Chapter 2
An Empirical Analysis of Foreign Direct Investment (FDI) and Banking Sector Development (BSD) in West Africa

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2.1 Introduction

Policymakers in developing countries have increased their efforts to attract more FDI in recent years. Their interest is partly because of the relatively less volatile nature of FDI to other forms of capital flows, such as syndicated bank loans and equity flows. The high volatility of the other forms of capital flows to developing countries is an indication of the prevailing default risk, according to international investors. It reinforces the idea that developing countries view FDI as a critical source of long-term capital needed to break away from the low-level equilibrium trap that they face.

FDI and BSD are viewed as significant contributors to economic growth unilaterally or in unison. The former introduces new technology in the form of innovative processes and new capital goods, productivity, and competitiveness; the latter mobilizes savings for borrowers and enables efficient capital allocation. The innovative processes and modern capital introduced into host countries create spillover effects from the multinational companies to domestic firms. This is captured in the follower-leader hypothesis (FLH) by Barro and Sala-i-Martin (2003). The FLH suggests that domestic firms find it relatively cheaper to imitate new technologies than to invent. Recent reports from the United Nations Conference on Trade and Development infer that trends in announced Greenfield FDI projects in Africa have shifted from natural resource focused investments to manufacturing and the services sector (UNCTAD 2018). This means that value additions are created; employment increased which eventually increases economic growth.

The financial landscape in West Africa is mainly dominated by the banking sector (IMF 2016). The sector accounts for more than 60% of financial sector assets

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according to the data available from the International Monetary Fund report, 2016, on financial developments in sub-Saharan Africa. As of 2014, stock exchanges and pension funds within the nonbank financial sector contributed 30% of total financial bank assets in West Africa. The French West African countries have a regional stock exchange serving all eight countries since 1998. The English West African countries have individual stock exchanges except for Gambia and Sierra Leon that have none.

There is a dearth of studies on the direct causal relationship between FDI and BSD in the context of West Africa. Previous studies mainly focused only on private credit as a proxy for financial development in West Africa. In this study, the ratio of liquid liabilities and total assets to GDP are examined alongside private credit to determine the nature of causality in West Africa. This study aims to provide an analysis of the existence and direction of the causal relationship between FDI and BSD using panel data from 1990 to 2016. This study will contribute to the FDI-BSD literature by finding answers to the question:

Does the increase in FDI inflows lead to the growth of financial systems in both French West Africa (henceforth FWA) and English West Africa (henceforth EWA)?

On the other hand, does an expansion in financial systems induce more FDI into both French and English West Africa? From the Granger causality analysis, the study finds a unidirectional relationship from BSD to FDI in both regions. The remaining of this paper is organized as follows: Sect. 2.2 provides a review of related literature, Sect. 2.3 discusses the data and method of analysis, and the empirical result in Sect. 2.4, and conclusion in Sect. 2.5.

2.2 Review of the Literature on FDI and BSD

This section aims to give an overview of theoretical and empirical evidence that explains the relationship between FDI and BSD. In general, the economic theory posits that FDI flows and BSD have a positive and significant relationship.

Bilir et al. (2019), Feinberg and Phillips (2004), using comprehensive U.S. micro-level data examined cross border greenfield investments by US multinational corporations (MNCs) and found that host countries with more significant capital market development do not pose growth constraints to affiliates of the US MNCs, whereas host countries with restrictions on FDI and underdeveloped financial markets constrained their expansion drive.

Desbordes and Wei (2017) using cross-country firm-level data on FDI investigated the effects of source and destination countries' financial development on Greenfield investments. The authors found that both source and destination financial development positively and significantly cause FDI inflows directly. The authors also observe that the host country's financial development indirectly promotes economic activities.

Chen et al. (2015) used a micro-level dataset of Chinese manufacturing firms to examine the link between regional financial development and foreign direct investment. The results show that a well-developed regional financial sector induces more

FDI inflows into the Chinese manufacturing sector. The study also found that local manufacturing firms in financially developed regions enjoy positive externalities from direct foreign investment.

Huang (2011) studied the causality between aggregate private investments and financial development using 43 developing countries from 1970 to 1998. By allowing for entity heterogeneity, the author found causality in both directions using GMM estimation. This means that financial development served as a boost to private investment and vice versa. Abimbola and Oludiran (2018) studied the significant determinants of FDI in the West African Economic and Monetary Union (WAEMU) for the period 1980–2010 using the panel cointegration approach. The finding from their study shows that there is a positive and significant relationship between FDI and financial development. Similarly, Anyanwu and Yameogo (2015); Anyanwu (2012) analyzed the factors that drive FDI into West Africa and Africa, respectively, using the least squares and generalized method of moment estimation methodology. The results showed a negative and significant relationship between FDI and financial development.

Soumaré and Tchana Tchana (2015) used cross-country data on 29 emerging markets to study FDI and financial market development relationship. The results showed that FDI and stock market variables are significant and positively impact each other. In the case of banking sector variables, the authors observed that FDI causes private credit and liquid liabilities.

Otchere et al. (2016) using both banking and stock market variables studied the direct causal relationship between foreign direct investment and financial market development in Africa over the period 1996–2009. Using the Granger non-causality test hypothesis, they find bidirectional causality by rejecting the null hypothesis of homogenous causality. This means that causality is heterogeneous among the countries chosen for the study.

Gebrehiwot et al. (2016) used a panel of eight African countries to study the FDI-financial development nexus. The authors found FDI and private credit to be positive and statistically significant using a 2SLS estimation procedure, whereas liquid liabilities statistically insignificant. The test for Granger causality revealed unidirectional causality from private credit to FDI but no causation in the case of liquid liabilities. Country-specific studies exploring the causal relationship between FDI and financial development in the West African context include Adam and Tweneboah (2009), OlugBenga and Grace (2015), Musa and Ibrahim (2014). These country-specific studies focused mainly on the relationship between stock market development and FDI, leaving out banking sector variables. The causal links between stock market variables and FDI were exempted in their study except for cointegration analysis.

2.3 Data and Methodology

Data on 12 countries from West Africa were collected for this study. There are eight countries in FWA: Benin, Burkina Faso, Senegal, Niger, Guinea, Ivory Coast, Mali, and Togo; four in EWA: Gambia, Ghana, Nigeria, and Sierra Leone. Data on the four variables from 1990 to 2016 are used. Descriptions of the variables are typically provided in Table 2.1. Following Alfaro et al. (2004), Okeyere et al. (2016), the below mentioned BSD variables are used. To analyze the relationship of growth of FDI and BSD in West Africa, the Holtz-Eakin et al. (1988) approach is used. In the panel data analysis literature, testing for the cross-sectional dependence is essential because it informs on the choice of panel unit root test to be applied. Granger causality analysis requires that the variables are stationary; hence panel unit root test is conducted on all the variables. Furthermore, the standard Wald test is also used to determine the direction of causality.

2.3.1 Cross-Sectional Dependence Test

The growing interdependence of countries in the last few decades (in the economic and financial front) has drawn the attention of researchers to relax the assumption of independence across individual time series in a panel setting. Dependence may take two forms: spatial or distance decaying dependence, where nearer individual cross-sectional units experience the most impact from a shock relative to entities that are farther away. This follows Tobler's First Law of Geography, "*Everything is related to everything else. But near things are more related than distant things.*" Pesaran and Tosetti (2011) describe this kind of dependence as weak form of cross-sectional dependence.

Table 2.1 Definition of variables

Variable	Definition	Source
G(CCA)	Growth of the ratio of commercial bank assets to the sum of commercial bank and central bank assets. Alternatively, the growth of the ratio of total bank assets.	The World Bank's Global Development Finance database
G (C/GDP)	Growth of the ratio of total private sector credit to GDP.	The World Bank's Global Development Finance database
G(FDI/ GDP)	Growth of the ratio of foreign direct investment to GDP.	World Development Indicators database
G (LL/GDP)	Growth of the ratio of liquid liabilities of the financial system to GDP.	The World Bank's Global Development Finance database

Note: The variables are defined following the World Development Indicators, published by the World Bank

The other form of dependence does not consider the distance of the individual units, but rather, the correlation among them is assumed to emanate from their exposure to the same cross-sectionally invariant common or global factors. For example, a boom or bust on a regional stock exchange or changes in global commodity (for example, oil) prices. Pesaran and Tosetti (2011) describe this kind of dependence as strong form of cross-sectional dependence. In the context of regional FDI growth, cross-sectional dependence can be introduced due to national policies aimed at attracting FDIs to their respective countries. Although these national policies may be common to all the countries, the effect is heterogenous due to country-specific characteristics. Hence this paper assumes a strong cross-sectional dependence of the individual time series variables; hence unit root test assumes a null hypothesis of cross-sectional independence using the common factor approach. The factor-augmented panel model is considered as follows:

$$y_{it} = \gamma_i^T z_{it} + \delta_i^T f_t + \in_{it} \tag{2.1}$$

where y_{it} is the individual time series variable, $i = 1,\ldots, N$ is the cross-sectional index, and $t = 1,\ldots, T$. z_{it} is a vector of observed exogenous regressors and f_t is a vector of unobserved cross-sectionally invariant common factors. Pesaran (2007) proposes a test for cross-sectional dependence known as the Pesaran CD-test given by

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\widehat{\rho}_{ij}\right) \tag{2.2}$$

under the null and alternative hypothesis as follows:

H_o: cross-sectional independence
H_1: cross-sectional dependence

2.3.2 Panel Unit Roots Tests

According to Baltagi (2008), it is prudent to examine the panel data for possible elimination of first-order integration to avoid spurious regression estimates. A regression equation of non-stationary series may give an appearance of a strong correlation even though the covariates may not have strong explanatory power or zero explanatory power. The fundamental test to check for unit root is the Augmented Dickey Fuller (ADF) test. The various tests for the order of integration in panel data series are all extensions of the ADF procedure. The ADF specification is:

$$\Delta y_{it} = \alpha_i y_{it-1} + \sum\nolimits_{j=1}^{\rho_i} \beta_{ij} \Delta y_{it-1} + \delta d_{it} + \epsilon_{it} \tag{2.3}$$

where d_{it} represents the deterministic component. When $\alpha_i = 0$, then the variable y_{it} has a unit root for the individual unit *i*. When $\alpha_i < 1$, then the variable y_{it} is stationary.

Broadly, there are two generations of panel unit root tests. The Levin, Lin, Chu (Levin et al. 2002) test (LLC), Fisher type tests, Im, Pesaran and Shin (Im et al. 2003) test, and Maddala and Wu (1999) belong to the first generation test, which assumes cross-sectional independence across the individual units. The second-generation test allowed for cross-sectional dependence or correlation among the various units. The Pesaran (2007) test for panel unit root is one of the frequently applied second-generation tests which make use of the common factor model framework. This paper applies the Pesaran (2007) test of unit root. A simple dynamic model with cross-sectional dependence is considered:

$$y_{i,t} = (1 - \partial_i) d_i + \partial_i y_{i,t-1} + u_{it} \tag{2.4}$$

where d_i is the deterministic component, y_{i0} is the initial values, and the u_{it},disturbance term, follows a one-factor structure given by

$$u_{it} = \delta_i f_t + \varepsilon_{it} \tag{2.5}$$

In which ε_{it} is the individual specific error and f_t is the unobserved common factor. Eqs. (2.4) and (2.5) can be written as

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \delta_i f_t + \varepsilon_{it} \tag{2.6}$$

where $\alpha_i = (1 - \partial_i) d_i$, $\beta_i = -(1 - \partial_i)$, and $\Delta y_{it} = y_{it} - y_{i,\,t-1}$. Pesaran (2007) proposes the following unit root hypothesis:

$$H_O : \beta_i = 0 \text{ for all } i$$

$$H_1 : \beta_i < 0, \quad = 1, \ldots, N_1, \beta_i = 0, i = N_1 + 1, N_1 + 2, \ldots, N$$

assuming that N_1/N is the fraction of the individual cross-sectional units that are stationary.

The idiosyncratic shocks, ε_{it}, the unobserved common factor f_t, and the coefficient of the unobserved common factor δ_i are independently distributed for all *i*. In testing for unit root, Pesaran (2007) proposes *t*-ratio based on the ordinary least squares (OLS) estimate of $\beta_i(\widehat{\beta}_i)$ by augmenting the individual ADF regressions with the cross-sectional averages of lagged levels and differences of the individual series:

$$\Delta Y_{i,t} = \alpha_i + \beta_i Y_{i,t-1} + \gamma_i \bar{Y}_{t-1} + \delta_i \Delta \bar{Y}_t + \epsilon_{i,t} \tag{2.7}$$

where $\bar{Y}_t = \frac{1}{N}\sum_{i=1}^{N} Y_{i,t}$, $\Delta \bar{Y}_t = \frac{1}{N}\sum_{i=1}^{N} \Delta Y_{i,t}$, and $\epsilon_{i,\,t}$ is the error term.

2.3.3 *Granger Causality Test*

Following Holtz-Eakin et al. (1988), a bivariate panel VAR model is considered:

$$\mathrm{G(FDI)}_{it} = \alpha_{11} + \sum_{i=1}^{T_{11}} \beta_{11i} \mathrm{G(FDI)}_{i,t-1} + \sum_{j=1}^{T_{12}} \beta_{12j} \mathrm{G(BSD)}_{i,t-j} + v_{12t} \tag{2.8}$$

$$\mathrm{G(BSD)}_{it} = \alpha_{21} + \sum_{i=1}^{T_{21}} \beta_{21i} \mathrm{G(BSD)}_{i,t-1} + \sum_{j=1}^{T_{22}} \beta_{22j} \mathrm{G(FDI)}_{i,t-j} + v_{22t} \tag{2.9}$$

where G(FDI) and G(BSD) represent the growth of the ratio of FDI to GDP and banking sector development indicators [measured by three variables, growth of the ratio of liquid liabilities to GDP, G(LL/GDP); growth of the ratio of private sector credit to GDP, G(C/GDP); growth of the asset structure of the banking sector, G (CCA)], respectively. T is the lag order, α is the individual effect, and β's are the parameters of interest, v_t is the error term. Using Eqs. (2.8) and (2.9), Table 2.2 summarizes the various null and alternate hypotheses concerning the causal relationship between the growth of FDI and BSD.

Table 2.2 Hypotheses tested in this study

Causal flow of interest	Null hypothesis
G(CCA) => G(FDI/GDP)	**G(CCA)** does not Granger-cause **G(FDI/GDP)**
G(C/GDP) => G(FDI/GDP)	**G(C/GDP)** does not Granger-cause **G(FDI/GDP)**
G(LL/GDP) => G(FDI/GDP)	**G(LL/GDP)** does not Granger-cause **G(FDI/GDP)**
G(FDI/GDP) => G(CCA)	**G(FDI/GDP)** does not Granger-cause **G(CCA)**
G(FDI/GDP) => G(C/GDP)	**G(FDI/GDP)** does not Granger-cause **G(C/GDP)**
G(FDI/GDP) => G(LL/GDP)	**G(FDI/GDP)** does not Granger-cause **G(LL/GDP)**

G(FDI/GDP) measures the growth of the ratio of foreign direct investment (FDI) to gross domestic product (GDP). G(CCA) measures the growth of the ratio of total bank assets. G(LL/GDP) measures the growth of the ratio of liquid liabilities to GDP. G(C/GDP) measures the growth of the ratio of private sector credit to GDP

Table 2.3 Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
English West Africa					
G(CCA)	104	0.07	0.15	−0.27	0.88
G(C/GDP)	104	0.05	0.14	−0.22	0.5
G(FDI/GDP)	104	0.88	7.48	−3.63	75.63
G(LL/GDP)	104	0.05	0.1	−0.25	0.45
French West Africa					
G(CCA)	208	0.01	0.08	−0.25	0.53
G(C/GDP)	208	0.02	0.13	−0.32	0.69
G(FDI/GDP)	208	−1.52	27.88	−371.44	62.93
G(LL/GDP)	208	0.03	0.09	−0.3	0.28

Note: GFDI/GDP measures the growth of the ratio of foreign direct investment (FDI) to gross domestic product (GDP). GCCA measures the growth of the ratio of total bank assets. GLL/GDP measures the growth of the ratio of liquid liabilities to GDP. GC/GDP measures the growth of the ratio of private sector credit to GDP

Table 2.4 Cross-sectional dependence test

	English West Africa		French West Africa	
Variable	CD-test	*p*-Value	CD-test	*p*-Value
G(CCA)	3.43	0	10.76	0
G(C/GDP)	2.8	0.01	8.03	0
G(FDI/GDP)	1.57	0.12	0.54	0.59
G(LL/GDP)	2.96	0	4.76	0

Note: The null hypothesis assumes cross-section independence. *p*-values close to zero indicate the presence of cross-section dependence. G(FDI/GDP) measures the growth of the ratio of foreign direct investment (FDI) to gross domestic product (GDP). G(CCA) measures the growth of the ratio of total bank assets. G(LL/GDP) measures the growth of the ratio of liquid liabilities to GDP. G (C/GDP) measures the growth of the ratio of private sector credit to GDP Significant at 5%, Significant at 1%

2.4 Empirical Results

Table 2.3 shows the summary statistics of the variables chosen for this study. There is high variability in EWA compared to FWA except for the growth in FDI/GDP with 7.48 and 27.88 standard deviations, respectively. FWA experienced a considerable decline in growth of FDI/GDP of 371.44% compared to a relatively marginal decline of 3.63 in EWA for the period under study. The panel data in both regions are balanced (104 observations in EWA and 208 observations in FWA).

The mean values of the variables are higher in EWA than FWA. Especially, G (FDI/GDP) is 0.88 in EWA and −1.52 in FWA, which indicates that on an average, there seems to be disinvestment in FWA.

Table 2.5 Panel unit root test

	English West Africa			French West Africa		
Variable	Statistic	*P*-value	Decision	Statistic	*P*-value	Decision
G(CCA)	−3.59	0.00***	I(0)	−3.45	0.00***	I(0)
G(C/GDP)	−4.22	0.00***	I(0)	−3.64	0.00***	I(0)
G(FDI/GDP)	−6.94	0.00***	I(0)	−3.58	0.00***	I(0)
G(LL/GDP)	−3.30	0.00***	I(0)	−3.65	0.00***	I(0)

Note: Null hypothesis assumes that all series are non-stationary
The alternative hypothesis assumes that only some of the series are stationary. Variables with cross-section dependence are estimated using Pesaran (2007) CD unit root test, else the Im, Pesaran and Shin (Im et al. 2003) test is used. I(0) represents stationarity at level. The deterministic term: Constant. G(FDI/GDP) measures the growth of the ratio of foreign direct investment (FDI) to gross domestic product (GDP). G(CCA) measures the growth of the ratio of total bank assets. G(LL/GDP) measures the growth of the ratio of liquid liabilities to GDP. G(C/GDP) measures the growth of the ratio of private sector credit to GDP. ***Significant at 1%

Table 2.6 Granger causality test

Causality between G(CCA), G(C/GDP), G(FDI/GDP), G(LL/GDP)					
	Variables	G(CCA)	G(C/GDP)	G(FDI/GDP)	G(LL/GDP)
English West Africa	G(CCA)	–	0.28	0.0001***	0.36
	G(C/GDP)	0.97	–	0.008***	0.99
	G(FDI/GDP)	0.64	0.024**	–	0.8
	G(LL/GDP)	0.006***	0.0016***	0***	–
French West Africa	G(CCA)	–	0***	0.0001***	0***
	G(C/GDP)	0.11	–	0.0^{2}**	0.0014***
	G(FDI/GDP)	0.29	0.35	–	0.045**
	G(LL/GDP)	0.03**	0.003***	0.095*	–

Note: Row and column variables indicate dependent and independent variables, respectively, in the Granger causality model. G(FDI/GDP) measures the growth of the ratio of foreign direct investment (FDI) to gross domestic product (GDP). G(CCA) measures the growth of the ratio of total bank assets. G(LL/GDP) measures the growth of the ratio of liquid liabilities to GDP. G(C/GDP) measures the growth of the ratio of private sector credit to GDP. *Significant at 10%, **Significant at 5%, ***Significant at 1%

Table 2.4 shows the results of the cross-sectional dependence test. The *p*-values corresponding to G(CCA), G(C/GDP), and G(LL/GDP) indicate a rejection of the null hypothesis of cross-sectional independence in both EWA and FWA. The exception is G(FDI/GDP) with a p-value greater than 0.05; hence the null hypothesis cannot be rejected. The Pesaran Cross-sectional Augmented Dickey Fuller (CADF) test is to test for the presence of unit root in the variables except for G(FDI/GDP) where the Im, Pesaran and Shin Im et al. (2003) test is used.

The panel unit root results reported in Table 2.5 indicate that all the series are stationary at level for both EWA and FWA.

Given that the variables are stationary at level, the Granger causality tests are applied. The results are presented in Table 2.6. A bivariate vector autoregression (VAR) model consisting of Eqs. (2.8) and (2.9) is estimated using OLS and then the

standard Wald test is applied to check the direction of causality. From Table 2.6, in the EWA region, Granger causality runs from G(CCA) to G(FDI/GDP), from G (C/GDP) to G(FDI/GDP), and from G(LL/GDP) to G(FDI/GDP) at the 1% significance level. Granger causality also runs from G(FDI/GDP) to G(C/GDP). The results indicate that bidirectional causality exists only between G(FDI/GDP) and G (C/GDP). Intuitively, the growth of credit extended to the private sector [G(C/GDP)] induces the growth of FDI flows (G(FDI/GDP)) into the EWA region.

Similarly, the growth of FDI flows (G(FDI/GDP)) into countries in EWA induces the growth of credit to the private sector. In the case of FWA, a unidirectional Granger causality runs only from all the banking sector development variables to growth in FDI inflows except the growth of liquid liabilities that has bidirectional causality with FDI flows.

Levin (2005) notes that among all the three measures of financial intermediation (liquid liabilities, total banking sector assets, and private credit), private credit is a direct and efficient measure of financial intermediation. For the reason that it solely measures credit to the private sector as opposed to other sectors such as public enterprises and government agencies, unlike total banking sector asset that includes central banks allocation of savings and liquid liabilities that include the interest-bearing liabilities of non-financial institutions. A significant difference between private credit and liquid liabilities is that the former measures actual financial intermediation, whereas the later measures capacity to intermediate. Hence the bidirectional causality between G(FDI/GDP) and G(C/GDP) in EWA indicates that the growth in FDI flows is induced by a stronger financial development relative to FWA, whereas the bidirectional causality between G(FDI/GDP) and G(LL/GDP) is induced from a weak financial development.

2.5 Conclusion

This paper examines the nature of the causal relationship between FDI and BSD in French West Africa (eight countries considered) and English West African countries (four countries considered). The findings suggest that BSD has an impact on FDI in both EWA and FWA. However, the impact of BSD seems to be stronger in EWA than in FWA since bidirectional causality exists between FDI/GDP and private credit in the former and between FDI/GDP and LL/GDP in the latter. This is in line with Chen et al. (2015) and Levin (2005), who found that financial development measured by private credit to GDP ratio positively and significantly influences the location of foreign affiliates to host countries. From the results, it follows that countries in West Africa, especially the French West African region should reform their financial regulations to deepen financial intermediation.

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