growth ($\beta = 0.9680$; $p = 0.000$). This evidence indicates that increased investment is closely linked to higher income growth among the five developing countries examined during the study period. Specifically, a one-percentage-point increase in the investment-to-GDP ratio corresponds to an approximate 0.97 percentage point rise in GDP per capita growth, controlling for other variables.

These findings reinforce the theoretical perspective that capital accumulation is fundamental to economic growth. The Solow growth model posits that investment augments the stock of physical capital, thereby increasing labor productivity and expanding production capacity. Increased investment also enables the adoption of new technologies and enhances the efficiency of production processes. In developing economies, where capital scarcity frequently limits economic activity, investment can substantially accelerate income growth by promoting capital deepening and infrastructure development.

The significant effect of investment identified in this study indicates that capital formation continues to be a primary driver of economic growth in emerging economies. Investments in infrastructure, manufacturing, and technology generate positive spillover effects by enhancing production efficiency and strengthening the competitiveness of domestic industries. These outcomes contribute to increased output per worker and higher per capita income.

These findings align with empirical studies that emphasize the positive contribution of investment to economic growth. Prior research demonstrates that increases in gross fixed capital formation are strongly associated with higher economic growth in developing and emerging economies. Consequently, the results reinforce the argument that policies promoting productive investment are essential for sustaining long-term economic growth.

The Effect of Trade Openness on GDP Growth per Capita

The estimation results indicate that trade openness has a negative, yet statistically insignificant, effect on GDP per capita growth ($\beta = -0.0037$; $p = 0.488$). After accounting for investment dynamics, inflation changes, private credit, and year effects, trade openness does not demonstrate a statistically significant influence on economic growth in the sample countries.

Trade openness is theorized to enhance economic growth by expanding market access, promoting specialization, increasing competition, and facilitating the diffusion of technology across countries. Increased participation in international trade enables economies to exploit comparative advantages and improve productivity through knowledge spillovers. Nevertheless, empirical evidence indicates that the growth benefits of trade openness are not universally realized in all developing countries.

The impact of trade openness is largely determined by structural conditions within the domestic economy. The effectiveness of trade integration depends on factors including export diversification, industrial competitiveness, infrastructure quality, and the capacity of domestic firms to absorb foreign technology. If exports are concentrated in primary commodities or low value-added products, trade openness is likely to yield limited productivity gains and exert a minimal effect on income growth.

An additional factor that could diminish the estimated effect of trade openness is the presence of strong multicollinearity with private credit within the dataset. A high correlation between these variables increases the standard errors of the estimated coefficients, which complicates the isolation of trade openness's independent contribution to economic growth. Therefore, a lack of statistical significance should not be interpreted as evidence of the irrelevance of trade openness. Instead, its impact may be mediated through alternative channels, including investment and financial development.

These findings align with empirical literature indicating that the relationship between trade openness and economic growth is conditional rather than automatic. In developing economies, the positive effects of trade liberalization are contingent upon the implementation of complementary policies that enhance domestic production capacity and increase the competitiveness of export sectors.

The Effect of Inflation on GDP Growth per Capita

The results indicate that changes in inflation exert a negative effect on GDP per capita growth ($\beta = -0.0726$; $p = 0.066$). While the coefficient does not reach statistical significance at the 5 percent level, it attains significance at the 10 percent level, indicating a modest yet noteworthy association between inflation dynamics and economic growth.

The negative coefficient indicates that higher inflation rates are associated with lower GDP per capita growth. This finding aligns with the macroeconomic stability hypothesis, which posits that rising inflation generates uncertainty in

economic decision-making. Elevated and unpredictable inflation distorts price signals, increases transaction costs, and diminishes the efficiency of resource allocation. Such conditions may discourage investment and reduce productivity, thereby impeding economic growth.

The relatively weak statistical significance indicates that the relationship between inflation and economic growth is unlikely to be strictly linear. Previous studies have identified threshold effects, where low or moderate inflation exerts minimal influence on growth, whereas higher inflation levels substantially impede economic performance. When both moderate and extreme inflation episodes are included in a sample, linear regression models often yield negative coefficients that are only marginally significant.

A further explanation concerns the incorporation of time effects within the model. Year-specific effects account for global macroeconomic shocks, including fluctuations in commodity prices, financial crises, and global inflation waves. These shocks may influence inflation concurrently across countries, thereby diminishing the independent variation of inflation in the regression model.

The findings indicate that although inflation does not emerge as a primary driver of growth within the sample, maintaining price stability is essential for sustaining long-term economic performance. Stable inflation contributes to a predictable macroeconomic environment, which encourages investment and supports sustainable economic expansion.

The Effect of Private Credit on GDP Growth per Capita

The estimation results indicate that changes in private credit are associated with a negative coefficient ($\beta = -0.1086$) and a p-value of 0.085. While this coefficient does not reach statistical significance at the 5 percent level, it is marginally significant at the 10 percent threshold. These results suggest that increases in private credit are not consistently linked to higher GDP per capita growth among the sample countries.

Theoretically, financial development is expected to stimulate economic growth by enhancing access to financing, supporting entrepreneurial activity, and improving the allocation of financial resources. An effective financial system mobilizes savings and channels them into productive investments, which increases economic efficiency and productivity.

However, the negative coefficient identified in this study indicates that credit expansion does not inherently result in higher economic growth. A plausible explanation concerns the quality of financial intermediation. If credit is allocated predominantly to consumption, real estate speculation, or other nonproductive activities, its contribution to productive capacity and sustained economic growth remains limited.

Another explanation concerns the phenomenon commonly referred to as the "too much finance" hypothesis. Empirical studies indicate that, beyond a certain threshold, excessive credit expansion produces diminishing returns and elevates

the risk of financial instability. In these circumstances, financial deepening does not necessarily result in sustained improvements in economic performance.

Furthermore, the strong correlation between private credit and trade openness in the dataset may compromise the statistical identification of the credit variable. Multicollinearity between these variables can increase standard errors and diminish the statistical significance of individual coefficients.

The findings indicate that the impact of private credit on economic growth is influenced by both the volume of credit and the efficiency of its allocation, as well as the quality of financial institutions. Consequently, policies that strengthen financial regulation and direct credit toward productive sectors are likely to enhance the positive effects of financial development on economic growth.

Conclusion

The effects of investment, trade openness, inflation, and private credit on GDP per capita growth were analyzed for five developing countries from 2010 to 2024. Panel estimation using the Panel-Corrected Standard Errors (PCSE) approach demonstrates that changes in investment have a positive and statistically significant impact on GDP per capita growth. This result underscores the importance of capital formation in expanding productive capacity and sustaining income growth in developing economies. Conversely, trade openness does not exhibit a statistically significant effect, while inflation and private credit display weak negative associations with economic growth.

The findings indicate that strengthening productive investment is the most reliable strategy for promoting income growth. Policies that expand infrastructure investment, improve industrial productivity, and encourage technological upgrading can enhance capital accumulation and long-term growth potential. The effectiveness of trade openness and financial development, however, depends on country-specific structural conditions. Economies with greater trade integration may require stronger export diversification and increased industrial competitiveness to fully benefit from international trade. In addition, countries with underdeveloped financial systems should improve the quality of financial intermediation to ensure that credit expansion supports productive sectors rather than speculative activities. Maintaining macroeconomic stability, particularly through prudent inflation management, remains essential for sustaining a stable investment environment.

The findings indicate that macroeconomic growth drivers function differently across countries depending on their levels of economic openness, financial development, and structural transformation. For instance, economies characterized by greater financial depth and trade integration exhibit distinct growth dynamics compared to those in which investment serves as the primary catalyst for economic expansion.

Several limitations are present in this study, such as the relatively small sample size and reliance on a linear econometric framework. Future research may

address these issues by utilizing larger country samples and employing nonlinear or dynamic panel models to investigate potential threshold effects in the relationship among financial development, inflation, and economic growth.

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