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Sustainable Energy Supply, Finance, and Domestic Investment Nexus in West Africa

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Abstract: This study examines the impact of financial deepening and sustainable energy supply on domestic investment in West African countries. The data for the study range from 1990 to 2020 and were sourced from the World Development Indicator database. We used the cross-sectional autoregressive distributed lag (CS-ARDL) estimator for the analysis. Empirical findings showed that credit to the private sector significantly impacts domestic investment in West Africa. It was also revealed that access to electricity significantly impacts domestic investment in West Africa. This demonstrates that funding for the private sector and adequate power generation improve the investment in any economy. The study concludes that financial deepening has a significant impact on domestic investment. The study therefore recommends that the management of banks should be encouraged to pursue policies that will deepen the efficient allocation of financial services for domestic investment in the region.

Keywords: financial deepening; financial development; sustainable energy supply; domestic investment; autoregressive distributed lag model (ARDL)

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1. Introduction

The importance accorded to domestic investment as one of the major movers of any economy has been a growing phenomenon and has remained a recurrent issue in recent years. One of the most crucial economic activities that nations place a high value on is a domestic investment, which serves as the primary driver of national economic development and the economic cycle (Bakari [1]). Domestic investment is a tool of an unhindered efficient economic system that plays a significant role in determining how much an economy grows. The governments of developed countries have renewed efforts in promoting domestic investment, after many years of economic adjustment and various economic reform programs. Having realized the importance of domestic investment, successive governments in West Africa have tried implementing some trade reforms and other macroeconomic reforms to improve domestic investment in their various countries and the region in general; however, the available relevant economic indicators show slow and minimal improvement in domestic investment (Ekpo [2]). The domestic investment in West Africa has continuously remained low compared to North Africa and other regions in the world.

According to the United Nations Economic Commission for Africa (UNECA) [3], domestic investment in West African countries, particularly public investment, is still inadequate and has not improved much despite the region's political and economic situations

getting better over the past two decades. Moreover, the private domestic investments for West African countries have been deteriorating over the last two decades, while the performance of some countries was far below the regional average. The failure of several programs on domestic investment has particularly led to interest in discussions and research on how financial deepening could lead to improved domestic investment in Africa. It has been acknowledged globally that financial deepening plays a catalytic role in the economic development of nations (Sanusi [4]). According to Giovanni [5], financially robust markets, whether assessed by size or the liquidity made available to businesses, increase their ability to acquire the capital they need to carry out investment initiatives that they might otherwise have to postpone. Additionally, dependable, sufficient, and high-quality infrastructure boosts economic productivity, reduces production costs, raises the nation's regional and worldwide competitiveness, and aids in the modernization of the economy. Infrastructure is there to meet needs, which can be social or economic. Economic infrastructures have been crucial for a long time in fostering domestic investment. For instance, improved infrastructure facilities enhance intra-regional trade and investment flows, which are essential for the development of regional markets, acceleration of growth, and eradication of poverty (United Nations Conference on Trade and Development (UNCTAD) [6]).

Several studies (such as Frank and Eric [7], Ajide and Lawanson [8], and Ang and McKibbin [9]) on financial deepening and domestic private investment have been conducted on a single country analysis, while relatively less is known for cross-country investigation such as in West African countries. For instance, Frank and Eric [7] and Ajide and Lawanson [8] focused on the finance–growth relation in a bivariate framework for Ghana and Nigeria. Meanwhile, Ang and McKibbin [9] incorporated some control variables such as real interest rate and extent of financial repression into the finance–growth model for Malaysia. Similarly, most of these studies (Ndikumana [10]; Le [11]; Deltuvaite and Sineviciene [12]; Onuonga [13]; Odedokun [14]) concentrated on the impact of financial deepening on economic growth while neglecting the impact on domestic investment in West Africa.

Moreover, Onwumere, Ibe, Ozoh, and Mounanu [15] and Aye [16] carried out studies on financial deepening using variables such as broad money and market capitalization. The focus has been almost entirely on bank-based financial deepening measures while ignoring the possible impact of insurance companies on domestic investment. Other studies such as those of Odeniran and Udeaja [17]; Okpara [18]; and Ferreira, Tadeu, and Silva [19] failed to consider interest rates as a determinant of domestic investment. Finally, the previous studies neglected to consider the impact of financial deepening and infrastructural development on domestic investment in West Africa. Against this backdrop, this study aims to investigate the impact of financial deepening and sustainable energy supply on domestic investment while accounting for some macroeconomic variables, namely exchange rate, interest rate, credit to the private sector, and insurance services, in 16 West African countries. To this end, the panel ARDL method is applied, and the CS-ARDL method is also used as a robustness check over the period 1990–2020. Thus, this paper contributes to the existing literature in terms of scope and econometric method. Hence, the results are suitable for policy crafting in the examined bloc regarding financial deepening and sustainable economic growth.

Our study's empirical results highlight that financial deepening variables significantly impact domestic investment in West Africa. Additionally, sustainable energy supply significantly impacts domestic investment in West Africa. Therefore, there is a need to pursue policies that will deepen the efficient allocation of financial services for domestic investment in the region; the government of West African countries should strive to stabilize their capital market, thereby pursuing competitive market policies.

This study is organized into five sections. The first section is the introductory section while the second section presents the literature, and the third section is the methodology. This is followed by the empirical results and discussions of the findings. The last section covers the conclusion.

2. Literature Review

2.1. *Theoretical Review*

2.1.1. Theory of Financial Intermediation

According to Schumpeter's [20] theory of financial intermediation, financial intermediaries have a critical role to play in the process of growth by shifting financial resources from net savers to net borrowers, thereby affecting investment and, in turn, economic growth. According to the theory, financial intermediaries can eliminate information asymmetry and market inefficiencies by altering the risk characteristics of assets (Nzotta and Okereke [21]). Due to the fact that borrowers typically have a better understanding of their investment projects than do lenders, there are asymmetries in the loan markets.

Financial intermediaries, therefore, seem to at least somewhat offset the expenses associated with certain types of transaction costs that are caused by information breakdowns. According to Tobin [22], the concept of transaction costs includes costs associated with searches, monitoring, and auditing in addition to exchange or monetary transaction costs (Benston and Smith [23]). The idea that efficient financial intermediaries might increase overall economic efficiency is supported by Schumpeter's study [20]. Intermediation roles of the financial sector encourage creativity and the development of entrepreneurship, which are essential elements for economic progress, by pooling and adequately allocating these resources (Karimo and Ogbonna [24]).

2.1.2. Supply Leading Hypothesis

Schumpeter in 1911 developed this hypothesis, and it was later reinforced by other writers such as McKinnon, Shaw, and Gupta, among others. According to this hypothesis, financial progress leads to the expansion of economic activities. In a world of frictionless transaction, information, and monitoring costs, financial intermediaries are not required. No exchange will occur between economic agents if transaction, information, and monitoring costs are too high.

The financial sector was created in an effort to lower those costs and facilitate exchanges. According to the hypothesis, a developed financial sector offers vital products that lower transaction, monitoring, and information costs and also boost intermediation efficiency. It mobilizes savings, locates and finances successful company ventures, keeps an eye on managers' performance, makes trading and risk diversification easier, and promotes the trade of products and services.

2.2. *Empirical Review*

2.2.1. Financial Deepening and Economic Growth

It is commonly known that financial deepening has a significant role in boosting economic growth and productivity. Results on the relationship between financial deepening and economic growth, however, have been contradictory. According to Torruam et al. [25], financial deepening boosts the sector's competitive efficiency, which indirectly benefits the economy's non-financial sectors. The supply leading hypothesis is supported by research conducted by Christopoulos and Tsionas [26] that showed a uni-directional causal relationship between financial development and growth in developing nations. In developing economies, Odedokun [14], Ang and McKibbin [9], Frank and Eric [7], Ajide and Lawanson [8], and Onuonga [13] examined the effects of financial sector deepening and economic growth. However, the results of the studies show that there is a statistically significant positive relationship between the financial sector deepening and economic growth.

Ho et al. [27], Xu [28], and Ndikumana [10] reported a long-run equilibrium relationship between economic development and financial deepening, which was supported by Tonye and Andabai [13,29] and Mehrara and Ghamati [30], while Adamopoulos [31] found that a short-term 1% impact on economic growth is caused by financial deepening. However, in a study of the financial deepening and growth of Turkey's economy, Ardic and Damar [32] discovered a significant inverse relationship between the two variables. Meanwhile, according to John and Ibenta [33], Michael [34], and Nyamongo et al. [35], there

was little to no impact on economic growth. According to Darrat [36], financial deepening is a necessary cause of the growth rate of any economy.

2.2.2. Financial Deepening and Domestic Investment

According to Onwumere et al. [13], an active financial sector can increase overall economic efficiency, generate and increase liquidity, foster capital accumulation, mobilize savings, and channel resources from traditional (non-growth) sectors to more modern, growth-inducing sectors as well as encourage businesses in these modern sectors of the economy. Levine [37] explains the impact of financial development from two angles: the view of financial services and the view of law and finance. When looking at the situation from the perspective of financial services, it emphasizes how crucial the financial system is to minimizing market imperfections and providing the private sector with essential services, which helps the economy perform better. By evaluating investment opportunities, exercising corporate governance, strengthening the management of risks, and lowering the cost of resource mobilization, financial systems improve the performance of the economy (Levine [38]). Financial development variables were found to significantly and favorably affect investment, according to King and Levine [39], Valderrama [40], and Deltuvaite and Sineviciene [12].

Misati and Nyamongo [41] looked into the impact of financial SSA development on investment while controlling it with political regime. According to the study, investment is adversely correlated with deposit interest rates and institutional characteristics but positively correlated with private sector credit and turnover ratio. According to Roger and George [42], the financial sector has a considerable impact on savings and subsequent investment in African nations. According to Agu [43], Nigeria's investment has slowed down due to higher lending rates, lower state spending, lower savings, political unrest, and poor infrastructure. Adu et al. [44] found a positive relationship between private sector credit and domestic investment, while finding a negative relationship when money supply was used as a proxy for financial development. By using the ARDL approach, Kargbo and Adamu [45] also discovered a positive relationship between financial development and economic growth in Sierra Leone.

Using a set of data from Nigeria, Osinubi and Amaghionyeodiwe [46] found no evidence of a relationship between indicators of capital market development and the growth rate of the economy between 1980 and 2000. Ndebbio [47] examined the relationship that exists among the deepening of the financial sector, economic growth, and development in sub-Saharan African countries. He came to the conclusion that the per capita growth rate of output is not positively impacted by real and nominal money supply or financial intermediation. In a cross-country analysis of the relationship among stock and investment effectiveness in African economies, Misati [41] showed that only North and Southern African countries are affected by investment efficiency. The results for sub-Saharan Africa, however, do not match this expectation. According to Ghura and Goodwin [48], lending to the private sector encourages private investment in Asia, Latin America, and SSA. Ho et al. [27] further revealed that financial deepening creativity is needed for investment in any nation. Le [11] in his study discovered that sociopolitical instability characterized by non-violent protests promotes investment, while violent uprisings hinder private investment. Similarly, Alhassan et al. [49] revealed a positive association between financial institutions and markets' development and economic progress in both upper–middle-income and lower–middle-income countries in Asia. Ferreira, Tadeu, and Silva [19] explored the determinants of private investment in Brazil. Using panel data and a fixed effects model, the result revealed a positive relationship between funding and investment.

The majority of the reviewed studies (such as Kargbo and Adamu [45] and others) considered a single country analysis, neglecting cross-country investigation such as in West African countries. Furthermore, the reviewed studies failed to consider the impact of the deepening of the insurance sector on domestic investment, which this study adequately considered.

2.2.3. Sustainable Energy Supply and Domestic Investment

The energy sector of any nation has a positive effect on businesses' efficiency, productivity, and effectiveness across a range of industries (Rehman et al. [50]). A wide range of productivity and services depend on infrastructure development, without which no significant economic activity can be carried out. Canning and Pedroni [51] asserted that increasing infrastructure spending which is important for maximum growth reduces the available funds for other unnecessary types of investment that may slow growth. According to Ntebo et al. [52], the expansion of the electricity infrastructure can support urban development and regional and national progress. According to Nketiah-Amponsah and Sarpong [53], an increase of 1% in transportation and electrical infrastructure leads to growth of 0.09 and 0.06%, respectively. Finally, Onabote et al. [54] found foreign direct investment infrastructure to significantly affect productivity in Nigeria.

3. Methodology

3.1. *Model Specification*

The supply leading hypothesis, which holds that the economy responds to real sector expansion aided by financial development, served as the foundation for this study. In order to determine whether financial deepening and sustainable energy supply influence domestic investment in West Africa, we classified the financial deepening variables as banking sector variables, namely credit to private sector/GDP, money supply/GDP, and interest rates/GDP; capital market variables, namely market capitalization/GDP and volume of trade/GDP; and insurance sector variables, namely insurance premiums/GDP, while sustainable energy supply was proxied with access to electricity (% of population). The dependent variable was domestic investment. This study made use of the autoregressive distributed lag model (PMG/MG-ARDL) method of estimations. Pesaran et al. [55] presented the PMG estimator in 1999, which involves pooling and averaging the coefficients across the cross-sectional units. On the other hand, the MG recommends assessing each unit independently and averaging the predicted coefficient across the cross-sectional units (Pesaran and Shin [56]). The ARDL model was employed since it is appropriate for our data collection because it allows a mix of stationary variables such as I(0) and I(1). In addition, it is suitable for studies with modest sample numbers. The 16 cross-sections (16 countries) and 31-year time series in this study are smaller than those in most panel studies, which ARDL models can adequately handle.

3.2. *Model Specification*

This study modeled domestic investment as a function of financial deepening and sustainable energy supply. The model specification was stated as follows:

$$DOI = f\ (CPS, MS, INTR, MC, ISS, AE, ETD) \quad (1)$$

Econometrically, it can be written as follows:

$$\Delta DOI_{it} = \beta 0 + \beta_1 \Delta CPS_{it} + \beta_2 \Delta MS_{it} + \beta_3 \Delta INTR_{it} + \beta_4 \Delta MCGDP_{it} + \beta_5 \Delta ISS_{it} + \beta_6 \Delta AE_{it} + \beta_7 \Delta EXRA_{it} + \varepsilon_{it} \quad (2)$$

where DOI = domestic investment (proxy with domestic investment is proxy by the total quantum of capital acquisition); CPS = credit to private sector to GDP; BMV = broad money to velocity (proxy with the ratio of M2 to nominal GDP); MCGDP = market capitalization (proxy with the ratio of listed shares to GDP); ISS = insurance services (proxy with the ratio of insurance services transacted to GDP); AE = sustainable energy supply (proxy with access to electricity (% of population)); INTR = interest rate (proxy with real interest rate is measured by rate of interest an investor, saver, or lender receives (or expects to receive) after allowing for inflation); EXRA = exchange rate (proxy with real exchange rate, which measures the price of foreign goods relative to the price of domestic goods); β1, β2, β3, β4, β5, β6, and β7 are the coefficients to be estimated; ε = error term. The subscripts i and t indicate country and time period, respectively.

4. Results

The summary data from the 16 West African economies are presented in Table 1.

Table 1. Descriptive statistics.

	(1)	(2)	(3)	(4)	(5)
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Domestic investment (DOI)	496	20.33	10.93	−2.424	131.05
Credit to private sector (CPS)	496	13.70	11.78	0	73.19
Insurance services (ISS)	496	3.24	7.10	0	96.32
Market capitalization (MCGDP)	496	0.267	1.85	0	24.20
Broad money to velocity (BMV)	496	26.53	17.94	0	125.29
Interest rate (INT)	496	3.69	8.21	0	33.46
Exchange rate (EXRA)	496	745.48	1531.42	0	9829.92
Sustainable energy supply (AE)	496	27.09	23.40	0	94.16
Number of countries	16	16	16	16	16

Source: Authors' computation.

The descriptive statistics of the variables used in the study are presented in Table 1. The results indicate the total number of observations and the mean, standard deviation, minimum, and maximum values of all the variables for a panel of 16 West African countries over the period 1990 to 2020. The results show that the average DOI, CPS, ISS, BMV, MCGDP, INTR, EXRA, and AE values are 20.33, 13.70, 3.24, 0.267, 26.53, 3.69, 745.48, and 27.09, respectively. The standard deviations are 10.93, 11.78, 7.10, 1.85, 17.94, 8.21, 1531.422, and 23.40 for these variables, respectively. The minimum value of DOI is −2.424 and the maximum is 131.05. Furthermore, CPS has a minimum of 0 and a maximum of 73.19. ISS varies from 0 to 96.32, while MCG varies from 0 to 24.20 among the countries over the period considered. Additionally, INTR has a minimum of 0 and a maximum of 33.46, while in the same vein, the minimum and maximum values of EXRA are 0 and 9829.92, respectively. Meanwhile, BMV has a minimum of 0 and a maximum of 125.29, and the minimum and maximum values of AE are 0 and 94.16, respectively. This shows a significant variation in all the variables over the studied period. This enormous variation warrants investigation. Therefore, this current study evaluates the impact of financial deepening and sustainable energy supply on domestic investment in West Africa over the period of 1990 to 2020.

In a multiple regression model, multicollinearity (the interdependence of independent variables) causes biased estimations of the coefficient, which makes the regression result unreliable. In this investigation, a correlation test was performed to see if multicollinearity existed. Results as presented in Table 2, all of the correlation coefficients between the independent variables, according to the correlation analysis findings, are lower than 0.5. Moreover, the variance inflation factor (VIF) test was also employed to test the presence of multicollinearity. The rule of thumb is that when the VIF value is greater than five, there is a problem of multicollinearity; otherwise, there is no problem of multicollinearity. The result of the VIF test showed that the values of the VIF are 3.37, 1.05, 1.07, 3.14, 1.03, 1.08, and 1.49 for credit to the private sector, insurance services, market capitalization, broad money to velocity, interest rate, exchange rate, and sustainable energy supply, respectively, which are all lower than five. Therefore, there is no multicollinearity between them.

It is important to perform a unit root test to examine the order of integration of a series. Therefore, Im, Pesaran, and Shin [57] and Levin, Lin, and Chu [58] unit root tests were conducted in this study, and the results are presented in Table 3. The results of the IPS and LLC tests revealed that interest rates and insurance services are stationary at level. That is, they are integrated of order zero [I(0)], while domestic investment, credit to the private sector, money supply, market capitalization, access to electricity, and exchange rates are stationary at first difference, which means that they are integrated of order one—that is, I(1).

Table 2. Correlation.

Variables	DOI	ISS	CPS	MCK	BMV	INT	EXCR	AE	VIF
Domestic investment (DOI)	1.00								
Credit to private sector (CPS)	−0.09	1.00							3.37
Insurance services (ISS)	0.28	0.00	1.00						1.05
Market capitalization (MCGDP)	0.01	0.07	0.02	1.00					1.07
Broad money to velocity (BMV)	0.20	−0.01	0.81	0.01	1.00				3.14
Interest rate (INT)	−0.04	−0.05	−0.02	−0.00	0.03	1.00			1.03
Exchange rate (EXRA)	−0.01	0.17	−0.17	−0.03	−0.10	−0.03	1.00		1.08
Sustainable energy supply (AE)	0.29	0.01	0.51	0.21	0.48	0.08	−0.04	1.00	1.49

Table 3. Result of unit root (stationarity) test.

	IPS		LLC	
Statistics	**At Level t-Statistics**	**At First Difference t-Statistics**	**At Level t-Statistics**	**At First Difference t-Statistics**
Domestic investment (DOI)	−1.5271	−13.920 ***	−5.865	−19.563 ***
Credit to private sector (CPS)	0.207	−9.541 ***	−4.941	−14.892 ***
Broad money to velocity (BMV)	1.468	−11.049 ***	−3.326	−16.806 ***
Interest rate (INT)	−1.783 ***	−7.547 ***	−10.181 ***	−23.213 ***
Market capitalization (MCGDP)	−1.213	−6.331 ***	−4.740	−17.029 ***
Insurance services (ISS)	−1.725 **	−12.763 ***	−6.553	−18.308 ***
Sustainable energy supply (AE)	3.448	−13.734 ***	−2.691	−19.178 ***
Exchange rate (EXRA)	1.765	−9.576 ***	−0.854	−14.353 ***

Note: IPS and LLC refer to tests by Im, Pesaran, and Shin [57] and Levin, Lin, and Chu [58]), respectively. ** and *** denote significance at the 5% and 1% levels, respectively. Rejection of the null hypothesis (p-value < 5%) indicates the absence of unit root.

Interpretation of Results

By using the Hausman test, we could choose the best suited model between the pooled mean group and the mean group as well as between the pooled mean group and the dynamic fixed effect. The test in this study, however, revealed that the pooled mean group is the most suitable model because the results were not statistically significant. Thus, the pooled mean group estimator served as the foundation for our interpretation. The long-run assessment in Table 4 below indicates that credit to the private sector has a positive relationship with domestic investments, which is significant at the 1% level. Essentially, the coefficient value of credit to the private sector for domestic investment is positive (0.3090) and significant at the 1% level. Every unit rise in credit to the private sector leads to an increase of 0.3090 in domestic investment. This is consistent with the result of Adu et al. [44], which allows the continued existence of companies deprived of funding. This is also supported by the works of Adamopoulos [31]; Mehrara and Ghamati [30]; Sineviciene and Deltuvaite [12]; Ferreira, Tadeu, and Silva [19]; and Ghura and Goodwin [48] which averred that financial deepening is an important factor in the mobilization and allocation of savings for productive use of any nation. Similarly, the money supply is significant to domestic investment at the 1% level of significance with a coefficient value of 0.4607. This means a unit rise in money supply leads to an increase of 0.4607 in domestic investment. This is consistent with the work of Rafindadi and Yosuf [59] that found money supply to make a significant contribution to gross domestic product. However, insurance services and market capitalization are not significant to domestic investment. This is consistent with the studies of Osinubi and Amaghionyeodiwe [46] and Ndebbio [47] which opined that the capital market does not significantly impact domestic investment in West African countries. However, at the 1% level of significance, access to electricity displays a positive significant relationship with domestic investment with a coefficient value of 0.0828. This means a unit rise in access to electricity leads to an increase of 0.0828 in domestic investment. This is in agreement with the works of Ntebo et al. [52], Nketiah-Amponsah and Sarpong [53],

and Onabote et al. [54] which supported that a sustainable energy supply improves the productivity and investment of any nation. Furthermore, interest rates and exchange rates are not significant to domestic investment. In addition, as indicated in the table, the coefficient of error correction term is −0.3490. Given the *t*-statistic of 0.0727, the value is statistically significant at 1%. Since it is negative and significant, it is implied that domestic investment responds to shocks from credit to the private sector, money supply, interest rates, insurance services, market capitalization, access to electricity, and exchange rates. This means that domestic investment is getting adjusted at a speed of 0.3490 from a state of disequilibrium in the short run to a state of equilibrium in the long run.

Table 4. Regression results of domestic investment (DOI) model.

	Dependent Variable: Domestic Investment		
Independent Variables	**Pooled Mean Group**	**Mean Group**	**Dynamic CCE (CS-ARDL)**
Long-run coefficients			
Credit to private sector (CPS)	0.3090 ***	0.2563 *	0.4855
	(0.0856)	(0.1530)	(0.4584)
Broad money to velocity (BMV)	0.4607 ***	0.0289	0.0225
	(0.0847)	(0.0996)	(0.1880)
Insurance services (ISS)	−0.0092	0.4305 ***	1.3886
	(0.1173)	(0.1174)	(1.6494)
Market capitalization (MCGDP)	0.0247	0.0413	−155.34
	(0.0985)	(0.4551)	(369.93)
Sustainable energy supply (AE)	0.0828	0.1691 ***	0.2735
	(0.0210)	(0.0539)	(0.1944)
Interest rate (INT)	0.0630	−0.3539 ***	0.2857
	(0.1330)	(0.1276)	(0.3554)
Exchange rate (EXRA)	0.00009	0.00003	0.0200
	(0.0005)	(0.0007)	(0.0754)
Hausman rest	5.92	1.75	
	(0.5496)	(0.9725)	
Short−run coefficients			
Error correction	−0.3490 ***	−0.5677 ***	0.6876 ***
	(0.0727)	(0.0419)	(0.0622)
Credit to private sector (CPS)	−0.2308	0.0784	−0.6619
	(0.3370)	(0.1434)	(0.6347)
Broad money to velocity (BMV)	−0.2667 ***	0.1195 **	−0.1611
	(0.0762)	(0.0569)	(0.0944)
Insurance services (ISS)	0.5026	0.1629 **	−0.3067
	(0.5264)	(0.0684)	(0.5321)
Market capitalization (MCGDP)	−37.0848	−0.1277	150.8782
	(159.5608)	(0.3225)	(93.5449)
Sustainable energy supply (AE)	0.1904 ***	−0.1233	−0.3190
	(0.0807)	(0.0821)	(0.1569)
Interest rate (INT)	−0.0289	0.0639	−0.1501
	(0.0558)	(0.0553)	(0.1823)
Exchange rate (EXRA)	0.01294	0.0052	0.4109
	(0.1801)	(0.0026)	(0.3406)
Cons	4.1265 ***	8.1048 ***	18.5470 ***
	(1.2052)	(1.2395)	(5.9515)

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors in parentheses. Source: Authors' computation (2022).

5. Conclusions

Using the cross-sectional autoregressive distributed lag model (CS-ARDL) panel estimator to analyze data from 1990 to 2020, which were sourced from the World Development Indicator database, we examined the nexus between financial deepening, sustainable energy supply, and domestic investment in West Africa. It was inferred from our studies

that financial deepening variables significantly impact domestic investment in West Africa. Furthermore, sustainable energy supply significantly impacts domestic investment in West Africa. Some proxies were adopted, and the need for data transformation was the limitation of this study. However, the findings of this study are accurate, comprehensive, reliable, and therefore fit for policy formulation and implementation. Based on the conclusions, the study recommends that the management of banks should be encouraged to pursue policies that will deepen the efficient allocation of financial services for domestic investment in the region. The governments of West African countries should strive to stabilize their capital markets, thereby pursuing competitive market policies; this will improve the competitiveness of local firms by enhancing domestic investment output. Furthermore, the insurance regulatory agencies of West African countries should also implement policies and programs aimed at restoring customers' confidence, trust, and loyalty with a reflective effect in increased sales and insurance penetration. We also recommend that interest rates should be managed in a way that will encourage the use of financial services by the unbanked population.

Although the current study explores the nexus between sustainable energy supply, financial deepening, and domestic investment in 16 West African countries, it fails to account for demographic indicators, which serves as a limitation alongside the availability of the data. Thus, future studies could explore this theme while considering other macroeconomic variables not captured in the current study. Additionally, future studies can also explore this subject under an asymmetric framework.

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