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Foreign Direct Investment and Domestic Private Investment in WAEMU Countries: Crowding-in or Crowding-out?

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ABSTRACT

Foreign direct investment (FDI) is a particularly attractive prospect for WAEMU countries, which are constantly integrating it into their development policies. However, studies on the relationship between FDI and private domestic investment (PDI) come to contradictory conclusions. This article focused on the effect of FDI on private domestic investment over the period 1996-2018. The results validated the presence of cross-country dependence. The article uses Common Correlated Effect-Mean Group (CCE-MG) as the analytical technique for this purpose. The results are consistent with the "crowding-out" hypothesis of FDI on PDI.

Keywords: Foreign Direct Investment, Domestic Investment, CCE-MG, WAEMU
JEL Classifications: O52, E22, F21, F23

1. INTRODUCTION

Over the past few decades, investment by multinational companies has increased considerably in developing countries. In the 1970s, many economies saw multinational investment as detrimental to the well-being and development of host economies. The argument was that multinational investments created monopoly situations and stifled local competition. Since the 1990s, this pessimistic view of multinational investment has changed. Today, multinational investments can have important complementary effects and stimulate the development of host economies.

FDI[1] is an activity whereby an investor resident in one country obtains a lasting interest and significant influence in the management of an entity resident in another country (OCDE, 2005). FDI can therefore have perverse effects on the local economy.

The economic literature shows that the encounter between domestic and foreign supply is likely to create crowding-out effects through two mechanisms: The competition mechanism both on the product market and on the production factor market (Agosin et al., 2012; Helpman et al., 2004) and the Dutch disease mechanism, notably through an expenditure effect (Corden and Neary, 1982; Gregory, 1976). These latter effects operate in the case of FDI in the extractive industries.

In recent years, academic debate has focused on the relationship between FDI and PDI, i.e. whether FDI has a complementary or substitution effect with PDI. There is a complementary effect if FDI leads to more domestic investment. Conversely, there is a substitution effect if FDI leads to less domestic investment. The complementarity effect is generally considered beneficial to the economic growth of host countries.

1 According to the World Bank, FDI is the new flow of investment aimed at acquiring a lasting management stake (10% or more of voting shares) in an enterprise operating in an economy other than that of the investor. It is the sum of capital, reinvested earnings and other long-term capital and short-term capital as reported in the balance of payments.

However, the empirical literature on the relationship between FDI and PDI does not point to a clear-cut conclusion. Results vary depending on the methodological approach, the time period, the use of poor theoretical proxies and the business environment; these results depend on several factors, including the recipient country's economic and trade policy; the strength and assets of domestic firms; and the types and mode of FDI entry (Farla et al., 2016; Jude, 2019).

In an influential study of newly industrializing countries (NICs), Markusen and Venables (1999) compare multinational and national firms. These authors show that the entry of multinational compagnies creates two effects in the host country: A competition effect and a linkage effect. Through the competition mechanism, the entry of multinationals increases competition in the final product industry and reduces the profitability of domestic firms in the same industry. This, in turn, can trigger the exist of domestic firms. However, the entry of multinational firms could, at the same time, lead to an increase in demand for domestic production of intermediate inputs. This may eventually lead to an increase in the number of domestic firms in the intermediate inputs industry. Based on both these concepts of competition and linkage effects, Krugman and Venables (1996) argue that the net effect of multinational entry on domestic firms is uncertain.

Neo-liberals argue that FDI benefits recipient countries and encourages growth and development, while Keynesians maintain that if FDI has brought benefits in one country, it doesn't necessarily mean that the same will happen in another; much depends on the conditions prevailing in the host country (Buoziute-Rafanaviciene et al., 2009).

FDI inflows to Africa have seen a significant upturn, rising from US$9.651 billion to US$9.651 billion between 2000 and 2017 (CNUCED, 2016). In the WAEMU zone, direct investment flows posted an average annual growth rate of 18.8% over the 2006-2011 period, compared with just 3.5% between 2000 and 2005 (BCEAO, 2013). This trend is said to be the result of renewed interest in the mining resources of the union's countries. However, the high concentration of FDI in sectors such as mining, which are poorly integrated into the rest of the economy, could also help to mitigate the overall effects on the economy. In this context, this essay examines the "debatable" question of whether FDI complements or displaces capital formation in the domestic private sector in the light of the experience of WAEMU countries over the period 1996-2018. As in recent years there has been a rush of FDI into the mining sector, it would be interesting to know whether or not FDI in the sector has a positive effect on domestic investment. The hypothesis is that FDI inflows have a knock-on effect on PDI. The research finds its interest in the controversial results of previous studies in developing countries, and in recent theoretical and index developments whose application to WAEMU countries would add to the literature.

The structure of the article, in an attempt to shed light on the issue, is as follows. The second section briefly reviews the literature on the link between FDI and domestic investment. The third section explains the econometric model used, the estimation method and our data sources. The fourth section presents the results of the model's estimation, before concluding the paper's findings in the fifth section.

2. THEORETICAL AND EMPIRICAL REVIEW OF THE RELATIONSHIP BETWEEN FDI AND PDI

This analysis is based on new international trade theory, growth theories, new geographical economics and work on industrial economics (Caves, 1996; Dunning and Lundan, 2008; Englmann and Walz, 1995; Horstmann and Markusen, 1992; Awad et al., 2013). These studies have identified two main effects: A crowding-out effect and a stimulating effect.

According to the literature, FDI entry can benefit local firms through several mechanisms including competition, export promotion, stimulation of domestic demand and technology diffusion (Chen et al., 2017; Desai et al., 2005). FDI increases local liquidity, promoting currency appreciation and lower interest rates (Harrison et al., 2004).

The influx of FDI can encourage domestic investment thanks the complementarity between foreign and domestic companies in their strategies for producing and marketing these products, as well as in the mobilization of corporate resources (Jansen, 1995). Local companies can imitate the new technology introduced by foreign firms, which can stimulate domestic investment (Noorzoy, 1979). According to Cardoso and Dornbusch (1989); Dornbusch et al. (1977), these opportunities arise through upstream and downstream links between foreign and local firms.

The pessimistic view in the literature stems in part from the assumption that FDI intensifies competition in local factor and product markets (Aitken and Harrison, 1999). Indeed, multinationals compete with local producers in both product and factor markets. Increased competition can be beneficial for the host economy, but it can also have negative effects. According to the law of the market, an increase in the number of companies reduces the price index, which in turn reduces the sales of domestic companies and leads to the exit of domestic companies to restore the sales of the remaining companies to their zero-profit level. Innovative technologies embodied in FDI can accelerate the technological obsolescence of traditional technologies used in DCs and thus crowd out domestic investment (Kim and Seo, 2003; Lipsey, 2004).

For Aitken and Harrison (1999), competition on the factor market leads to an increase in demand for these factors of production (labor, capital), which in turn leads to an increase in factor costs. This situation can lead to the disappearance of local companies unable to overcome the rise in factor prices.

The idea behind the interaction between FDI and domestic investment in the real market is that FDI inflows affect demand for local companies. Foreign firms capture part of domestic demand, forcing local firms to cut back on production and thus increase their average cost, as they have lower marginal costs due to the decisive advantages they possess over local firms (Aitken and Harrison, 1999; Jude, 2019). Agosin and Mayer (2000) indicate that increased competition can lead to a crowding-out effect of FDI on domestic investment when FDI follows the existing structure of the economy and goes to sectors where there are already many local firms.

In a seminal article linking FDI and PDI, Agosin and Machado (2005) examine the effects of FDI on PDI in 36 developing countries over the period 1971-2000. To mitigate aggregation bias, they divide the sample into 12 countries in each of the regions studied, notably Asia, Africa and Latin America. They find that FDI has no significant effect on domestic investment for host countries in these regions. They do, however, find a crowding-out effect in certain sub-periods for Latin America.

In a more recent article, Morrissey and Udomkerdmongkol (2012) improve on Agosin and Machado (2005) by introducing governance as one of the explanatory variables. They use the generalized method of moments (GMM) system on a panel of 46 developing countries over the period 1996-2009 and find that FDI crowds out domestic investment in host countries. They find that this substitution effect is aggravated in the presence of better governance.

Despite Morrissey and Udomkerdmongkol's innovation to improve the Agosin and Machado (2005); Farla et al. (2016) question the conclusions of Morrissey and Udomkerdmongkol (2012). They criticize Morrissey and Udomkerdmongkol both conceptually and methodologically. Conceptually, they criticize Morrissey and Udomkerdmongkol for using an inaccurate approximation of domestic investment by deducting net FDI inflows and domestic investment from gross fixed capital formation (GFCF) to obtain domestic investment; this introduces a bias into the analysis. On the methodological front, they criticize Morrissey and Udomkerdmongkol for neglecting the problem of instrument proliferation in their estimation by using GMMs as a system; this further introduces bias into the analysis. By estimating Morrisey and Udomkerdmongkol's original data with a correct GMM specification, they find that FDI has a complementary effect with domestic investment in the same countries.

In response to criticism from Farla et al. (2016), Morrissey and Udomkerdmongkol (2016) accepted the criticism on the methodological level, as in their view, GMM estimators are sensitive to the set of instruments used, particularly in cross-country regressions over a relatively short period. On the other hand, they are categorical on the conceptual level. For them, all research on the relationship between FDI and domestic investment in developing countries is undermined by poor data quality, in particular the absence of data on private investment. This observation leads the researchers to make a conceptual choice. They add that the choice made by Farla et al. (2016) to use GFCF as the dependent variable is not ideal either.

To better manage aggregation bias and limit methodological criticism, some authors classify countries according to their stage of economic development, or use countries that are geographically close. Using a sample of 91 developing countries over the period 1970-2000, Al-Sadig (2013) finds a complementarity effect between FDI and domestic investment. He argues that the size of the effect depends on the availability of human capital, especially in low-income countries. Ndikumana and Verick (2008) also find that FDI stimulates domestic investment by examining 38 Sub-Saharan African countries for the period 1970-2005. They obtained this result using the fixed-effect estimator and the ordinary least squares method. Also, Farla et al. (2016) echoing the work of Ndikumana and Verick (2008), find no negative effects of FDI on domestic investment. They do, however, find that the interaction between FDI and governance negatively influences domestic investment. Examining the relationship between FDI and domestic investment productivity of in data from 59 DCs over the period 1984-2010, Li and Tanna (2019) find a weak direct link between FDI and productivity growth.

In addition, Delgado and McCloud (2017) focus on institutional factors to explain heterogeneity of the relationship between FDI and domestic investment. Using a sample of 137 developed and developing countries over the period 1984-2010, these authors find that FDI has a positive and significant effect on domestic investment only in countries with good institutions.

3. THE METHODOLOGICAL APPROACH TO THE RELATIONSHIP BETWEEN FDI AND PPI

3.1. Empirical Model for Estimation Purposes

We use an empirical model similar to that of Agosin and Machado (2005) as follows:

$$PDI_{it} = \alpha + \beta_1 PDI_{it-1} + \beta_2 PDI_{it-2} + \beta_3 FDI_{it} + \beta_4 FDI_{it-1} + \beta_5 FDI_{it-2} + \beta_k X_{it} + \mu_t + \varepsilon_{it} \quad (1)$$

X_{it} = Vector of explanatory variables chosen on the basis of existing empirical work and data availability, μ_t = represents the vector of country fixed effects, ε_{it} = the vector of random disturbance terms.

Farla et al. (2016) have argued that the use of private domestic investment, obtained by subtracting net FDI inflows and public investment from gross fixed capital formation (GFCF), can introduce a bias in the analysis in favor of crowding-out. The problem is that the approach used to measure FDI is inaccurate, as FDI data is not a true measure of the foreign component of GFCF, especially in the case of mergers and acquisitions, as these investments are not taken into account in GFCF. FDI and GFCF are constructed from different conceptual frameworks in that FDI is a balance of payments concept, whereas GFCF is a national accounts concept. We therefore use a second specification following the example of Farla et al. (2016); Jude (2019), in which the dependent variable is GFCF. Consequently, the second equation we will estimate is as follows:

$$GFCF_{it} = \alpha + \beta_1 GFCF_{it-1} + \beta_2 GFCF_{it-2} + \beta_3 FDI_{it} + \beta_4 FDI_{it-1} + \beta_5 FDI_{it-2} + \beta_k X_{it} + \mu_t + \varepsilon_{it} \quad (2)$$

GFCF is a national account aggregate and therefore includes both foreign and domestic investment. It should be stressed that the use of total investment (GFCF) as the dependent variable indicates that a positive coefficient on FDI only shows that total investment increases with FDI. It does not, therefore, provide a sufficient indication of the behavior of local companies. In this case, it's the value of the FDI coefficient that interests us, since a crowding-out effect would result in a coefficient of <1, while a crowding-in effect would correspond to a coefficient >1. The problem with this approach, too is that using GFCF as the dependent variable would be tantamount to testing another relationship; in this context, while a negative coefficient on FDI does indeed a crowding-out effect, a positive coefficient only shows that total investment increases with FDI Morrissey and Udomkerdmongkol (2016).

3.2. Data Sources

The data used comes mainly from the World Bank's development indicators database (World Development Indicators, 2019). They are annual in scope and cover the period 1996-2018.

4. EMPIRICAL STRATEGIES

Accounting for dependency in panel data can lead to unreliable results. For this reason, we use second-generation panel data methodologies that take account of dependency between countries. In addition, we use first-generation methods to observe how the results change when we consider the independence of indicators between different countries.

4.1. Cross-Sectional Dependency Tests

We first test for the existence of cross-sectional dependence between the countries in the sample, to determine whether it is appropriate to apply test procedures and estimators that take this dependence into account. Indeed, if cross-sectional dependence is present in the data and is not controlled for, the results estimated with conventional estimators are likely to be biased and inconsistent Phillips and Sul (2003). To do this, we apply the Breusch and Pagan (1980); Pesaran et al. (2004) tests for the model's residuals. For example, the test proposed by Pesaran (2004) can be written as follows:

$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{J=i+1}^{N}\rho_{ij}\right)$ with N the sample size, T the study period and ρ_{ij} the estimated cross-sectional correlation of countries i and j. The null hypothesis of the test indicates that there is no CD in the data, while the alternative hypothesis indicates the presence of CD in the panel.

4.2. Stationarity Tests

To take into account the issue of cross-sectional dependency, we used the unit root test developed by Pesaran (2007). These unit root tests are known as second generation unit root tests. These tests reject the null hypothesis of cross-sectional independence, and are therefore applicable to panel data where cross-sectional dependence is present. The formula for calculating the cross-sectional ADF (CADF) test is as follows:

$$\Delta Y_{it} = \alpha_i + \rho_i Y_{it-1} + \beta_i \bar{Y}_{t-1} + \sum_{j=0}^{k}\gamma_{it}\Delta\bar{Y}_{it-1} + \sum_{j=0}^{k}\delta_{it}Y_{it-1} + \varepsilon_{it} \quad (3)$$

With α_i the deterministic term; k the lag order and $\bar{Y}_t$ the cross-sectional mean at time t. Following equation 7, the t-statistics are obtained by calculating the individual ADF statistics. In addition, the CIPS is recovered from the average CADF statistic for each i as follows:

$$CIPS = \left(\frac{1}{N}\right)\sum_{i=1}^{N} t_i(N,T)$$

Critical CIPS values for various deterministic terms are given by Pesaran (2007).

4.3. Westerlund Cointegration Test

To analyze the long-term relationship between model parameters, we used the error correction model based cointegration technique developed by Westerlund (2007). The main advantage of Westerlund's cointegration test is that it takes into account heterogeneity and cross-sectional dependence. Also, the test statistics are normally distributed and have good properties for small samples. The Westerlund test has four statistics, namely G_t, G_a, P_t *et* P_a. Mean Group Tests (G_t et G_a) are constructed under the assumption of individual-specific error correction parameters. The Panel Tests P_t et P_a statistics (Panel Tests) are calculated under the assumption of error correction parameters common to all individuals in the panel. In the estimation process, test statistics are calculated to test the cointegration relationship between the model parameters. The statistical significance of the error correction term in the constrained panel error correction model is used to calculate the statistics. The estimation model is as follows:

$$\Delta Y_{it} = \delta_i' d_t + \alpha_i\left(Y_{it-1} - \lambda_i' X_{it-1}\right) + \sum_{j=1}^{Pi}\alpha_{ij}\Delta Y_{it-j} + \sum_{j=-qi}^{Pi} Y_{ij}\Delta X_{it-1} + u_{it} \quad (4)$$

With d_t the deterministic term such that:

$$d_t = \begin{cases} 0, & \text{no deterministic term} \\ 1, & \text{with constant term} \\ (1, t), & \text{with constant term and trend} \end{cases}$$

In addition, α_i determines the adjustment speed of the system.

The statistics can be calculated in three steps. In the first step, for each cross-section, equation 8 is estimated by the least squares method to obtain γ_{it} and μ_{it}. In the second step, $\hat{u}_{it} = \sum_{j=-qi}^{Pi}\gamma_{it}\Delta X_{it-1} + u_{it}$ is calculated. After this calculation, using $\hat{\omega}_{ui}$ and $\hat{\omega}_{Ei}$ which are the usual long-run variance estimators of $\hat{\mu}_{it}$ *and* ΔY_{it} from Newey and West (1994), the formulation $\hat{a}_i(1) = \hat{\omega}_{ui} / \hat{\omega}_{Ei}$ is calculated. In the last step, the statistics are constructed as follows:

$$G_t = \frac{1}{N}\sum_{i=1}^{N}\frac{\hat{a}_i}{SE(\hat{a}_i)}, G_a = \frac{1}{N}\sum_{i=1}^{N}\frac{T\hat{a}_i}{\hat{a}_i(1)} \quad (5)$$

Where *SE* indicates the standard error. To calculate the statistics P_t et P_a statistics, we first calculate the projection errors $\Delta\tilde{Y}_{it}\ et\ \tilde{Y}_{it-1}$ as follows:

$$\Delta\tilde{Y}_{it} = \Delta Y_{it} - \delta_i^{'} d_t - \alpha_i \left(Y_{it-1} - \lambda_i^{'} X_{it-1}\right) - \sum_{j=1}^{Pi} \alpha_{ij} \Delta Y_{it-j} - \sum_{j=-qi}^{Pi} \gamma_{ij} \Delta X_{it-1} \quad (6)$$

$$\tilde{Y}_{it-1} = Y_{it-1} - \delta_i^{'} d_t - \alpha_i \left(Y_{it-1} - \lambda_i^{'} X_{it-1}\right) - \sum_{j=1}^{Pi} \alpha_{ij} \Delta Y_{it-j} - \sum_{j=-qi}^{Pi} \gamma_{ij} \Delta X_{it-1} \quad (7)$$

Next, the common error correction parameter and its standard error are obtained as follows:

$$\hat{a} = \left(\sum_{i=1}^{N}\sum_{t=2}^{T} \hat{Y}_{it-1}\right) \sum_{i=1}^{N}\sum_{t=2}^{T} \frac{1}{\hat{a}_i(1)} \tilde{Y}_{it-1} \tilde{Y}_{it} \quad (8)$$

$$SE(\hat{a}) = \left(\left(\hat{S}_N^2\right) \sum_{i=1}^{N}\sum_{t=2}^{T} \frac{1}{\hat{a}_i(1)} \tilde{Y}_{it-1}^2\right)^{-1/2} \quad (9)$$

Where $\hat{S}_N^2 = 1/N \sum_{i=1}^{N} \hat{\sigma}_1 / \hat{a}_i\ et\ \hat{\sigma}_i$ is the standard error of the regression in equation 9. Finally, the statistics are obtained with $P_t = \hat{a} / SE(\hat{a})$ and $P_a = T\hat{a}$.

4.4. CCE Estimation Methodology

Several arguments lead us to choose the CCE procedure as our estimator. In addition to taking into account cross-sectional dependency between the countries in the sample, this estimator is robust to serial correlation (Pesaran, 2006). In addition, this methodology is robust to structural breaks (Kapetanios et al., 2011). Moreover, this estimator is robust to non-stationary variables and the CCE estimator can be used whether or not there is a cointegrating relationship between the variables. Consequently, the use of this estimator does not require a pre-testing procedure, notably the cointegration test. Finally, the CCE estimator can obtain long-run coefficients that cannot be obtained using the cointegration test of (Westerlund, 2007). Pesaran (2006) has devised a method that takes cross-sectional dependence into account. Based on the equation, the error term ε_{it} can be written as follows:

$\varepsilon_{it} = \lambda_i^{'} UF_t + \mu_{it}$ Where UF_t is the m × 1 matrix of unobservable factors. In addition, Pesaran (2006) uses cross-sectional averages as reliable approximations of common factors to deal with cross-sectional dependence. Thus, we have:

$\bar{Y}_t = \frac{1}{N}\sum_{i=1}^{N} Y_{it}\ et\ \bar{X}_t = \frac{1}{N}\sum_{i=1}^{N} X_{it}$ Where $\bar{Y}_t$ *and* $\bar{X}_t$ respectively the cross-sectional mean of the endogenous variable and the various exogenous variables. Finally, taking into account our selected variables, the regression model obtained is as follows:

$$PDI_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 GDPP_{it} + \alpha_3 DCPSB_{it} + \alpha_4 INST_{it} + \alpha_5 PUBE_{it} + \alpha_6 TO_{it} + \alpha_7 INDHK_{it} + \alpha_0 \frac{1}{N}\sum_{i=1}^{N} PDI_{it} + \alpha_1 \frac{1}{N}\sum_{i=1}^{N} FDI_{it} + \alpha_2 \frac{1}{N}\sum_{i=1}^{N} GDPP_{it} + \alpha_3 \frac{1}{N}\sum_{i=1}^{N} DCPSB_{it} + \alpha_4 \frac{1}{N}\sum_{i=1}^{N} INST_{it} + \alpha_5 \frac{1}{N}\sum_{i=1}^{N} PUBE_{it} + \alpha_6 \frac{1}{N}\sum_{i=1}^{N} TO_{it} + \alpha_7 \frac{1}{N}\sum_{i=1}^{N} INDHK_{it} + \varepsilon_{it} \quad (10)$$

Pesaran (2006) states that the individual slope coefficients *CCE* + $(\alpha_1,\ldots,\alpha_7)$ estimated by ordinary least squares (OLS) are called "Common Correlated Effect" estimators.

5. FOREIGN DIRECT INVESTMENT AND DOMESTIC INVESTMENT: EMPIRICAL EVIDENCE

5.1. Dependency Test Results

We begin our analysis by examining the presence of cross-sectional dependence between countries in order to determine the appropriate unit root and cointegration tests. We examine this dependence using the tests of Breusch and Pagan (1980); Pesaran et al. (2004, 2008). The results of these tests are presented in Table 1.

The empirical results of these dependence tests at residuals and variables level do not allow us to accept the null hypothesis of independence between the individuals in the panel for both models. Indeed, the probability associated with the Breusch and Pagan test is below the 5% threshold in both equations. On the other hand, the probability of the Pesaran test in the equations is >5%. To this end, using the dependency test of Pesaran (2007), we examine the cross-sectional dependence for each variable and the results are given in Table 2.

These empirical results lead us to consider cross-sectional independence while testing the unit root properties of the various variables selected.

Table 1: Tests of inter-individual dependence of model residuals

Tests of inter-individual dependence	Statistical test	P-values
Equation A: PDI		
Breusch-Pagan LM	39.724	0.0080
Pesaran Scaled LM	2.889	0.0039
Bias-Corrected Scaled LM	2.730	0.0063
Pesaran CD	−1.5256	0.1271
Equation B: GFCF		
Breusch-Pagan LM	48.463	0.0006
Pesaran Scaled LM	4.2376	0.0000
Bias-Corrected Scaled LM	4.078	0.0000
Pesaran CD	−0.5435	0.5868

Source: Author's calculations

5.2. Stationarity Test Results

With regard to the results of the dependency tests, we used traditional unit root tests such as the Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) tests, which are appropriate in the presence of cross-sectional series independence. In addition, we also use second-generation unit root tests such as CADF and CIPS, which take account of possible dependence between individuals in the panel when comparing results. The empirical results in Table 3 illustrate the results of the traditional unit root and cross-sectional dependence tests.

Unit root analysis reveals that some variables are stationary at level (I[0]) while others are integrated of order one (I[1]). No variable is integrated of order greater than one. These orders of integration allow us to apply panel cointegration to examine the long-term relationship between the variables.

5.3. Cointegration Relationship between Series

Given the small size of our sample, in terms of individuals and time, and the results of the cross-sectional independence test; for the analysis of the cointegrating relationship, we applied the cointegration tests of Kao (1999) and Pedroni (1999), which are appropriate and referred to as first-generation panel cointegration tests. In addition, we applied the panel cointegration test of Westerlund (2007), a second-generation cointegration test, to consider cross-country dependency. We calculate cointegration for both models by applying the three cointegration tests. The empirical tests for these tests are presented in Table 4.

The empirical results show that the cointegration test rejects the null hypothesis of no cointegration between the variables in the two models for 6 of the 7 Pedroni statistics and for all the Kao statistics (ADF and DF). These results therefore point to the existence of a cointegrating or long-term relationship between the variables over the study period.

5.4. Long-term Estimation Results

After confirming the cointegration between the variables, we proceed with the estimation to determine their effect on PDI and GFCF. In doing so, we use two estimators (FMOLS-MG, DOLS-MG) that do not take into account cross-sectional dependence between countries. Individual FMOLS estimates are highly consistent and robust in the presence of variable endogeneity when the variables are non-stationary and cointegrated (Pesaran, 2007). In addition, we also use the CCE-MG (Common Correlated Effect-Mean Group) estimation method to take into account possible cross-sectional dependence and observe possible changes from the assumption of cross-sectional independence in the empirical results. Indeed, the CCE-MG estimator is based on the MG and aims to eliminate the biased effect of cross-sectional dependence by including the cross-sectional means of the dependent and independent variables as additional regressors. The empirical results of these tests are presented in Tables 5 and 6.

The results appear relatively robust and significant. The results show that FDI is negatively and significantly correlated with PDI, regardless of the method used. Indeed, the estimated coefficient of our main variable of interest, FDI, is negative and significant at the 1% level in all regressions. The magnitude of the coefficient varies from −0.2706 in the FMOLS-MG estimate to −0.6546 in the CCE-MG estimator. First of all, it should be pointed out that in the case of cross-sectional independence, the empirical results,

Table 2: Cross-sectional dependency analysis

Variables	CD-test	P-value
Private domestic investment	0.96	0.336
Gross fixed capital formation	6.28	0.000
Foreign direct investment	1.99	0.046
Domestic credit to private sector by banks	18.52	0.000
Institutional quality	−0.08	0.933
GDP per capita growth	2.35	0.019
Trade openness rate	5.07	0.000
Public expenditure	−1.25	0.210
Human capital	21.54	0.000

Source: Author's calculations

Table 3: Panel unit root tests

Variables	LLC	IPS	CIPS	Decision
A level	T-statistics	W-statistics	T-statistics	Decision
Private domestic investment	−2.4871***	−2.2633**	−3.120	I (0)
Gross fixed capital formation	−0.9480	−0.2193	−1.666	NS
Foreign direct investment	−3.8596***	−4.0482***	−3.087	I (0)
Domestic credit to private sector by banks	−0.7889	0.3093	−2.269	NS
GDP per capita growth	8.6089***	−7.9577***	−4.104***	I (0)
Institutional quality	−0.8091	−0.3656	−1.197	NS
Trade openness rate	1.3158	−0.4632	−1.178	NS
Public expenditure	−3.9672***	−3.4676***	−1.850	I (0)
Human capital	−1.8806**	−1.0636	−2.114	NS
Primary difference				
Private domestic investment	−13.3546***	−12.3475***	−5.652***	-
Gross fixed capital formation	−9.4178***	−8.2848***	−4.206***	I (1)
Foreign direct investment	−11.6834***		−5.426***	-
Domestic credit to private sector by banks	−10.1060***	-9.6669***	−5.109***	I (1)
GDP per capita growth	−13.7973***		−5.631***	-
Institutional quality	−7.3271***	−6.0196***	−3.418***	I (1)
Trade openness rate	−7.9169***	−6.9285***	−4.427***	I (1)
Public expenditure	−11.8016***	−11.6016***	−4.604***	-
Human capital	−4.5969***	−4.1987***	−2.522**	I (1)

Note: ***; **; *: Significant at the 1%; 5% and 10% thresholds respectively; I (0): Stationary at level; I (1): Stationary at first difference; NS: Non-stationary

Table 4: Cointegration test results

Cointegration test	Model I		Model II	
	Statistics	P-value	Statistics	P-value
Null hypothesis of inter-individual non-cointegration				
Modified Phillips-Perron	2.3165**	0.0103	2.3613***	0.0091
Phillips-Perron	−4.1755***	0.0000	−2.8444***	0.0022
Augmented Dickey-Fuller	−6.8680***	0.0000	−3.6513***	0.0001
Null hypothesis of intra-individual non-cointegration				
Modified Variance ratio	−2.1344**	0.0164	−2.4516***	0.0071
Modified Phillips-Perron	1.4744*	0.0702	1.3736*	0.0848
Phillips-Perron	−3.4755***	0.0003	−3.1239***	0.0009
Augmented Dickey-Fuller	−3.3878***	0.0004	−3.7205***	0.0001
Kao				
Modified Dickey-Fuller	−6.3618***	0.0000	−5.2152***	0.0000
Dickey-Fuller	−4.4190***	0.0000	−4.4294***	0.0000
Augmented Dickey-Fuller	−3.5766***	0.0002	−2.9435***	0.0016
Unadjusted modified Dickey-Fuller	−6.4611	0.0000	−5.7431	0.0000
Unadjusted Dickey-Fuller	−4.4371	0.0000	−4.5422	0.0000

Note: ***; **; *: significant at the 1%; 5% and 10% thresholds respectively

Table 5: Estimated long-term relationship between FDI and PDI

Variables	Model I: Private domestic investment		
	FMOLS-MG	DOLS-MG	CCE-MG
Foreign direct investment	−0.2706***	−0.2986***	−0.6546***
GDP per capita growth	0.1236**	−0.0908	0.0330
Domestic credit to private sector by banks	−0.1085**	−0.0330	0.0758
Institutional quality	1.2523	−1.2505	−1.9080
Public expenditure	0.1649**	0.2054**	−0.3887***
Trade openness rate	0.0196	−0.0005	0.0970**
Human Capital	0.0235**	0.0231	0.0570

Note: ***; **; *: significant at the 1%; 5% and 10% thresholds respectively

Table 6: Estimated long-term relationship between GFCF and PDI

Variables	Model II: Gross fixed capital formation		
	FMOLS-MG	DOLS-MG	CCE-MG
Foreign direct investment	0.0716	0.0570	0.0634
GDP per capita growth	0.1034*	0.4545***	0.0078
Domestic credit to private sector by banks	-0.1273***	-0.2337***	0.0536
Institutional quality	4.6316*	4.1827	22.3994*
Public expenditure	0.1321*	0.3400***	-0.1390
Trade openness rate	0.0329**	0.0446**	0.1118***
Human Capital	0.0222**	0.0567***	0.1180

Note: ***; **; *: significant at the 1%; 5% and 10% thresholds respectively

obtained by the FMOLS-MG and DOLS-MG estimators, show that FDI has a negative and significant effect at the 1% threshold on PDI. The magnitude of the effect is greater with the FMOLS-MG estimator, as it has a relatively higher coefficient in absolute value. These results suggest that, over the study period, FDI crowds out domestic investment. For example, the FMOLS estimators indicate that a 1% increase in inward FDI as a proportion of GDP is associated with a 27.06% decrease in outward FDI as a proportion of GDP in host countries, holding other items constant.

These empirical results support the view held by some authors that the entry of FDI leads to a crowding-out effect on PDIs in host countries (Jansen, 1995; Kim and Seo, 2003; Lipsey, 2004). These results corroborate the findings of previous studies by (Morrissey and Udomkerdmongkol, 2012; Reinhart and Talvi, 1998). This result could be explained by the fact that the entry of multinational firms (MNFs) generates increased competition in the product market, which reduces the profit margin of domestic companies.

So, if FDI is concentrated in sectors already occupied by local investors, competition in these sectors increases, and FDI, thanks to its specific advantages, manages to gain a large share of the market. This forces local firms to reduce their investments. On the other hand, some domestic firms are unable to compete with MNFs and have to leave the market.

The Domestic credit to private sector by banks (DCPSB) is a competitor of the IDP. Indeed, an increase in the DCPSB leads to a decrease in the IDP at the 5% threshold with the FMOLS-MG estimator. DCPSB has the same sign with the DOLS-MG estimator, but is not significant. Consequently, an increase in the DCPSB will lead to a crowding-out effect of the PDI. In contrast, the results of our empirical analysis revealed that PDI is significantly encouraged and determined by public spending, gross domestic product per capita and human capital.

In addition, as mentioned above, we also use the CCE-MG estimation method to account for cross-sectional dependence, in order to observe changes from the cross-sectional independence assumption in the empirical results. The results, with this estimator, also show that FDI contributes to reducing the PDI. According to the results of this test, therefore, the evidence for the negative effect of FDI, and therefore of the crowding-out of PDI, does not change. Overall, the variables have the same signs as with the previous estimators; only the public spending variable changes sign. Indeed, it now has a negative and significant effect on the PDI at the 1% level. Secondly, as the use of PDI as a dependent variable is criticized, we used gross fixed capital formation as a dependent variable in a second specification following the example of Farla et al. (2016) et de Jude (2019) while using the same estimators (FMOLS-MG, DOLS-MG and CCE-MG).

As shown in Table 6, model II, in the case of cross-sectional independence, FDI has no effect on GFCF. On the other hand, our results reveal that only the variable credit granted to the private sector by banks is a brake on FDI; the other variables are the determinants of FDI in the long term. Similarly, the results of the CCE-MG estimation do not change with regard to the effect of FDI on GFCF.

6. CONCLUSION

In this article, we examined the effects of FDI on domestic investment and gross fixed capital formation for the period 1996-2018, focusing specifically on WAEMU countries. To do this, we used second-generation panel data approaches to account cross-country dependence. The CCE-MG estimator was used to assess the effects of FDI on domestic investment or gross fixed capital formation. In addition, under the assumption of crowding-out of domestic investment, we found that FDI crowds out PDI, but that FDI has no effect on GFCF. Using the FMOLS-MG and DOLS-MG methods, the results still show that the entry of FDI leads to a crowding-out of outward FDI in the WAEMU.

The governments of these countries will need to discourage the development of wholly foreign-financed enterprises, as this could undermine the growth trajectory of domestic investment. It would therefore be interesting to direct FDI into sectors other than domestic companies, to avoid crowding-out domestic investment.

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