THE NEXUS BETWEEN FOREIGN DIRECT INVESTMENT AND DOMESTIC PRIVATE CAPITAL ACCUMULATION REVALUED: A CROSS-COUNTRY ASSESSMENT FOR 32 EMERGING MARKETS

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ABSTRACT

This study examines the impact of greenfield Foreign Direct Investment (FDI) on domestic private investment in 32 emerging economies from 1995 to 2021. Using conventional panel data methods —Ordinary Least Squares, and Fixed/Random effects models—, initial results suggest that FDI crowds in domestic investment. However, when addressing endogeneity and cross-sectional dependence through difference and system Generalized Method of Moments (GMM) estimators and augmented with Common Correlated Effects (CCE), FDI becomes statistically insignificant. Thus, the apparent positive effect disappears when robust methods are used, thereby highlighting that the FDI-investment nexus is highly sensitive to

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econometric methodology, particularly those that address endogeneity and cross-country interdependence.
Keywords: FDI, domestic private capital accumulation, emerging countries, panel data.
JEL Classification: F21, E22, C33, O16.

REVISANDO LA RELACIÓN ENTRE LA INVERSIÓN EXTRANJERA DIRECTA Y LA ACUMULACIÓN NACIONAL DE CAPITAL PRIVADO: UN ANÁLISIS TRANSVERSAL PARA 32 ECONOMÍAS EMERGENTES

RESUMEN

Este estudio examina el impacto de la inversión extranjera directa (IED) en proyectos greenfield sobre la inversión privada nacional en 32 economías emergentes durante el periodo 1995-2021. Los estimadores tradicionales de datos de panel (mínimos cuadrados ordinarios, efectos fijos y efectos aleatorios) sugieren inicialmente una relación positiva y estadísticamente significativa entre la IED y la inversión nacional. No obstante, al corregir la endogeneidad y la dependencia transversal mediante estimadores del método generalizado de momentos (GMM en diferencias y en sistema) y al incorporar estimadores de efectos correlacionados comunes (CCE), el coeficiente de la IED pierde toda significatividad estadística. En consecuencia, el aparente efecto estimulante de la inversión extranjera directa sobre la inversión privada nacional desaparece por completo cuando se emplean técnicas econométricas más robustas. Este resultado pone de manifiesto que la relación entre IED e inversión nacional es extremadamente sensible a la especificación econométrica, particularmente a aquellos métodos que controlan adecuadamente la endogeneidad y la interdependencia entre países.
Palabras clave: IED, acumulación de capital privado nacional, países emergentes, datos de panel.
Clasificación JEL: F21, E22, C33, O16.

1. INTRODUCTION

Although economic development process is not reduced to growth alone, capital accumulation plays a crucial role in reducing the gap between developed and emerging countries as accelerate

technological change and boost labor productivity (Cypher, 2021). According to Solow's (1956) exogenous growth theory, limited investment in physical capital by developing nations is associated with their low savings rates. This gap may be filled by foreign direct investment (henceforth, FDI) from developed countries, resulting in a positive impact on the growth of developing countries. From a neoclassical perspective, thus, FDI should stimulate domestic investment by alleviating capital scarcity and introducing productivity-enhancing technologies (Barro, 1997; Barro and Sala-i-Martin, 1992; Mankiw *et al.*, 1992; Obstfeld and Rogoff, 1996). Structuralist and classical political economy approaches, conversely, highlight that FDI may generate competitive pressures, repatriation of profits, and enclave dynamics that weaken domestic linkages (Arrizabalo *et al.*, 2025; Cypher, 2021; Hirschman, 1958; Lewis, 1955; Prebisch, 1949; Taylor, 1983). Whether FDI complements or displaces national capital formation depends on the domestic capacity to absorb foreign investment, the industrial structure, and the nature of backward and forward linkages.

Therefore, predicting the impact of FDI on the growth and development of recipient countries is a challenging task because capital accumulation is not simply an external factor. In this regard, competition among firms, international division of labor, market expansion, spatial agglomeration, and technological innovation make tough to predict the accurate effects of FDI on the growth and development of emerging countries (Ghosh and Parab, 2021; Shah *et al.*, 2020).

Based on the above, the research is aimed at evaluating the effects of FDI on domestic private investment in 32 major emerging countries from 1995 to 2021. Given the mixed empirical evidence found in existing literature (Agosin and Machado, 2005; Farla, Crombrugghe, and Verspagen, 2016; Jude, 2019; Morrissey and Udomkerdmongkol, 2012), the results of this study may help inform policymakers from emerging economies about the implications of FDI for domestic private investment.

Likewise, several estimators are applied in the analysis to improve robustness of the findings. Hence, the main contribution of the investigation lies in the fact that it is the first attempt to compare the outcomes derived from the application of traditional estimators based on the Ordinary Least Squares (OLS) regression, the Fixed/Random Effects models, the Generalized Method of Moments (GMM) by Arellano y Bond (1991),

and the combination of the GMM with the Common Correlated Effects (CCE) approach put forth by Pesaran (2006). By means of the CCE-GMM estimator, both endogeneity and cross-sectional dependence may be addressed, thereby obtaining more robust results than conventional panel data techniques (Boundi-Chraki and Perrotini-Hernández, 2025). The study is organized as follows. Section 2 conducts an empirical literature review. Section 3 presents the data, methods, and preliminary analysis. Section 4 examines and discusses the findings. Finally, the main conclusions are summarized, and policy implications are discussed.

2. EMPIRICAL LITERATURE REVIEW

As emphasized by Jude (2019), despite the abundance of literature on FDI, the nexus between FDI and domestic private investment has received limited attention from scholars as the theoretical research shortage and the contradictious findings of empirical studies. Nevertheless, several studies provide valuable insights into the relationship between domestic private investment and FDI in emerging markets. Agosin and Machado's (2005) study is regarded as a seminal work on the FDI -domestic private investment nexus. In line with Romer (1992), Agosin and Machado (2005) posit that multinational corporations introduce new goods into those countries which lack the know-how and labor force to produce them. In such a framework, a crowding-out effect may arise when FDI is concentrated in sectors with domestic competitors, as foreign firms could limit investment opportunities for local producers. In emerging industries, FDI could have a positive impact on stimulating national capital accumulation, as it brings in technology, knowledge, and increases demand for intermediate inputs. In accordance with Hirschman[2] (1958), Agosin and Machado (2005) propose that FDI has a crowding-in effect

[2] Large companies with operations in multiple countries could help drive the concept of backwards industrialisation proposed by Hirschman (1958). The increased demand for intermediate inputs may lead to the development of local industries that produce final products. Hirschman notes that backwards and forward linkages are interconnected because some industries supply intermediate and final goods. Therefore, when multinational corporations establish backwards linkages, they can also foster forward linkages as domestic suppliers emerge.

on domestic private investment through the backward linkages. Based on these potential scenarios, the authors examine whether FDI has a crowding-in or crowding-out effect on national private investment in 36 countries from Africa, Asia, and Latin America during the 1971-2000 period. Employing the one-step GMM developed by Arellano and Bond (1991), the authors conduct two regressions. The first regression includes both current and lagged values of the growth rate and FDI as regressors, while the second regression incorporates a proxy for the gap between real and potential output.

According to their findings, empirical evidence suggests that FDI had a crowding-out effect on domestic private investment in Latin America over the 1971-2000 period. Conversely, FDI had a crowding-in effect on domestic capital accumulation in both Africa and Asia. When the period is divided into decades, Agosin and Machado (2005) show that FDI displaced domestic investment in Africa during the 1990s. The mixed results can be attributed to the varying roles played by institutions and the State in developing and emerging countries. While in Asia, the State continued to pursue industrial policies, in Latin America the liberalization process during the 1990s did not stimulate a crowding-in effect. Agosin and Machado's (2005) pioneering work laid the ground for modern empirical literature on this topic, considering institutional aspects. Among following studies, Morrissey and Udomkerdmongkol (2012) stand out for their comprehensive approach, by extending Agosin and Machado's regression by incorporating public investment and five governance indicators to control for the effects of State and institutions on the dependent variable. Applying the system GMM estimator put forth by Blundell and Bond (1998), the authors address the limitations of lagged levels as instruments for first differences, as suggested by the literature (Arellano and Bover, 1995).

Through their analysis of 46 developing countries from 1996 to 2009, Morrissey and Udomkerdmongkol (2012) reveal that in countries with favorable regimes for capital accumulation, FDI inflows might displace domestic private investment. Despite better governance and institutions, the increase in total investment remains smaller than the contribution from FDI. In contrast, countries with poor governance experience higher domestic private investment to compensate for the shortage of FDI. It is worth mentioning that Farla, Crombrugghe, and Verspagen (2016)

attempted to replicate Morrissey and Udomkerdmongkol's (2012) estimation by making several modifications to the system GMM specification. Incorporating additional control variables and refining the econometric approach to strengthen the robustness of the analysis, Farla, Crombrugghe, and Verspagen (2016) arrived at a different conclusion from Morrissey and Udomkerdmongkol (2012). Their findings indicate that there is no evidence of crowding-out effects, nor does good governance enhance total investment in the context of FDI and domestic private investment in developing economies. Furthermore, Farla, Crombrugghe, and Verspagen (2016) raise a potential concern with Morrissey and Udomkerdmongkol's (2012) estimation, noting that the sample used in the latter study includes several developing countries with significantly different levels of economic development.

The presence of heterogeneity within the sample may contravene the assumption of homogeneity in the coefficients of the lagged regressors in the GMM estimator. As Chen, Yao, and Malizard (2017) noted, this could lead to biased parameter estimates and affect the reliability of the results. To address this aggregation bias, some studies examine the relationship between FDI and domestic private investment in countries that share similar features. For instance, in Adams' (2009) study, the impact of FDI on domestic private investment was analyzed for 42 Sub-Saharan countries over the period from 1990 to 2003, using both OLS and fixed effects (FE) estimations. According to the author, in the long run, FDI has a crowding-in effect due to backward linkages, in line with the notion of backwards industrialization *à la* Hirschman (1958). Similarly, Ndikumana and Verick (2008), who also utilized the FE estimator, found that FDI stimulated domestic private investment in 38 Sub-Saharan countries between 1970 and 2005. Moreover, the authors contend that a bidirectional relationship may exist between FDI and domestic private investment, which can be related to the notion of circular cumulative causation[3] *à la* Smith-Young-Myrdal.

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[3] According to Young (1928), Adam Smith's (1776) theory on the correlation between labor division and market expansion suggests a circular cumulative causation. That is, a more refined labor division enhances labor productivity, boosts national income, and leads to market growth. This reciprocal relationship between labor division and market expansion is further strengthened by international trade, as excess production can be

The effects of FDI on domestic investment are decomposed into short-term and long-term components by Jude (2019) in an assessment of 10 Central and Eastern European countries, covering the period from 1995 to 2015. Employing the GMM estimator developed by Arellano and Bover (1995) and incorporating several financial control variables, Jude (2019) finds that FDI has a crowding-out effect in the short term. Conversely, over the long run, the impact of FDI on domestic investment evolves into a crowding-in effect, stimulating and attracting additional domestic investment in the host country. Notably, Jude's (2019) research on the short-term and long-term effects of FDI on domestic investment aligns with the concept of circular accumulative causation. On the other hand, a body of research examines the effects of FDI on domestic private investment at the sectoral level. Among these studies, Ha, Holmes, and Tran (2022) apply the system GMM estimator to investigate whether FDI leads to crowding-in or out effects on domestic investment in 397 sectors over six years in Vietnam.

One of the most significant contributions of this research is that it calculates backwards and forward linkages *à la* Rasmussen-Hirschman[4] (Hirschman, 1958; Miller and Blair, 2022; Rasmussen, 1956), by following Newman *et al.* (2015), Fujimori and Sato (2015), Javorcik (2004), and Jude (2012). The authors incorporate the productive linkages between foreign and domestic firms in the regression, which represents a crucial novelty in literature. Based on the findings of Ha, Holmes, and Tran (2022), it has been observed that FDI exerts a positive crowding-in

absorbed by other nations, contributing to domestic capital accumulation and serving as a primary driver of a nation's prosperity. Along these lines, Myrdal (1957) emphasizes that development is a complex process characterized by interdependencies and feedback loops, where FDI and domestic private investment can interact and reinforce each other through circular and cumulative causation, *à la* Smith-Young, resulting in both positive and negative effects on domestic capital accumulation.

4 By summing the columns and rows of the Leontief inverse, respectively and then multiplying them by the horizontal linkages, the authors may estimate the backward linkages among industries. It is worth mentioning that in the literature the limitations arising from calculating productive linkages using demand multipliers (column sums) and supply multipliers (row sums) from the Leontief inverse have been extensively discussed (Miller and Blair, 2022). Regarding forward linkages, the preference has been for the sum of the rows from the Ghosh inverse (Aroche Reyes and Márquez Mendoza, 2021; de Mesnard, 2024; Guerra and Sancho, 2011).

effect on local firms, especially when the productive linkages within and between sectors are stronger. Therefore, the inflows of FDI and the growing presence of foreign firms may play a significant role in promoting backwards industrialization in emerging countries like Vietnam. Remarkably, several studies have attempted to examine the relationship between FDI and domestic capital accumulation using time series data rather than panel data. For instance, As Chen, Yao, and Malizard (2017) employ the ARDL bounds test to assess the impact of FDI on domestic private investment in China from 1991q1 to 2014q1. To ensure robustness, the authors apply full-modified OLS (FMOLS), canonical correlation regression (CCR), and dynamic OLS (DOLS) estimators. According to their findings, before China joined the World Trade Organization (WTO), FDI stimulated domestic private investment in the country. However, in the period following WTO entry, the trend was primarily driven by the higher presence of wholly foreign-funded enterprises (WFFE) compared to equity joint ventures (EJV). Chinese institutions should be more discerning in granting preferential treatment and fiscal concessions to support national firms, according to the authors.

Nguyen, Luu, and Do (2021) employ the Structural Vector Autoregression (SVAR) model to analyze the relationship between FDI and domestic investment in Vietnam from 2003 to 2017. Acknowledging the heterogeneity of FDI, the authors differentiate between greenfield investments and cross-border mergers and acquisitions[5] (M&A) to assess their respective impacts on national capital accumulation and subsequent economic growth. The findings suggest that cross-border mergers and acquisitions (M&A) hinder national capital accumulation. In contrast, greenfield FDI can complement national private investment, thereby stimulating economic growth in both the short and long term. Given that cross-border M&A primarily involves a change in ownership of non-current assets, Vietnamese policymakers should prioritize promoting greenfield investment and enhancing economic infrastructure to leverage the backward linkages between multinational corporations and local firms.

[5] In the next section, the difference between greenfield and M&A investment will be discussed.

3. DATA, METHODS, AND PRELIMINARY ASSESSMENT

As mentioned earlier, the research is focused on assessing the impact of FDI on domestic private investment in 32 major emerging countries (see Table 1). According to data from the World Bank, these 32 emerging countries collectively account for approximately 38% of the world's Gross Domestic Product (GDP) at current prices and represent 64% of the world's population in 2022. The sample includes countries that are members of important economic organizations: The European Union (Bulgaria, Czechia, Hungary, Poland, and Romania), the Common Market of the South (MERCOSUR) (Argentina and Brazil), the Association of Southeast Asian Nations (ASEAN) (Indonesia, Malaysia, Philippines, Thailand, and Vietnam), the BRICS + (Brazil, Russian Federation, India, China, South Africa, as original members, and Egypt, Indonesia, Iran, and United Arab Emirates, as recent adherents), the Organization of the Petroleum Exporting Countries (OPEC) (Algeria, Iran, Saudi Arabia, and the United Arab Emirates), and the Organization for Economic Co-operation and Development (OECD) (Chile, Czechia, Colombia, Hungary,

Table 1. Sample

Algeria	Hungary	Romania
Argentina	India	Russian Federation
Bangladesh	Indonesia	Saudi Arabia
Bolivia	Iran	South Africa
Brazil	Malaysia	Thailand
Bulgaria	Mexico	Tunisia
Chile	Morocco	Turkey
China	Pakistan	Ukraine
Colombia	Peru	United Arab Emirates
Czechia	Philippines	Vietnam
Egypt	Poland	

Source: Own elaboration.

Mexico, Poland, and Turkey). Therefore, data consists of countries with strongly heterogeneous features, which may hinder the application of estimators based on the GMM or FE, as we will discuss later.

The assessment begins in 1995, coinciding with the General Agreement on Tariffs and Trade (GATT), which is replaced by the World Trade Organization (WTO). The dataset comprises strongly balanced panel encompassing 32 countries for 26 years (1995-2021), capturing the effects of increased globalization and trade openness on the flow of FDI and its relationship with domestic private investment. By using a balanced panel data approach, potential biases can be mitigated to a more comprehensive understanding of the FDI -domestic investment nexus (Hsiao, 2014).

As Agosin and Machado (2005) highlight, comparing FDI with domestic private investment poses limitations due to the distinction between a component of the capital account of the balance of payments and a macroeconomic measure specific to national accounts. Ndikumana and Verick (2008) and Farla, Crombrugghe, and Verspagen (2016) argue that subtracting FDI from gross fixed capital formation (GFCF) to isolate domestic private investment may yield misleading results as the potential negative correlation between domestic private investment and FDI.

To address these limitations, GFCF is adopted as a percentage of nominal GDP —dependent variable—, as the literature suggests (Farla, Crombrugghe, and Verspagen, 2016; Jude, 2019). It is worth noting that the FDI's definition presents some challenges. It should be differentiated between greenfield FDI and cross-border M&A. Greenfield FDI involves the establishment of new foreign-owned enterprises in the host country. Cross-border M&A refers to the acquisition of existing domestic companies by foreign investors. Therefore, the effects on domestic private investment should be distinguished (Jude, 2019; Nguyen, Luu, and Do, 2021).

Cross-border M&A may have a neutral impact on national capital accumulation and may not be statistically significant (Jude 2019; Nguyen, Luu, and Do, 2021). Therefore, the research is focused on greenfield FDI, which is computed by using net FDI inflows at current prices collected from the United Nations Conference on Trade and Development (UNCTAD) and the International Monetary Fund (IMF) Databases. Net M&A flows at current prices is subtracted from nominal net FDI inflows to

obtain greenfield FDI at current prices[6] (Jude, 2019). To contextualize the significance relative to each country's, greenfield FDI is measured as a percentage of nominal GDP. The GDP at constant prices is included as a control variable in the regression to account for the potential impact of economic growth on the dependent variable (Agosin and Machado, 2005). The relationship between investment and economic growth lies in the acceleration principle posited by Clark (1917), which states that increased aggregate demand may spur capital accumulation in both the short and long run. As highlighted by Boundi-Chraki and Perrotini-Hernández (2024), the effect of economic growth on capital accumulation is not contemporaneous, thereby leading to lagging the GDP for a period. In other words, the GDP growth variable is introduced with a lag to reflect that the effect of economic growth on investment decisions is not contemporaneous but manifests with a time delay. Likewise, the dependent variable is included with a one-period lag to capture the dynamic effects of domestic capital accumulation, acknowledging its path-dependent nature and the acceleration principle. While the dynamic model with a one-period lag is standard, it is to be acknowledged that the employed short-run structure may not fully capture long-run dynamics —such as the long-run crowding-in effect suggested by Jude (2019)—.

Considering that domestic private investment decisions can be influenced by numerous factors, including access to finance, the money supply, the level of public indebtedness, and the integration of national economies into the global market, control variables are included as proxies for these effects.

Specifically, domestic credit to the private sector as a percentage of nominal GDP (*FIN*), general government gross debt as a percentage of nominal GDP (*DEBT*), broad money as a percentage of nominal GDP (M3), and the degree of trade openness (*TRADE*) are incorporated. All the information was gathered from the World Bank Database, except for general government gross debt, which was collected from the IMF

[6] As an additional robustness exercise, alternative definitions of FDI were tested, including net FDI inflows excluding reinvested earnings. The results remained qualitatively unchanged, with no statistically significant effect on domestic private investment in GMM-based estimations. This suggests that the null effect is not driven by the treatment of reinvested earnings or the decomposition of FDI flows.

Database. To capture the dynamics of national capital accumulation, the lagged dependent variable is integrated, and the natural logarithms (*LOG*) are taken to obtain the linear regression:

$$\begin{aligned} LOG(GFCF_{i,t}) &= \beta_0 + \alpha LOG(GFCF_{i,t-1}) + \beta_1 LOG(FDI_{i,t}) \\ &+ \beta_2 LOG(GDP_{i,t-1}) + \beta_3 LOG(FIN_{i,t}) + \beta_4 LOG(DEBT_{i,t}) \\ &+ \beta_5 LOG(M3_{i,t}) + \beta_6 LOG(TRADE_{i,t}) + \varepsilon_{i,t} \end{aligned} \quad [1]$$

Where β_0 stands for the constant, β_n means the coefficient of the regressors (n = 1,2,…,6), $\varepsilon_{i,t}$ represents the error term, the subscript i denotes each country from the sample (i = 1,2,…,32), t corresponds to the time span (t = 1995,…,2021), and the rest has been previously defined.

The preliminary analysis begins by testing the correlation among the regressors using the variance inflation factor test (VIF). Table 2 indicates that the regressors exhibit a low level of correlation, as the VIF values are below the predefined threshold of 5. Therefore, the VIF test suggests that regressors can be included in the linear regression without inflating the standard errors or affecting the reliability of the estimated coefficients.

Table 2. Multicollinearity test

Variable	*vif*
$LOG(GFGF_{i,t-1})$	1.34
$LOG(FDI_{i,t})$	2.11
$LOG(GDP_{i,t-1})$	1.37
$LOG(FIN_{i,t})$	2.13
$LOG(M3_{i,t})$	2.23
$LOG(DEBT_{i,t})$	1.19
$LOG(TRADE_{i,t})$	1.70

Note: To obtain VIF's outcomes, the regress and *vif* commands included in Stata 18 were applied.

Equation [1] is estimated by using OLS, as well as Fixed Effects (FE) and Random Effects (RE) models, to obtain preliminary insights be-

tween greenfield FDI and domestic private investment. These standard panel data approaches allow to control unobserved heterogeneity and to assess the overall direction and statistical significance of the estimated coefficients. The FE model accounts for country-specific time-invariant characteristics by controlling for individual effects, while the RE model assumes that these effects are uncorrelated with the explanatory variables (Greene, 2003). These static estimators have well-known limitations in the presence of dynamic relationships and endogenous regressors. The inclusion of a lagged dependent variable—as required to capture capital accumulation dynamics—introduces a correlation with the error term, thereby violating strict exogeneity and rendering OLS, FE, and RE estimators biased and inconsistent (Nickell, 1981).

Although the VIF test may help to address concerns related to multicollinearity, it does not resolve the potential issue of endogeneity. When some regressors are endogenous, *i.e.*, correlated with the error term, the standard linear regression estimators, such as the OLS regression or the fixed effects model, yield biased and inconsistent results. To overcome this limitation, the GMM approach is employed to obtain consistent estimators by using internal instruments, typically lagged levels or differences of the endogenous variables.

By addressing the endogeneity problem through appropriate instrumenting and controlling for unobserved heterogeneity and dynamic panel bias, the GMM approach improves the robustness and reliability of the estimated relationships (Arellano and Bond, 1991; Arellano and Bover, 1995; Bun and Windmeijer, 2010; Hsiao, 2014; Roodman, 2009a, 2009b; Windmeijer, 2005). The use of the GMM is particularly appropriate for the features of the dataset, which consists of 32 countries (N) observed over 26 years (T), —*i.e.*, from 1995 to 2021—. GMM estimators —especially in their Difference-GMM and System-GMM formulations— are well suited for panel data structures where $N > T$ (Arellano and Bond, 1991; Blundell and Bond, 1998).

This panel configuration allows for the use of internal instruments derived from the panel structure itself, such as lagged levels and differences of the endogenous variables, to correct for biases arising from endogeneity, measurement error, and unobserved heterogeneity. In such settings, traditional estimators like OLS or FE/RE not only fail to address these econometric issues but also yield biased and inconsistent

estimates, particularly in dynamic specifications with lagged dependent variables. GMM provides a more efficient and consistent framework for estimating the greenfield FDI-domestic private investment nexus. The equation [1] is redrafted as follows:

$$\begin{aligned} &LOG(GFCF_{i,t}) = \beta_0 + \alpha LOG(GFCF_{i,t-1}) + \beta_1 LOG(FDI_{i,t}) \\ &+\beta_2 LOG(GDP_{i,t-1}) + \beta_3 LOG(FIN_{i,t}) + \beta_4 LOG(DEBT_{i,t}) \\ &+\beta_5 LOG(M3_{i,t}) + \beta_6 LOG(TRADE_{i,t}) + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \quad [2]$$

In the equation [2], μ_i and λ_t stand for the fixed effects for each country and the time fixed effects, which capture common shocks or trends affecting all cross-sectional units in each period, respectively. The two-step procedure is preferred to one-step approach due to it incorporates a robust weighting matrix based on the residuals from the first step, offering greater efficiency under general conditions, including heteroskedasticity or autocorrelation in the error terms (Arellano and Bond, 1991; Windmeijer, 2005). Since the two-step GMM often underestimates standard errors in finite samples, Windmeijer (2005) proposes a finite sample correction for the standard errors.

On the other hand, the difference GMM estimator (henceforth, dif-GMM) and the system GMM estimator (henceforth, sys-GMM) are applied to assess the greenfield FDI-domestic private investment nexus (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). The Dif-GMM method estimates equation [2] in first differences to eliminate individual effects:

$$\begin{aligned} &\Delta LOG(GFCF_{i,t}) = \beta_0 + \alpha \Delta LOG(GFCF_{i,t-1}) + \beta_1 \Delta LOG(FDI_{i,t}) \\ &+\Delta\beta_2 LOG(GDP_{i,t-1}) + \beta_3 \Delta LOG(FIN_{i,t}) + \beta_4 \Delta LOG(DEBT_{i,t}) \\ &+\beta_5 \Delta LOG(M3_{i,t}) + \beta_6 \Delta LOG(TRADE_{i,t}) + \Delta\lambda_t + \varepsilon_{i,t} \end{aligned} \quad [3]$$

In equation [3], Δ represents the first difference, whereas the rest has been defined previously. The dif-GMM estimator effectively addresses unobserved individual differences by transforming the regression into first differences. However, it can encounter issues with weak instruments, particularly when the time series data is persistent or when the

lagged levels of the endogenous variables show a weak correlation with their subsequent differences. To address these challenges, the sys-GMM estimator combines first-differenced equations with level equations, using lagged differences of the variables as instruments for the level equation. This approach enhances efficiency and mitigates finite sample bias, particularly when the number of periods is small or when the regressors exhibit high persistence (Arellano and Bover, 1995; Blundell and Bond, 1998). Hence, sys-GMM may provide more reliable estimates than dif-GMM in empirical applications involving dynamic panel data characterized by potential endogeneity and fixed effects.

As Sarafidis, Yamagata, and Robertson (2009) point out, the GMM approach assumes cross-sectional independence, implying that its estimations might become inconsistent when cross-sectional dependence is present. Hsiao (2014, Chapter 9) highlights that, in panel data analysis, it is recommended to first test for cross-sectional independence. Conventional panel data estimators, such as GMM, may be inconsistent in the presence of cross-sectional dependence. To examine the presence of cross-sectional dependence, the Cross-Dependence (CD) test by Pesaran (2021) is applied. The findings presented in Table 3 indicate the presence of cross-sectional dependence in the data —*i.e.*, the null hypothesis of cross-sectional independence is rejected at any significance level—. Therefore,the empirical assessment should consider cross-sectional dependence.

Table 3. Pesaran (2021) CD test

Variable	CD-test	p-value	corr	abs(corr)
$LOG(GFCF_{i,t})$	11.110	0.000***	0.096	0.344
$LOG(FDI_{i,t})$	13.020	0.000***	0.113	0.223
$LOG(GDP_{i,t})$	110.390	0.000***	0.954	0.954
$LOG(FIN_{i,t})$	24.950	0.000***	0.216	0.476
$LOG(M3_{i,t})$	69.000	0.000***	0.596	0.686
$LOG(DEBT_{i,t})$	32.420	0.000***	0.280	0.469
$LOG(TRADE_{i,t})$	20.610	0.000***	0.178	0.436

Note: *** Denotes rejection at 1%. The test was conducted by using the *xtcd* command by Eberhardt (2011).

Source: Own elaboration based on Stata 18.

Given that conventional GMM estimators could be inconsistent in the presence of cross-sectional dependence, one way to address this issue is by combining GMM with the Common Correlated Effects (CCE) approach by Pesaran (2006). This strategy allows for controlling both endogeneity and cross-sectional dependence, being supported by recent literature (Boundi-Chraki and Perrotini-Hernández, 2025; Everaert and De Groote, 2016; Juodis and Sarafidis, 2022). Monte Carlo simulations by Neal (2015) demonstrated that the CCE-GMM combination yields efficient estimates in the presence of endogenous regressors. By integrating CCE into equation [3], the regression for CCE-GMM estimator adopts the following form:

$$\begin{aligned}\Delta LOG(GFCF_{i,t}) &= \beta_0 + \alpha\Delta LOG(GFCF_{i,t-1}) + \beta_1\Delta LOG(FDI_{i,t}) \\ &+\Delta\beta_2 LOG(GDP_{i,t-1}) + \beta_3\Delta LOG(FIN_{i,t}) + \beta_4\Delta LOG(DEBT_{i,t}) \\ &+\beta_5\Delta LOG(M3_{i,t}) + \beta_6\Delta LOG(TRADE_{i,t}) + \sum_{j=1}^{6}\gamma_j\Delta LOG(X_{j,t}) \\ &+\Delta\lambda_t + \varepsilon_{i,t}\end{aligned} \quad [4]$$

Where $\sum_{j=1}^{6}\gamma_j\Delta LOG(X_{j,t})$ represents the CCE, γ_j is the coefficients for cross-sectional averages, and $\Delta LOG(X_{j,t})$ stands for the first differenced logarithms of cross-sectional averages at time for the regressors. The equation [4] represents the regression for dif-GMM approach, which means that sys-GMM should combine first-differenced equations with level equations. In both dif-GMM and sys-GMM specifications, Roodman's (2009) procedure is followed to collapse the instrument matrix to avoid instrument proliferation, which can undermine the Hansen test and produce overfitting of endogenous variables. Lagged levels from *t*–2 to *t*–4 are used as instruments for the differenced equation, while lagged differences from *t*–1 to *t*–3 instrument the levels equation in sys-GMM. The choice of this lag structure balances instrument relevance and parsimony, especially given the persistence of investment and credit variables. The number of instruments remains below the number of countries, reducing the risk of weak identification. For the CCE-GMM estimators, the same lag structure is maintained to ensure comparability, and instrument collapsing is applied. Cross-sectional averages of the endogenous regressors and their first differences are included to absorb unobserved common factors.

4. RESULTS AND DISCUSSION

The preliminary estimations using OLS, FE, and RE models (see Table 4) reveal a statistically significant and positive coefficient for greenfield FDI, suggesting a potential crowding-in effect of foreign capital on domestic private investment. This result aligns with Hirschman's (1958) theoretical expectations regarding backwards linkages and is reminiscent of findings by Adams (2009) and Ndikumana and Verick (2008). The choice between FE and RE must be rigorously tested, as both models rely on different assumptions about the correlation between regressors and unobserved individual effects. As outlined in Table 4, the Hausman (1978) test rejects the null hypothesis that the RE estimator is consistent and efficient, which means that the RE assumptions are violated, most likely due to correlation between the regressors and the country-specific effects. Consequently, the FE model is the appropriate specification among the static estimators, reinforcing the importance of accounting for unobserved heterogeneity across countries in the sample. Yet, even the FE model suffers from limitations in dynamic panel settings, especially when including lagged dependent variables and potentially endogenous regressors like FDI, thereby rendering the static estimators biased and inconsistent (Nickell, 1981).

As aforementioned, GMM is capable to address endogeneity. According to Table 5, greenfield FDI appears statistically insignificant, and in the case of sys-GMM, it even bears a small negative sign. Thus, FDI has no discernible effect on domestic private investment once endogeneity, autocorrelation, and country-specific effects are adequately controlled. These findings correspond closely with those of Farla, Crombrugghe, and Verspagen (2016), who, after refining the GMM specification, found no clear crowding-out or crowding-in effect from FDI. The results also resonate with Jude (2019), who observed short-term crowding-out effects of FDI, followed by long-run crowding-in dynamics. However, the dataset and specifications, particularly the short-time-lag structure, may not capture such long-term dynamics. Furthermore, the diagnostic tests —such as the Hansen test for instrument validity and AR(2) tests for second-order autocorrelation— indicate that the sys-GMM estimations are statistically valid. Still, given the cross-sectional dependence detected through Pesaran's CD test, additional refinement is necessary.

Table 4. Results from OLS regression and FE/RE models

	OLS			FE			RE		
	Coef.	**Std. Error**	**t (p-value)**	**Coef.**	**Std. Error**	**t (p-value)**	**Coef.**	**Std. Error**	**t (p-value)**
$LOG(GFCF_{i,t-1})$	0.918	0.015	61.800 (0.000***)	0.728	0.025	29.470 (0.000***)	0.918	0.015	61.800 (0.000***)
$LOG(FDI_{i,t})$	0.006	0.004	1.770 (0.077*)	0.014	0.004	3.140 (0.002***)	0.006	0.004	1.770 (0.077*)
$LOG(GDP_{i,t-1})$	0.007	0.003	2.070 (0.039**)	0.034	0.0144	2.390 (0.017**)	0.007	0.003	2.070 (0.039)**
$LOG(FIN_{i,t})$	–0.024	0.007	3.260 (0.001***)	–0.016	0.014	1.160 (0.248)	–0.024	0.007	–3.260 (0.001***)
$LOG(M3_{i,t})$	0.020	0.011	1.850 (0.065*)	–0.037	0.022	1.690 (0.092*)	0.020	0.011	1.850 (0.065*)
$LOG(DEBT_{i,t})$	0.009	0.008	1.030 (0.301)	0.050	0.020	2.480 (0.013**)	0.009	0.008	1.030 (0.301)
$LOG(TRADE_{i,t})$	–0.021	0.006	3.710 (0.000***)	–0.045	0.008	5.890 (0.000***)	–0.021	0.006	–3.710 (0.000***)
Constant	–0.307	0.096	3.190 (0.001*)	–1.310	0.391	3.350 (0.001***)	–0.307	0.096	–3.190 (0.001*)
F-statistics (p-value)		765.070 (0.000***)			204.680 (0.000***)				
Wald $\chi^2(7)$ (p-value)								5 355.47 (0.000***)	
Hausmann test (p-value)					113.34 (0.000***)				
Observations		832			832			832	
Countries		32			32			32	

Note: ***, **, * stand for 1%, 5%, and 10% of significance, respectively. The *reg*, *xtreg*, and *hausman* commands included in STATA 18 were applied.

Table 5. Results from the conventional GMM approach

	dif-GMM			sys-GMM		
	Coef.	Corrected Std. Error	t (p-value)	Coef.	Corrected Std. Error	t (p-value)
$LOG(GFCF_{i,t-1})$	1.726	1.128	1.530 (0.136)	0.837	0.059	14.120 (0.000***)
$LOG(FDI_{i,t})$	0.003	0.013	0.260 (0.798)	–0.003	0.005	–0.510 (0.615)
$LOG(GDP_{i,t-1})$	0.348	0.141	2.460 (0.019**)	0.008	0.011	0.750 (0.459)
$LOG(FIN_{i,t})$	–0.415	0.194	–2.130 (0.041**)	–0.014	0.019	–0.777 (0.444)
$LOG(M3_{i,t})$	0.018	0.068	0.270 (0.790)	–0.031	0.014	–2.250 (0.031**)
$LOG(DEBT_{i,t})$	–0.269	0.169	–1.590 (0.121)	0.029	0.035	0.820 (0.418)
$LOG(TRADE_{i,t})$	0.237	0.122	1.940 (0.061*)	0.023	0.019	1.190 (0.244)
Observations		832			832	
Countries		32			32	
Number of instruments		7			11	
AR(1) (p-value)		–1.290 (0.196)			–3.700 (0.000***)	
AR(2) (p-value)		–1.620 (0.105)			–2.340 (0.207)	
Hansen test (p-value)		1.200 (0.549)			3.840 (0.279)	
Difference in Hansen tests (p-value)		3.550 (0.169)			2.640 (0.104)	

Note: ***, **, * stand for 1%, 5%, and 10% of significance, respectively. The *xtabond2* command in STATA by Roodman (2009b) was used for estimations.

To address this, CCE-GMM estimators are implemented (see Table 6). FDI remains statistically insignificant across both the dif-CCE-GMM and sys-CCE-GMM estimations, confirming the prior GMM results. This further suggests that the positive coefficients found in static regressions may be driven by omitted variable bias or unobserved common shocks that influence both FDI and domestic investment across countries. Interestingly, the robustness of the null effect of FDI across all GMM-based estimators, including those accounting for cross-sectional dependence—strongly supports the hypothesis that FDI does not automatically stimulate domestic capital formation in emerging economies. This casts doubt on conventional policy narratives rooted in neoclassical growth theory, which tends to assume a direct and positive relationship between foreign capital and domestic accumulation. Compared with the literature, the results provide little evidence for a crowding-in effect, as suggested by Ha, Holmes, and Tran (2022) in their sectoral analysis of Vietnam, where productive linkages enhanced the positive role of FDI. Similarly, the findings contradict the long-term complementarity suggested by Jude (2019). However, they are consistent with the results from Morrissey and Udomkerdmongkol (2012), who found that even in countries with good governance, FDI may displace rather than augment domestic investment.

One potential explanation lies in the heterogeneity of the 32 emerging countries included in the analysis. Institutional quality, industrial structure, and macroeconomic conditions vary significantly, and the aggregate panel analysis may obscure substantial variation across regions or sectors. As As Chen, Yao, and Malizard (2017) and Nguyen, Luu, and Do (2021) argue, differentiating between greenfield investment and M&A or disaggregating by sector may yield more nuanced insights into the FDI-investment nexus. Moreover, the consistent statistical significance and robustness of the lagged dependent variable across all specifications underscores the path-dependent nature of capital accumulation in emerging markets, as suggested by the acceleration principle and the classical political economy view emphasizing endogenous mechanisms of investment (Boundi-Chraki and Perrotini-Hernández, 2024; Clark, 1917).

To summarize, the findings suggest that the positive relationship observed between FDI and domestic private investment by using OLS, FE, RE regressions may be misleading. When endogeneity and cross-sectional dependence are accounted, greenfield FDI does not show a statistically

Table 6. Results from the CCE-GMM approach

	dif-CCE-GMM			sys-CCE-GMM		
	Coef.	Corrected Std. Error	t (p-value)	Coef.	Corrected Std. Error	t (p-value)
$LOG(GFCF_{i,t-1})$	0.388	0.428	0.910 (0.371)	0.701	0.081	8.630 (0.000***)
$LOG(FDI_{i,t})$	0.010	0.009	1.130 (0.267)	0.002	0.007	0.360 (0.721)
$LOG(GDP_{i,t-1})$	2.091	0.657	3.180 (0.003***)	0.020	0.013	1.550 (0.130)
$LOG(FIN_{i,t})$	–0.078	0.092	–0.850 (0.404)	–0.029	0.020	–1.460 (0.155)
$LOG(M3_{i,t})$	–0.029	0.038	–0.770 (0.446)	–0.040	0.017	–2.390 (0.023**)
$LOG(DEBT_{i,t})$	–0.116	0.115	–1.010 (0.321)	0.066	0.031	2.100 (0.044)
$LOG(TRADE_{i,t})$	0.141	0.068	2.060 (0.048)	0.029	0.024	1.190 (0.245)
Observations		832			832	
Countries		32			32	
Number of instruments		14			17	
AR(1) (p-value)		–0.080 (0.936)			–3.430 (0.001)	
AR(2) (p-value)		–0.720 (0.470)			–2.820 (0.005)	
Hansen test (p-value)		0.710 (0.399)			0.570 (0.904)	
Difference in Hansen tests (p-value)		3.550 (0.169)			0.540 (0.462)	

Note: ***, ** stand for 1%, and 5% of significance, respectively. The *xtabond2* command in STATA by Roodman (2009b) was used for estimations.

significant impact on domestic private capital accumulation. Although attracting FDI is a primary goal for many emerging economies in their development strategies, the potential benefits are not assumed that this will automatically occur in both short and long-term. On the contrary, implementing targeted policies that enhance the capability to absorb new investments, strengthen local connections, and support national firms may be more effective in promoting capital accumulation.

Lastly, a potential limitation of the aggregate panel design is that it assumes homogeneous coefficients across highly diverse regions. As aforementioned, institutions, productive structures, and development strategies differ substantially between Asia, Latin America, and Africa, and previous studies suggest that FDI may behave differently across these groups (Agosin and Machado, 2005; Ndikumana and Verick, 2008). While regional estimations were not conducted due to sample constraints within each subgroup, acknowledging this heterogeneity is important. Thus, region-specific dynamics may partly explain why the aggregate effect of greenfield FDI becomes statistically insignificant in robust models.

5. CONCLUDING REMARKS AND POLICY IMPLICATIONS

This study conducted a thorough reassessment of the relationship between FDI and domestic private investment across 32 major emerging economies from 1995 to 2021 by using several econometric estimators. Initially, the estimations suggested a statistically significant and positive relationship between greenfield FDI and domestic capital formation, seemingly supporting the crowding-in hypothesis. However, this relationship dissipates under more robust estimation frameworks that consider methodological challenges common in panel data analysis within globalized and interdependent economies. These findings contribute to broader debates on the limits of FDI-led development. The absence of a systematic crowding-in effect implies that merely attracting FDI —as emphasized in modernization-based development strategies— is insufficient for sustained capital accumulation. Instead, the effectiveness of FDI depends critically on absorptive capacity, industrial capabilities, and active industrial policy. Countries that successfully leveraged FDI historically —such as those in East Asia— did so through targeted policies, performance requirements, and strong domestic linkages. Without

such mechanisms, FDI risks remain weakly integrated into the domestic economy, with limited spillovers and productive linkages.

These conclusions have significant implications for policymakers from emerging economies, who should proceed with caution when designing growth strategies that prioritize attracting FDI. The absence of consistent crowding-in effect suggests that greenfield FDI alone does not guarantee increased domestic private investment or structural transformation. The success of FDI in promoting national capital formation likely depends on various enabling conditions, such as robust financial institutions, effective industrial linkages, sectoral complementarities, and coherent long-term development planning.

In this context, development strategies should shift away from passive models of FDI attraction and toward a more proactive framework that maximizes the domestic integration of foreign capital. Policies that promote backwards and forward linkages between multinational corporations and domestic firms are critical for ensuring technology spillovers and enhancing human capital and innovation systems. Investment promotion should be selective and aligned with national development goals rather than based solely on fiscal incentives or deregulated market access. Additionally, institutional mechanisms to monitor and evaluate the developmental impact of FDI —especially at the sectoral and firm levels— are essential for identifying and correcting policy misalignments.

The findings also suggest that further research should integrate sectoral heterogeneity more explicitly, in line with Jude (2019), who identifies differing short- and long-run dynamics across industries, and Ha, Holmes and Tran (2022), who show that productive linkages at the sectoral level critically shape the crowding-in effects of FDI. Incorporating sectoral input-output structures or industry-level panels would help determine whether specific branches (*e.g.*, manufacturing, electronics, extractives) exhibit stronger complementarities or displacement effects.

Overall, the research challenges conventional wisdom regarding the benefits of FDI for development in emerging economies. Specifically, the findings suggest that the relationship between foreign capital and domestic investment is far more complex than generally assumed, critically hinging on structural, institutional, and methodological contexts. It is not just the volume of FDI that matters but its quality, orientation, and integration into the host economy's productive framework. ◄

Code and Data availability

The Stata 18 code and the data that support the findings can be accessed from the following link: <https://data.mendeley.com/drafts/zyvmws89h6>.

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