International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2026, 16(1), 633-643.

Private Investment Flows in Developing Economies: Macroeconomic and Environmental Determinants

Nguyen Trung Dung*, Le Ngoc Lan, Bui Thi Thanh Tinh, Nguyen Thanh Phuong

Banking Academy of Vietnam, 12 Chua Boc, Kim Lien Award, Ha Noi, Viet Nam. *Email: dunght211089@gmail.com

Received: 03 July 2025 **Accepted:** 17 November 2025 **DOI:** https://doi.org/10.32479/ijeep.21903

ABSTRACT

The paper examines the macroeconomic and environmental determinants of private investment across 57 developing countries in Asia, Europe, North Africa, Sub-Saharan Africa, and Latin America during the period 2000-2023. Using the System Generalized Method of Moments (S-GMM) to address potential endogeneity and dynamic relationships, the analysis shows that rising CO_2 emissions significantly reduce private investment, suggesting that environmental degradation increasingly undermines capital allocation decisions in developing economies excluding Latin America and the Caribbean. Stronger GDP growth, higher domestic credit to the private sector, and greater trade openness positively influence private investment, except in Sub-Saharan Africa and North Africa, while high inflation deters capital formation. The real exchange rate also plays a key role in shaping investor confidence, except in Sub-Saharan and North Africa. A key point in developing contexts is that stronger tax burdens do not necessarily deter private investment; instead, flows often increase, challenging traditional economic views. The results highlight the critical role of macroeconomic stability and improved environmental performance in sustaining private capital flows offering practical guidance for policymakers seeking to attract investment in an era defined by sustainability.

Keywords: Private Investment Flows, Macroeconomics, Environmental Aspect
JEL Classifications: A10, C23, E22, E62

1. INTRODUCTION

The global economy today is confronted with interrelated environmental, economic, and geopolitical pressures. One of the most pressing challenges of the twenty-first century is finding a sustainable balance between economic growth and long-term development goals (Giroud, 2024). Private investment is now regarded not only as an additional financial resource but also as a driver of resource mobilization, innovation, and competitiveness across both domestic and international arenas (Xu et al., 2022; Li et al., 2025). Yet, the potential of private capital cannot be fully realized without addressing persistent structural constraints and risks. This concern is particularly acute as public funding remains limited, while the demand for infrastructure, green initiatives, and digital transformation continues to intensify (Dong et al., 2018; Raghutla et al., 2024). Although the literature consistently highlights the vital contribution of private investment to sustainable development, empirical evidence shows that capital flows remain unstable in both developed and developing contexts. Regulatory weaknesses, shallow financial markets, high transaction costs, institutional uncertainties, and climate-related vulnerabilities still discourage investors and diminish expected returns (Ayeni, 2020; Li et al., 2025). Global commitments to decarbonization and the energy transition have become increasingly ambitious, compelling investors to rethink their long-term planning. These shifts not only introduce new sources of uncertainty but also play a decisive role in shaping how capital is allocated (Bhattacharya et al., 2016; Dong et al., 2018; World Bank., 2020).

Private investment determinants have been studied through various perspectives. Building on classical growth models (Solow, 1956), institutional theory (North, 1990), and financial development frameworks (Levine, 1997), earlier studies established a strong theoretical basis for understanding how macroeconomic stability, institutional quality, interest rates, public investment, and

infrastructure development shape investment decisions. More recently, the scope of inquiry has widened to include environmental considerations, renewable energy, and green investment policies. This evolution highlights a more comprehensive shift from a purely economic perspective toward an interdisciplinary approach that responds to the evolving demands of the global context (Polzin et al., 2015; Ragosa and Warren, 2019; Fraga and Resende, 2022; Raghutla et al., 2024; Li et al., 2025).

Private investment continues to be constrained by institutional barriers, underdeveloped financial systems, and climate change, while limited public resources remain insufficient to meet the growing demands for sustainable infrastructure, ecological transition, and digital transformation. Existing studies highlight the importance of macroeconomic stability, governance, and infrastructure, and more recent approaches incorporate environmental and green investment perspectives; however, findings remain inconsistent, particularly regarding CO_2 emissions, tax burden and trade openness. Moreover, cross-regional and global comparative evidence is limited, leaving a critical gap in understanding how macroeconomic and environmental factors jointly influence private investment. To fulfil these gaps, this study focuses on the key determinants of private investment flows by integrating macroeconomic fundamentals with environmental dynamics in a cross-country panel setting. This analytical framework addresses the growing need for sustainable and resilient investment strategies, particularly as nations strive to achieve economic growth targets while meeting their global climate commitments (Xu et al., 2022; Li et al., 2025). The paper further incorporates a comprehensive set of macroeconomic factors (GDP growth, openness, real exchange rate, institutional capacity, and environmental aspects such as CO_2 emissions and climate risk exposure) to capture the multidimensional nature of investment decisions in the context of globalization and Climate change. Moreover, by employing robust panel econometric techniques, the purpose of this study is to disentangle the heterogeneous effects across regions and over time, thereby providing policymakers and development stakeholders with nuanced insights. By doing so, the research adds to the discussion on steering capital flows toward long-term sustainability objectives, in line with current policy debates and empirical evidence (Ayeni, 2020; Bhattacharya et al., 2016; Dong et al., 2018). Finally, the findings aim to inform both national strategies and global frameworks in enhancing private investment mobilisation under increasingly uncertain economic and environmental conditions. We reveal that while CO_2 emissions reduce private investment, greater trade openness and real exchange rate movements positively support capital flows in most developing economies. However, there are regional differences: the impact of CO_2 emissions, trade openness, and the real exchange rate varies across regions. Additionally, stronger tax burdens may occur alongside rising capital flows, highlighting unexpected dynamics.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Theoretical Framework

According to the neoclassical growth model (Solow, 1956), the short-term economic growth is driven by capital accumulation, which relies mainly on private investment. In developing economies, where capital is relatively limited, private investment supports expanding production, creating jobs, and raising income levels. However, the model emphasizes that due to diminishing returns to capital, private investment can only sustain growth for a limited time period. In the long term, sustainable development requires technological advancement and improvements in total factor productivity. Hence, this model provides a vital theoretical background for analyzing the role and limitations of private investment in economic growth.

Driver and Moreton (1992) argue that private investment decisions depend not only on current profits or capital costs but also on how enterprises assess market prospects, input prices, and policy stability. Under imperfect information, these expectations determine investment timing and magnitude, whereas economic or political uncertainties can reduce confidence. High-risk or capital-intensive long-term projects are often delayed to avoid potential losses.

Levine (1997) emphasizes that a well-functioning financial system is crucial for supporting private investment and economic growth. It improves capital allocation, reduces transaction costs, enhances access to credit, and provides transparent information. By monitoring risks and safeguarding investors, the financial system builds trust and enables enterprises, particularly in developing countries, to access a diverse range of funding sources, from bank loans to capital markets and financial intermediaries.

The institutional development theory of North (1990) underlines the positions of institutions (such as laws, regulations, social norms, and enforcement mechanisms) in forming economic behavior and then influencing the efficiency of resource allocation. North (1990) defines institutions as the "rules of the game" in an economy, providing the framework for agents (such as enterprises, investors, and governments) to make decisions. For private investment, those institutions with stable, transparent, and well-enforced states may protect their property rights, reduce transaction costs, and enhance investor confidence. In countries with a weak institutional situation, investment risk discourages private sector participation or limits it to short-term, small-scale ventures.

2.2. Literature Review and Hypothesis Development

2.2.1. CO_2 emissions and private investment flows

CO_2 emissions are characterized as the magnitude of pressure imposed on the environment from economic production. As a key indicator of a nation's fossil fuel dependence and extent of environmental degradation (Li et al., 2025), elevated CO_2 emissions are primarily associated with enhanced policy and macroeconomic risks (Tzeremes et al., 2018). Governments implement stricter environmental policies, such as carbon taxes, emission limits, or technical regulations, in an effort to reduce climate effects. These regulations increase the compliance and operating expenses of companies, thereby lowering the anticipated returns on proposed investment schemes (Dong et al., 2018). High CO_2 emissions lead to systemic unsustainable development and weaken investor confidence in both the short and long term. Bhattacharya et al. (2016) argue that persistent emissions erode business confidence in

the resilience of the investment environment, while Tzeremes et al. (2018) extend this view by linking emission intensity with higher production costs, increased legal risks, and shrinking opportunities for sustainable expansion jointly constraining private capital flows. Raghutla et al. (2024) further confirm this relationship, showing that private investors often delay commitments or reallocate capital toward cleaner sectors as a precaution against environmental risks. Thus, emissions not only reduce investment incentives but also act as a structural driver of capital shifts toward low-carbon industries. However, such transitions rarely occur spontaneously under weak institutional settings. According to Li et al. (2025), government-led green investment policies are crucial in institutionalizing the reallocation of finance from carbon-intensive to green enterprises, thereby restricting fossil fuel sectors' access to capital and enabling long-term mobilization of private finance. Hence, while CO_2 emissions remain a barrier to private investment, they may also serve as a catalyst for systemic transformation when aligned with appropriate policy interventions.

Hypothesis H_1: CO_2 emissions have a significant negative affects private investment flows

2.2.2. Economic growth on private investment flows

Economic growth refers to the increase in the value of goods and services produced by an economy over time, typically measured by the growth rate of real GDP (Verma, 2007). According to Solow's (1956) neoclassical growth model, economic growth enhances productive capacity, stabilizes the macroeconomic environment, and improves profit expectations, thereby attracting private investment capital (Tadeu and Silva, 2013; Polzin et al., 2015). Studies consistently highlight a close link between economic growth and private investment, yet the magnitude and direction of this effect vary across contexts. In advanced economies, Dreger and Reimers (2016) demonstrate a long-term positive relationship between GDP and private investment in the Eurozone, while Nguyen and Trinh (2018) confirm both short- and long-term effects in emerging markets, underscoring the pivotal role of GDP growth in fostering private capital accumulation. Complementing this view, Ragosa and Warren (2019) and Xu et al. (2022) show that stable GDP growth reduces financial risks, improves capital recovery in long-term projects, and triggers prompt corporate responses to positive growth signals in the short run. However, Shabbir et al. (2021) reveal that foreign private investment in Pakistan contributes positively in the short run but has limited long-term effects. Overall, the evidence suggests that GDP growth generally serves as a critical driver of private investment, but its influence may differ depending on structural economic characteristics and the origin of investment flows.

Hypothesis H_2: Economic growth positively affects private investment flows.

2.2.3. Real exchange rate on private investment flows

The real exchange rate can influence private investment decisions in both directions. Currency depreciation raises the cost of imported equipment, reducing investment attractiveness. However, it also enhances export competitiveness and can stimulate investment (Agénor, 2004). Previous studies reveal that the impact of the real exchange rate on private investment varies significantly across countries and economic contexts. In Thailand, Jongwanich and Kohpaiboon (2008) show that real currency appreciation fosters long-term private investment through higher expected export revenues. Conversely, Tadeu and Silva (2013) find that currency depreciation reduces investment in Brazil due to rising capital and import costs, reflecting an opposite effect. This divergence underscores the dependence of exchange rate impacts on economic structure and trade exposure. Fraga and Resende (2022) further emphasize that exchange rate volatility can alter investor expectations, particularly during downturns when risks intensify. Ayeni (2020) further emphasizes that this effect is more pronounced in low-income economies, where markets remain highly vulnerable to macroeconomic instability. Thus, the real exchange rate does not exert a uniform influence but rather depends on institutional settings, trade openness, and macroeconomic resilience, shaping private investment decisions differently across countries.

Hypothesis H_3: The real exchange rate positively affects private investment flows.

2.2.4. Trade openness on private investment flows

High trade openness facilitates access to equipment, technology, and global supply chains at lower costs, and signals commitment to economic integration, thereby strengthening investor confidence (Polzin et al., 2015). Trade openness plays a crucial role in shaping the environment for private investment, yet its impact largely depends on institutional quality and technological absorptive capacity. Ragosa and Warren (2019) show that countries with higher trade openness often exhibit more transparent institutions, lower policy risks, and stronger technological capacity—factors particularly vital for capital-intensive sectors such as renewable energy, which require stability and competitiveness. Complementing this, Xu et al. (2022) find a positive and statistically significant relationship in China, where trade openness stimulates private investment in industries heavily reliant on imported technology and equipment. Moreover, openness enhances access to high-quality inputs at lower costs and raises profit expectations, encouraging enterprises to expand investment. Highly open economies also attract international capital, reducing financing costs and increasing investment flexibility. Overall, these findings suggest that trade functions not only as a direct economic channel but also as an institutional and technological foundation for long-term private capital accumulation.

Hypothesis H_4: Trade openness has a positive affects private investment flows

2.2.5. Domestic credit to the private sector on private investment flows

Domestic credit to the private sector, measured as a percentage of GDP, reflects the development level of a country's financial system. In economies where capital markets are underdeveloped, private enterprises rely heavily on bank credit to finance long-term investment (McKinnon, 2010; Ayeni, 2020). The development of credit markets is regarded as a fundamental driver of private investment by improving access to finance, reducing costs, and

removing barriers to capital formation, particularly in capital-intensive sectors (Fraga and Resende, 2022). Beyond the provision of capital, Ragosa and Warren (2019) emphasize that cross-border private investment in renewable energy within developing countries depends heavily on the absorptive capacity of domestic financial systems, alongside international public finance and policy support. When enterprises can effectively combine local credit with foreign capital, financing efficiency improves and country risk perceptions decline, thereby facilitating international capital inflows. Polzin et al. (2015), Xu et al. (2022) consistently highlight that domestic credit development particularly medium and long-term lending generate a "crowding-in" effect that stimulates private investment. Thus, credit markets function not only as a financing channel but also as a "bridge" that integrates domestic and international capital flows, enhancing the attractiveness of private investment both nationally and across borders.

Hypothesis H_5: Domestic credit to the private sector positively affects private investment flows.

2.2.6. Inflation on private investment flows

Inflation significantly affects the investment environment, particularly in volatile developing economies (Serven, 2002). High inflation is widely regarded as a major barrier to private investment, primarily by increasing macroeconomic uncertainty, complicating cash flow and cost forecasting, and discouraging enterprises from committing to long-term projects (Tadeu and Silva, 2013). Luporini and Alves (2010) and Ayeni (2020) provide evidence from developing economies showing that inflation and price volatility heighten perceived risks, leading enterprises to delay or scale back investment. Taken together, these studies suggest that inflation consistently undermines private investment, particularly in emerging markets that are more exposed to macroeconomic instability. This highlights the importance of price stability as a foundation for sustained private capital accumulation.

Hypothesis H_6: Inflation negatively affects private investment flows

2.2.7. Tax burden on private investment flows

A high tax burden manifested in elevated tax rates, complex systems, and high compliance costs exacerbates institutional risks and raises investment costs, especially in developing countries (Tadeu and Silva, 2013). Ragosa and Warren (2019) argue that the stability and investor-friendliness of the tax regime are among the key factors influencing cross-border private investment in renewable energy. While their study focuses on public financial support and feed-in tariffs, it also acknowledges that institutional burdens, including taxation, remain significant barriers to private capital flows. Similarly, Polzin et al. (2015) confirm tax transparency and incentives can reduce investment risks and encourage private sector participation. Although taxation is often seen as a constraint on private investment, it can have a positive effect when revenues are efficiently used for public investment in infrastructure, education, and healthcare, which enhance private sector productivity (Agénor, 2012). Furthermore, well-designed tax incentives targeting key sectors can stimulate private capital formation. Effective public spending financed through taxation may crowd in private investment and support long-term growth (Barro, 1990; Agénor, 2012). Ayeni (2020) provides evidence from Gambia showing that a high tax burden does not deter private investment when supported by an improved investment climate. Likewise, North (1990) and the OECD (2015) highlight the critical role of a stable and transparent tax system in reinforcing institutional quality and fostering investor confidence. Xu et al. (2022) and Fraga and Resende (2022) argue that when tax revenues are efficiently allocated toward infrastructure development and market stabilization, private investment can thrive even in the presence of a substantial tax burden.

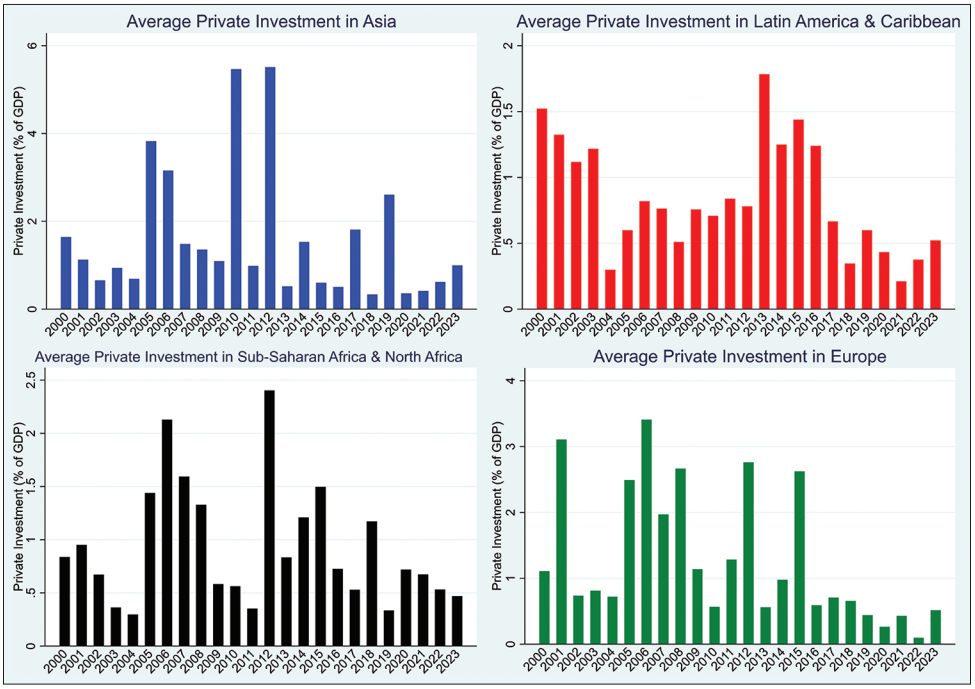
Hypothesis H_7: The tax burden has a significant negative affects private investment flows.

3. AN OVERVIEW OF PRIVATE INVESTMENT IN GLOBAL DEVELOPING COUNTRIES

Figure 1 illustrates the average value of private investment as a percentage of GDP across four regions as Asia, Latin America and the Caribbean, Sub-Saharan and North Africa, and Europe from 2000 to 2020. Throughout this period, Asia consistently maintained the highest level of private investment compared to the other regions, ranging from approximately 17% to over 22% of GDP. Notably, in 2010, Asia recorded the highest average private investment at 22.4% of GDP, reflecting a phase of recovery and expansion following the global financial crisis, during which countries like China, India, and members of ASEAN intensified investment in infrastructure and manufacturing. Even in a developed economic bloc like Europe, there were significantly lower rates of private investment, with the norm typically ranging between 15% and 18% of GDP, bottoming out in 2009 at as low as 14.3%, underscoring the sharp effect of the sovereign debt crisis and economic downturn in the Eurozone. Latin America and the Caribbean were less predictable in the fluctuations. The overall private investment rate was 16-18%, declining after 2013, reaching an all-time low of 15.1% in 2016, a period marked by declining commodity prices, political tensions, and capital outflows from emerging economies. Sub-Saharan Africa and North Africa had the lowest average private investment among these regions, frequently falling to as low as 12-15% of GDP. Unexpectedly, the area in 2003 had just 12.6%, demonstrating institutional constraints, political risk, and extreme limitations in investment infrastructure.

The evidence indicates wide differences by regions. Asia has been a key generator of private investment over the past twenty years, but there are still vast areas where other regions, particularly Africa, can catch up. These differences reflect the diversity of economic development, investment climate, institution quality, and methods for mobilizing private investment. Whereas private investment is the principal driver of economic development, various challenges still affect the majority of developing regions. Political instability and poor institutions remain key obstacles in Sub-Saharan Africa and North Africa, where private investment typically accounts for <15% of the GDP. In Latin America and the Caribbean, despite considerable potential, investment levels remain around 16-18% of

Figure 1: Private investment in global developing countries



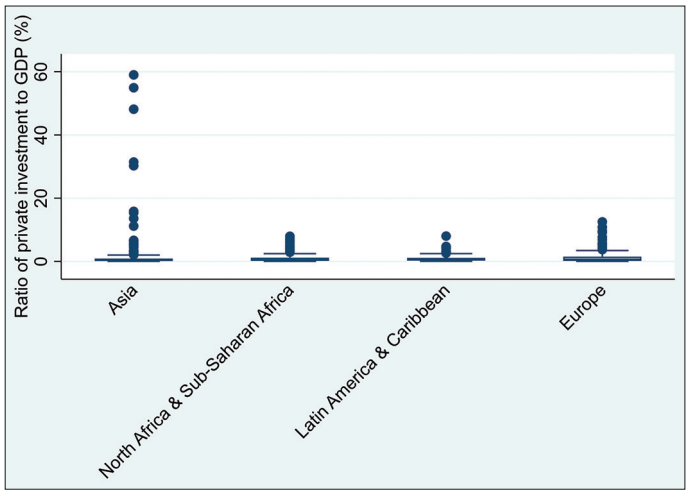
Source: Authors' calculations

GDP due to underdeveloped infrastructure and financial markets. Global shocks such as the 2008 financial crisis and the COVID-19 pandemic have also caused sharp capital flow contractions, as evidenced in Europe, where private investment dropped to 14.3% of GDP in 2009. Moreover, macroeconomic instability and uncompetitive tax regimes continue to pose risks to investment flows in Asia, despite the region consistently maintaining private investment above 20% of GDP for many years. Finally, poor public sector governance, ineffective PPP frameworks, and burdensome administrative procedures persist as common bottlenecks in many countries.

Figure 2 illustrates the geographical distribution of private investment across four major regions: Asia, North Africa and Sub-Saharan Africa, Latin America and the Caribbean, and Europe. The graph presents the ratio of private investment to GDP (%), serving as a key indicator of capital accumulation and investment intensity within each region. The data points are visualized through boxplots, which reveal both the central tendency and dispersion of investment levels.

Asia demonstrates the widest variation in private investment, with several countries exhibiting investment to GDP ratios exceeding 20%, and some even above 60%, indicating highly dynamic investment environments in select economies. This diversity is capable of mirroring the structural diversity in Asia, with both high-performing emerging economies and developing economies facing varied institutional capacities as well as varying capital mobilization approaches. However, these regions, including North Africa and Sub-Saharan Africa, as well as Latin America and the Caribbean, possess more limited distributions with significantly lower median investment ratios than those in Asia. This implies minimal private sector contribution to capital generation by way of institutional limitations, political volatility, or underdeveloped markets. Europe

Figure 2: Geographical distribution of private investment



Source: Authors' calculations

exhibits comparatively stable and moderate investment patterns, consistent with mature economic frameworks and a steady rule of law environment. These geographic differences necessitate policy settings tailored to individual countries to stimulate private investment, particularly in underperforming sectors. Encouraging financial inclusion, enhancing investment climate transparency, and creating public-private partnerships can be catalysts for promoting private investment in underperforming areas.

Private investment in emerging markets is highly constrained by environmentally associated risks and macroeconomic uncertainty. Weak ecological regulation and regulatory uncertainty are highlighted by rising carbon emissions, eroding investor confidence. While there exist pledges under the Paris Agreement (United Nation, 2015) and the promotion of sustainable investment under the UN Principles

for Responsible Investment (PRI) and OECD Guidelines (OECD, 2015), there are few emerging markets with good environmental regulations. This deters long-term capital, particularly from ESG investors. Macroeconomic uncertainty also enhances investment risk. Uncertain growth, long-term inflation, and exchange rate volatility erode real returns, making financial planning more challenging. These concerns have been emphasized in IMF Article IV Consultations and the World Bank's investment climate assessments, which stress that macroeconomic stability is critical to private sector development. Even pro-investment tools such as trade liberalization or tax burden have limited impact in the absence of credible fiscal and monetary frameworks. International organizations, notably UNCTAD and the United Nation (2015), call for integrated reforms that align investment promotion with sustainable development and macro-financial stability (Giroud, 2024). Without such reforms, private investment in developing countries is likely to remain low, short-term, and vulnerable to external shocks.

4. METHODOLOGY

To analyze the determinants of private investment flows from a macroeconomic and environmental perspective in 57 developing countries across Asia, Europe, North Africa and Sub-Saharan Africa, and Latin America during the period 2000-2023 (Appendix 1), this study utilizes data collected from the World Bank. The research constructs an integrated quantitative model incorporating macroeconomic and environmental variables. This model is grounded in the neoclassical growth theory (Solow, 1956), institutional theory (North, 1990), and financial development theory (Levine, 1997). The selection of explanatory variables is informed by prior empirical studies (e.g., Jongwanich and Kohpaiboon, 2008; Tadeu and Silva, 2013; Ayeni, 2020), while the analytical framework is further extended by incorporating CO_2 emissions, an environmental perspective that has been largely overlooked in previous research on private investment, particularly in cross-country and global analyses.

Building on prior research (Bhattacharya et al., 2016; Dong et al., 2018; Raghutla et al., 2024; Li et al., 2025), the paper develops a model to investigate the nexus between carbon reduction pressures and private investment behavior within the broader context of the global transition toward green and circular economies. The model integrates both conventional economic determinants and contemporary interdisciplinary perspectives, thereby providing robust and comprehensive empirical evidence that offers significant relevance to current global challenges.

$$PRINVEST_{i,t} = lnCO_2EM_{i,t} + OPENESS_{i,t} + PRIVCRE_{i,t} + TAXN_{i,t} + GDPR_{i,t} + CPI_{i,t} + REXR_{i,t} + RegionDummy_{i,t} + \varepsilon_{i,t}$$

In which, i = 1,2,…,57 denotes the developing countries across Asia, Europe, North Africa and Sub-Saharan Africa, and Latin America, while *t* represents the time period from 2000 to 2023. The research model is structured around two principal categories of variables. The environmental dimension is represented by CO_2EM, which captures environmental risks and commitments to sustainable development. The macroeconomic dimension comprises GDP, PRIVCRE, OPENESS, CPI, TAX, and REXR, reflecting market growth, financial development, international integration, macroeconomic stability, policy-related costs, and exchange rate fluctuations. The measurement and detailed definitions of these variables are presented in Table 1.

The cross-country dataset published by the World Bank contains missing or incomplete information for certain variables, which may result in the absence of cointegration relationships in the analysis. As shown in Table 2, the number of observations differs across variables. Variables with <15% missing entries were retained using available observations, while those exceeding 20% were excluded to ensure representativeness and reliability. This procedure has been clarified in the methodology section to enhance transparency. We apply the System-GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998) to investigate the relationships among the selected variables while addressing key econometric concerns, including endogeneity, heteroskedasticity, and autocorrelation, in dynamic panel data. By combining equations in levels and first differences and using lagged values of endogenous variables as instruments, the method ensures consistent and efficient estimation. System-GMM is particularly well-suited to this research setting, where the cross-sectional

Table 1: Measurement of research variables

Variable name	Measurement	Data source	Reference(s)
Private Investment Flows (PRINVEST)	Ratio of private investment to GDP (%)	World Bank	Jongwanich and Kohpaiboon (2008); Ayeni (2020)
CO_2 Emissions ($lnCO_2EM$)	Natural logarithm of CO_2 emissions per capita (in metric tons)	World Bank	Dong et al. (2018); Li et al. (2025)
Trade Openness (OPENESS)	Total trade (exports+imports) as a percentage of GDP (%)	World Bank	Agénor (2004); Tadeu and Silva (2013)
Domestic Credit to Private Sector (PRIVCRE)	Credit to the private sector as a percentage of GDP (%)	World Bank	Levine (1997); McKinnon (2010)
Tax burden (TAXN)	Total government tax revenue as a percentage of GDP (%)	World Bank	Ayeni (2020); Fraga and Resende (2022)
Economic Growth (GDPR)	GDP growth rate (% at current prices, USD)	World Bank	Solow (1956); Nguyen and Trinh (2018); Shabbir et al. (2021),
Inflation (CPI)	Annual change in Consumer Price Index (%)	World Bank	Serven (2002); Ayeni (2020)
Real Exchange Rate (REXR)	Real exchange rate against the USD (adjusted for inflation)	World Bank	Serven (2002); Agénor (2004); Ayeni (2020)

Source: Compiled by the authors

dimension (N) is larger than the time dimension (T) and the model incorporates a lagged dependent variable. Moreover, the validity of the instruments will be tested using the Hansen J-test, and the Arellano–Bond test for second-order autocorrelation (AR(2)) will be used to ensure the robustness of the estimation results. S-GMM has significant advantages in effectively addressing issues of endogeneity, heteroskedasticity, and autocorrelation in dynamic panel data. The method exploits information in both difference and level forms, producing more efficient and less biased estimates than alternative panel approaches (e.g., FMOLS/DOLS/D-GMM). Moreover, S-GMM is well-suited for unbalanced panel data, even with missing observations, and is accompanied by robustness tests that ensure the reliability of the results.

5. EMPIRICAL RESULTS

Descriptive statistics highlight substantial regional disparities in private investment and related macroeconomic and environmental indicators (Table 2). Asia and Europe exhibit the highest average levels of private investment (1.682% and 1.343% of GDP, respectively), reflecting more favorable conditions for capital mobilization, including macroeconomic stability and developed financial infrastructure. In contrast, Latin America and the Caribbean and Africa report significantly lower private investment ratios, at 0.867% and 0.922%, suggesting persistent institutional and market constraints.

Asia also leads in CO_2 emissions (CO_2EM), with an average of nearly 188 metric tons/capita well above other regions. Europe and Latin America follow with 31 and 18 tons/capita, respectively, while Africa reports a minimal level of 7.2 tons, indicating low industrialization but also implying high investment requirements for transitioning toward a green economy. Trade openness (OPENESS) is highest in Europe (0.845) and Asia (0.771), indicating deep global economic integration. Latin America and Africa remain less open (0.612 and 0.637), which may impede their ability to attract foreign direct investment (FDI).

In terms of financial development, private credit to the private sector (CREPR) is most robust in Asia (57.99% of GDP), followed by Europe (42.34%). Africa lags behind at only 28.42%, indicating significant financing barriers that may constrain private sector growth. Inflation (CPI) is most severe in Africa (11.277%), reflecting macroeconomic volatility. Europe and Asia maintain more moderate inflation levels (9.22% and 6.84%, respectively), providing more stable investment environments. Tax burden (TAXN) also varies by region, with Europe registering the highest average tax-to-GDP ratio (17.46%), followed by Africa (14.39%) and Latin America (14.16%). Asia reports the lowest average tax burden (11.79%), potentially serving as a fiscal incentive for private investment.

Correlation analysis reveals a negative relationship between private investment (PRINVEST) and CO_2 emissions (lnCO2EM) ($r = -0.178$, $P < 0.001$), suggesting that environmental degradation may hinder private capital inflows (Table 3). Conversely, PRINVEST is positively correlated with the real exchange rate (REXR, r = 0.193) and trade openness (OPENESS, r = 0.138), indicating the supportive role of global integration and trade competition. The tax burden (TAXN) also shows a mild positive correlation (r = 0.092), potentially signaling fiscal stability to investors. However, domestic private sector credit (CREPR) exhibits a slight negative correlation (r = −0.088), which may reflect competition for financial resources between the banking sector and private investment activities. Notably, some variables

Table 2: Summary statistics of key variables by region (2000-2023)

Variables	Cross-countries		Asia		Latin America and Caribbean		Sub-Saharan Africa and North Africa		Europe	
	Obs	Mean	Obs	mean	Obs	Mean	Obs	mean	Obs	mean
Prinvest	846	1.253	297	1.682	191	0.867	203	0.922	155	1.343
CO_2em	1344	68.959	408	187.991	264	18.160	408	7.236	264	31.188
lnCO_2EM	1344	1.647	408	2.737	264	1.615	408	0.555	264	1.683
GDPR	1368	4.287	408	5.204	264	3.053	408	4.236	288	4.190
REXR	1355	1553.123	395	4241.136	264	800.260	408	476.152	288	82.274
Openess	1326	0.717	396	0.771	260	0.612	382	0.637	288	0.845
CREPR	1162	41.156	348	57.989	250	34.820	355	28.421	209	42.340
CPI	1318	8.605	397	6.841	240	6.338	401	11.277	280	9.221
TAXN	980	14.377	275	11.794	207	14.160	254	14.390	244	17.461

Source: Authors' calculations

Table 3: Correlation analysis

	Prinvest	LNCO$_2$EM	GDPR	REXR	Openess	CREPR	CPI	TAXN
Prinvest	1							
LNCO$_2$EM	−0.178***	1						
GDPR	0.0706	0.0585	1					
REXR	0.193***	−0.172***	0.0637	1				
Openess	0.138***	−0.226***	0.0683	−0.0348	1			
CREPR	−0.0877*	0.497***	−0.0400	−0.148***	0.329***	1		
CPI	−0.0139	−0.0977*	−0.114**	0.0105	−0.0650	−0.119**	1	
TAXN	0.0922*	−0.154***	−0.130**	−0.243***	0.281***	0.188***	−0.122**	1

*P<0.05, **P<0.01, ***P<0.001. Source: Authors' calculations

demonstrate relatively high intercorrelations, such as CREPR and lnCO2EM (r = 0.497), warranting careful examination of multicollinearity in subsequent regression analysis.

The empirical results reveal that environmental and macroeconomic variables exert differential impacts on private investment across developing countries, reflecting regional disparities in institutional quality, development stages, and levels of global economic integration (Table 4).

Environmental risk captured by CO_2 emissions generally has a negative influence on private investment in Asia, Africa, and several cross-regional groupings. This finding aligns with the arguments of Dong et al. (2018) and Tzeremes (2018), who contend that environmental degradation increasingly functions as a deterrent to private capital inflows, particularly as environmental, social, and governance (ESG) standards and sustainability commitments become more stringent. Raghutla et al. (2024) and Li et al. (2025) further emphasize that uncontrolled emissions not only elevate regulatory compliance costs but also introduce policy uncertainty, thereby discouraging investment. In contrast, the relationship is positive in Latin America, potentially reflecting the attractiveness of pollution-intensive sectors such as mining and hydrocarbons as engines of private capital mobilization. This observation echoes Ayeni's (2020) findings that resource-rich, low-income economies often leverage natural endowments to stimulate growth. In Latin America and the Caribbean, high CO_2 emissions create strong pressures for green transition, thereby encouraging private investment in renewable energy, clean technologies, and green infrastructure. Moreover, supportive government policies and international climate finance flows help reduce capital costs, foster technological innovation, and enhance expected returns, which together exert a positive impact on private investment.

GDP growth remains a key determinant of private investment across all regions, reaffirming Solow's (1956) growth model and its extensions that incorporate private capital accumulation. As Agénor (2004) notes, economic expansion serves as a forward-looking signal of profitability, encouraging private investment a relationship corroborated by empirical studies in Brazil (Luporini and Alves, 2010; Tadeu and Silva, 2013) and Thailand (Jongwanich and Kohpaiboon, 2008). Nguyen and Trinh (2018), Ragosa and Warren (2019), Xu et al. (2022), and Shabbir et al. (2021) collectively emphasis GDP growth positively influences private investment, especially in projects with high upfront costs and long payback periods its effects vary over time, with short-term gains being more pronounced, whereas long-term impacts, particularly from foreign investment, may be limited or insignificant.

The influence of the real exchange rate (REXR) on private investment is heterogeneous. In Africa, depreciation of the local currency increases the cost of imported capital goods and intermediate inputs, dampening investment a pattern consistent with Serven's (2002) assertion that real exchange rate acts as a disincentive for private investors. Conversely, in Latin America, a weaker domestic currency appears to stimulate investment, possibly through enhanced export competitiveness and improved return expectations. McKinnon (2010) also stresses that such effects depend on the domestic financial structure and the availability of foreign exchange. Tadeu and Silva (2013), Fraga and Resende (2022), and Ayeni (2020) indicate real exchange rate depreciation can discourage private investment by increasing capital costs and uncertainty, with stronger effects in low-income or economically unstable countries, especially during downturns. In Sub-Saharan Africa and North Africa, the real exchange rate exerts a negative impact on private investment by raising the cost of imported machinery and raw materials, increasing the burden of foreign-currency debt, and signaling broader macroeconomic

Table 4: Environmental and macroeconomic determinants of private investment in developing countries

Variables	(1) Cross-countries	(2) Asia	(3) Latin America and Caribbean	(4) Sub-Saharan Africa and North Africa	(6) Europe	(7) Asia and Europe
$LNCO_2EM$	−0.38293***	−0.38751*	5.99084**	−0.52847*	−2.55967	−0.40498**
	(0.000)	(0.067)	(0.035)	(0.051)	(0.259)	(0.014)
GDPR	0.03746***	0.07891*	0.07292	0.00479	0.17095	0.04957***
	(0.000)	(0.060)	(0.275)	(0.874)	(0.311)	(0.000)
REXR	0.00024***	0.00022	0.00200**	−0.00016**	−0.01356	0.00024***
	(0.000)	(0.369)	(0.032)	(0.031)	(0.251)	(0.005)
Openess	0.39585***	−0.06673	−25.80910*	2.27385***	−8.15486	−0.42148
	(0.000)	(0.978)	(0.052)	(0.000)	(0.268)	(0.378)
CREPR	0.00289**	0.00404	−0.15179	−0.00751	0.03137	0.00918*
	(0.036)	(0.880)	(0.114)	(0.514)	(0.388)	(0.086)
CPI	−0.00265*	−0.09272*	0.16400	−0.00036	0.08865	0.00207
	(0.062)	(0.083)	(0.447)	(0.871)	(0.203)	(0.842)
TAXN	0.04904***	0.07779	1.34557**	0.16061***	−0.52366	0.04388**
	(0.000)	(0.828)	(0.019)	(0.002)	(0.369)	(0.036)
Constant	0.51214***	0.74663	−12.41846**	−1.79971**	21.07294	0.83334
	(0.005)	(0.805)	(0.034)	(0.025)	(0.281)	(0.180)
Observations	666	235	149	149	133	368
Number of code	57	17	11	17	12	29
AR(1) p	0.161	0.272	0.0799	0.0256	0.225	0.184
AR(2) p	0.289	0.0840	0.1425	0.180	0.975	0.181
Hansen p	0.269	0.652	0.704	0.778	0.695	0.743

PVAL in parentheses ***P<0.01, **P<0.05, *P<0.1

instability. Moreover, given the export structure dominated by primary commodities, currency depreciation does not necessarily improve export revenues, leaving enterprises more hesitant to undertake new investments.

Trade openness (OPENESS) exhibits contrasting effects: positively associated with investment in Africa, but negatively in Latin America. This dichotomy supports Ragosa and Warren's (2019) view that globalization simultaneously offers expanded market access and heightened competitive pressure. In the African context, trade liberalization has likely spurred investment in infrastructure and light manufacturing, consistent with Fraga and Resende (2022) findings on the role of enabling trade and infrastructure environments in attracting private capital. Domestic enterprises in the region face intense competition from imports, remain highly dependent on external demand, and are vulnerable to exchange rate fluctuations. In addition, weak competitiveness and underdeveloped financial institutions contribute to fragmented capital flows, further undermining incentives for long-term private investment.

Domestic private sector credit (CREPR) shows statistically significant effects only in select regions, highlighting disparities in financial sector development. This lends support to Levine's (1997) argument that a robust financial system is a prerequisite for unlocking private investment potential. In financially underdeveloped economies, institutional rigidities and limited capital market depth often blunt this channel of investment transmission. According to Ragosa and Warren (2019), Polzin et al. (2015), and Xu et al. (2022), a well-developed domestic credit system enhances private investmen both international and local by improving capital absorption, attracting foreign funds, and supporting long-term financing. In Asia and Europe, private credit positively influences private investment by improving access to finance, lowering costs and financial risks, and encouraging long-term projects. The development of credit markets also generates a "crowding-in" effect, attracting additional international capital and enhancing investment efficiency.

Inflation (CPI) Demonstrates a substantial negative influence in Asia and meta-contries, where macroeconomic volatility remains a persistent challenge. As noted by Driver and Moreton (1992), elevated inflation heightens uncertainty and increases the opportunity cost of capital, prompting investors to postpone long-term commitments. These results suggest that private investment is highly sensitive to macroeconomic fundamentals, particularly inflation dynamics and policy credibility, in economies undergoing structural transformation (Ragosa and Warren, 2019; Polzin et al., 2015; Xu et al., 2022). In Asia, inflation (CPI) exhibits a distinctly negative effect on private investment by raising borrowing costs, eroding export competitiveness, and amplifying macroeconomic uncertainty. Given the region's reliance on bank credit and export-oriented production, enterprises encounter tighter financial conditions and heightened risk perceptions, which in turn delay or scale back investment decisions.

Interestingly, the tax burden (TAXN) shows a positive correlation with private investment in some regions, contrary to traditional expectations (Barro, 1990; Agénor, 2012). This may be attributed to the indirect benefits generated by public investment financed through taxation when efficiently allocated to infrastructure and public goods, can crowd in private capital (Polzin et al., 2015; Dreger and Reimers, 2016). Ayeni (2020) indicates that a high tax burden does not have a negative impact on investment when the investment environment is favorable (Ayeni, 2020). Meanwhile, a stable and transparent tax system enhances institutional quality and investor confidence (North, 1990; OECD, 2015). Xu et al. (2022) and Fraga and Resende (2022) demonstrate that effective allocation of tax revenues stimulates private investment, even under heavy tax pressure. The institutional framework developed by North (1990) shows that institutional quality and governance capacity mediate the influence of macroeconomic variables on investment outcomes. Policy variables may also have different effects depending on the strength and reliability of institutional arrangements. Therefore, establishing a stable and transparent investment climate is essential to increasing the effectiveness of economic policies and attracting sustainable private capital flows.

6. CONCLUSION

The empirical findings derived from the system-GMM estimation address a critical gap in the existing literature by empirically linking environmental risks proxied by CO_2 emissions with private investment flows in developing economies. While prior studies have largely emphasized macroeconomic determinants, this study integrates environmental dimensions into the investment-growth nexus, drawing upon the neoclassical growth model (Solow, 1956) and extending it with insights from institutional and sustainability-oriented investment theories, including environmental, social, and governance (ESG) frameworks. Consistent with Hypothesis 1, we reveal that higher CO_2 emissions exert a statistically significant and negative influence on private investment, underscoring rising investor sensitivity to environmental degradation and long-term sustainability risks excluding Latin America and the Caribbean. This aligns with the growing prominence of ESG considerations in shaping capital allocation decisions, particularly within the context of global decarbonization efforts. Furthermore, our findings confirm Hypotheses 2, 4, and 5, indicating that macroeconomic fundamentals such as GDP growth, domestic credit to the private sector, and trade openness are found to foster private investment consistently. In Latin America and the Caribbean, trade openness produces the opposite effect. Conversely, inflationary pressures are shown to discourage investment, supporting Hypothesis 6. Notably, Hypothesis 3 is supported, with the real exchange rate emerges as a crucial determinant of investor confidence except in Sub-Saharan and North Africa, highlighting the importance of macroeconomic stability in attracting private capital. Contrary to Hypothesis 7, private investment in some developing countries increases when taxes rise, posing a challenge to conventional economic theory. More importantly, it shows that environmental risks are reshaping the way we understand investment decisions.

To attract and sustain private capital in the global economy, policymakers must embed environmental priorities within broader economic strategies. The task extends beyond compliance, requiring stricter CO_2 oversight, development of green

infrastructure, and support for sustainable finance. Such measures not only support environmental protection but also enhance national investment attractiveness. By aligning with global frameworks such as the Paris Agreement and ESG principles, governments can reinforce credibility, build investor confidence, and improve their competitive position in international markets.

Economic stability remains a fundamental condition. Investors are highly responsive to inflation and exchange rate volatility, which create uncertainty and distort business costs. To mitigate these risks, countries need reliable and well-coordinated macroeconomic policies on inflation targeting and exchange rate management, consistent with the guidance of institutions like the IMF and the OECD.

A strong financial system is also essential, as SMEs the backbone of most economies continue to face barriers in accessing credit. Banking reforms, improvements in risk assessment, and deeper capital market development guided by Basel III principles and World Bank recommendations can expand financial inclusion and unlock productive private investment.

Finally, Integration into the global economy continues to drive growth; expanding trade accords, easing investment procedures, and aligning domestic rules with WTO standards all lower barriers to capital flows. Simultaneously, comprehensive tax reform designed to simplification, transparency, and predictability combined with targeted incentives for clean technologies, digital transformation, and innovation, can deliver more sustainable returns. Aligning these policies with global initiatives such as the OECD/G20 BEPS framework and green finance taxonomies ensures that national strategies strengthen competitiveness while advancing long-term sustainable development.

While this study provides important empirical evidence on the negative impact of environmental risk proxied by CO_2 emissions on private investment, several limitations warrant further exploration. First, the reliance on CO_2 emissions alone may not fully capture the complexity of environmental and sustainability risks. Future research should consider broader ESG-related indicators, such as climate vulnerability indices, regulatory quality, or green finance performance metrics, to reflect investor perceptions better. Second, the use of macro-level panel data limits insights into firm-level or sectoral heterogeneity. Subsequent studies could adopt micro-level approaches to examine how environmental risks and policy uncertainty affect investment behaviour across industries, particularly in carbon-intensive versus low-carbon sectors. Moreover, while the system-GMM estimator mitigates some endogeneity concerns, the methodology may still be vulnerable to instrument proliferation and weak identification. Alternative approaches, such as natural experiments or structural models, could strengthen causal inference. Additionally, this study does not explicitly account for the role of institutional quality, legal frameworks, or political risk factors that may moderate the relationship between environmental risks and private capital flows. Finally, as global sustainable finance norms continue to evolve, driven by frameworks like the EU Green Deal, TCFD, or SDG-aligned investment taxonomies, future research should explore how these standards influence investor decision-making in developing and emerging economies. By addressing these gaps, future studies can offer more nuanced and policy-relevant insights to guide governments in designing investment-friendly and sustainability-aligned economic frameworks.

REFERENCES

Agénor, P.R. (2004), The Economics of Adjustment and Growth. La Editorial, UPR. Cambridge: Harvard University Press.

Agénor, P.R. (2012), Public capital, growth and welfare: Analytical foundations for public policy. In: Public Capital, Growth and Welfare. United States: Princeton University Press.

Arellano, M., Bover, O. (1995), Another look at the instrumental variable estimation of error-components models. Journal of Econometrics, 68(1), 29-51.

Ayeni, R.K. (2020), Determinants of private sector investment in a less developed country: A case of the Gambia. Cogent Economics and Finance, 8(1), 1794279.

Barro, R.J. (1990), Government spending in a simple model of endogeneous growth. Journal of political economy, 98(5, Part 2), S103-S125

Bhattacharya, M., Paramati, S.R., Ozturk, I., Bhattacharya, S. (2016), The effect of renewable energy consumption on economic growth: Evidence from top 38 countries. Applied Energy, 162, 733-741.

Blundell, R., Bond, S. (1998), Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115-143.

Dong, K., Hochman, G., Zhang, Y., Sun, R., Li, H., Liao, H. (2018), CO_2 emissions, economic and population growth, and renewable energy: Empirical evidence across regions. Energy Economics, 75, 180-192.

Dreger, C., Reimers, H.E. (2016), Does public investment stimulate private investment? Evidence for the euro area. Economic Modelling, 58, 154-158.

Driver, C., Moreton, D. (1992), Investment, Expectations and Uncertainty. Oxford: Blackwell.

Fraga, J.S., da Cunha Resende, M.F. (2022), Infrastructure, conventions and private investment: An empirical investigation. Structural Change and Economic Dynamics, 61, 351-361.

Giroud, A. (2024), World Investment Report 2023: Investing in Sustainable Energy for all: In: United Nations Conference on Trade and Development. Vol. 205. Geneva and New York. p128-131.

Jongwanich, J., Kohpaiboon, A. (2008), Private investment: Trends and determinants in Thailand. World Development, 36(10), 1709-1724.

Levine, R. (1997), Financial development and economic growth: Views and agenda. Journal of Economic Literature, 35(2), 688-726.

Li, X., Zheng, Z., Shi, D., Han, X. (2025), How government green fund reduce corporate carbon emissions. Journal of Environmental Management, 380, 124999.

Luporini, V., Alves, J. (2010), Private investment: An empirical analysis for Brazil. Economia e Sociedade, 19, 449-475.

McKinnon, R.I. (2010), Money and Capital in Economic Development. Washington, DC: Brookings Institution Press.

Nguyen, C.T., Trinh, L.T. (2018), The impacts of public investment on private investment and economic growth: Evidence from Vietnam. Journal of Asian Business and Economic Studies, 25(1), 15-32.

North, D.C. (1990), Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

OECD. (2015), The OECD Guidelines for Multinational Enterprises. Paris: OECD.

Polzin, F., Migendt, M., Täube, F.A., Von Flotow, P. (2015), Public policy influence on renewable energy investments-A panel data study across

OECD countries. Energy Policy, 80, 98-111.
Raghutla, C., Malik, M.N., Hameed, A., Chittedi, K.R. (2024), Impact of public-private partnerships investment and FDI on CO_2 emissions: A study of six global investment countries. Journal of Environmental Management, 360, 121213.
Ragosa, G., Warren, P. (2019), Unpacking the determinants of cross-border private investment in renewable energy in developing countries. Journal of Cleaner Production, 235, 854-865.
Serven, L. (2002), Real Exchange Rate Uncertainty and Private Investment in Developing Countries. Washington, D.C: World Bank Publications.
Shabbir, M.S., Bashir, M., Abbasi, H.M., Yahya, G., Abbasi, B.A. (2021), Effect of domestic and foreign private investment on economic growth of Pakistan. Transnational Corporations Review, 13(4), 437-449.
Solow, R.M. (1956), A contribution to the theory of economic growth. The Quarterly Journal of Economics, 70(1), 65-94.
Tadeu, H.F.B., Silva, J.T.M. (2013), The determinants of the long term private investment in Brazil: an empirical analysis using cross-section and a Monte Carlo simulation. Journal of Economics Finance and Administrative Science, 18, 11-17.
Tzeremes, P. (2018), Time-varying causality between energy consumption, CO_2 emissions, and economic growth: Evidence from US states. Environmental Science and Pollution Research, 25(6), 6044-6060.
United Nations. (2015), Paris Agreement. United Nations Framework Convention on Climate Change.
Verma, R. (2007), Savings, investment and growth in India: An application of the ARDL bounds testing approach. South Asia Economic Journal, 8(1), 87-98.
World Bank. (2020), World Development Report 2020: Trading for Development in the Age of Global Value Chains. World Bank Publications. Available from: https://www.worldbank.org/en/publication/wdr2020
Xu, N., Kasimov, I., Wang, Y. (2022), Unlocking private investment as a new determinant of green finance for renewable development in China. Renewable Energy, 198, 1121-1130.

APPENDIX

Appendix 1: Compilation of developing countries

No	Region	Country name
1	Asia	Bangladesh
2	Asia	Cambodia
3	Asia	China
4	Asia	India
5	Asia	Indonesia
6	Asia	Iran, Islamic Rep.
7	Asia	Iraq
8	Asia	Jordan
9	Asia	Lao PDR
10	Asia	Malaysia
11	Asia	Nepal
12	Asia	Pakistan
13	Asia	Philippines
14	Asia	Sri Lanka
15	Asia	Thailand
16	Asia	Uzbekistan
17	Asia	Viet Nam
18	Europe	Albania
19	Europe	Armenia
20	Europe	Belarus
21	Europe	Bosnia and Herzegovina
22	Europe	Bulgaria
23	Europe	Georgia
24	Europe	Kazakhstan
25	Europe	North Macedonia
26	Europe	Romania
27	Europe	Russian Federation
28	Europe	Serbia
29	Europe	Turkiye
30	Latin America and Caribbean	Argentina
31	Latin America and Caribbean	Brazil
32	Latin America and Caribbean	Colombia
33	Latin America and Caribbean	Costa Rica
34	Latin America and Caribbean	Dominican Republic
35	Latin America and Caribbean	Ecuador
36	Latin America and Caribbean	Honduras
37	Latin America and Caribbean	Jamaica
38	Latin America and Caribbean	Mexico
39	Latin America and Caribbean	Paraguay
40	Latin America and Caribbean	Peru
41	North Africa and Sub-Saharan Africa	Algeria
42	North Africa and Sub-Saharan Africa	Angola
43	North Africa and Sub-Saharan Africa	Cameroon
44	North Africa and Sub-Saharan Africa	Congo, Dem. Rep.
45	North Africa and Sub-Saharan Africa	Congo, Rep.
46	North Africa and Sub-Saharan Africa	Cote d'Ivoire
47	North Africa and Sub-Saharan Africa	Egypt, Arab Rep.
48	North Africa and Sub-Saharan Africa	Ghana
49	North Africa and Sub-Saharan Africa	Kenya
50	North Africa and Sub-Saharan Africa	Morocco
51	North Africa and Sub-Saharan Africa	Nigeria
52	North Africa and Sub-Saharan Africa	Senegal
53	North Africa and Sub-Saharan Africa	South Africa
54	North Africa and Sub-Saharan Africa	Tanzania
55	North Africa and Sub-Saharan Africa	Tunisia
56	North Africa and Sub-Saharan Africa	Uganda
57	North Africa and Sub-Saharan Africa	Zamb