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## **Effect of public spending on well-being in Waemu: A spatial analysis of governance's role**

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**Abstract**--The objective of this study is to analyze the effect of public spending on the well-being of populations in the WAEMU zone based on the principles of spatial econometrics over the period from 2000 to 2022. The focus is on the direct and indirect effects of investment, health and education spending on the HDI. As a methodology, after detecting spatial autocorrelation, the Akaike and Schwarz information criteria indicate that a Combined Spatial Autoregressive Model and a Spatial Error Model should be used. In general, the results show that public spending has a significant effect, both direct and indirect, on the HDI of WAEMU countries. More specifically, public spending on investment and education improves the economic and social well-being of populations. However, an increase in public spending on health does not necessarily imply an improvement in the level of well-

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being of populations. This could be explained by the loss of resources allocated to the health sector and the implementation of unproductive investments. Hence, the need for WAEMU member states to strengthen the governance of the execution of public spending on infrastructure, education, and especially funds allocated to the health sector. Health policies must place a high priority on prevention and the establishment of local health centers.

**Keywords**---governance, public spending, well-being, spatial econometrics.

## **Introduction**

The analysis of the effect of public spending on growth and economic well-being recalls the controversy between classical and Keynesian theories. The former warn governments about the negative consequences of an increase in public spending. The latter argue that a budget deficit policy through increased public spending is necessary to correct market imperfections and revive the national economy (Nakatani & Herrera, 2013).

As a key component of the economic and social governance of states, the influence of public spending on macroeconomic indicators has been the subject of numerous empirical investigations. In this respect, three (3) levels of observation emerge: the choice of the impacted indicator, the analytical methodology, and the nature of the results. Concerning the first point, investigations in Africa, and particularly in the WAEMU, have mostly focused on economic growth rate, employment levels, and income inequalities (Ouattara, 2014 ; Aka et al., 2020 ; Bathily & Bamba, 2023 ; Brou & Ouattara, 2024).

In terms of methodological approaches, Ouattara (2014) relied on a system of simultaneous equations using Seemingly Unrelated Regressions (SURE), whereas Aka et al. (2020) opted for a microsimulated inter-industry model. Bathily and Bamba (2023) preferred a panel VAR using the Abrigo and Love (2016) approach, applied to 25 Sub-Saharan African countries. Overall, the results are mixed. For some, public spending significantly improves economic growth (Ouattara, 2014). For others, this relationship is not direct (Bathily & Bamba, 2023), and increased public spending will not prevent living standard disparities among WAEMU countries throughout the period 2015–2030 (Aka et al., 2020).

While the diversity of results from pioneering investigations aligns with methodological differences, these studies have paid little attention to the Human Development Index (HDI) as an indicator of population well-being. Yet, this index offers the advantage of combining health, education, and purchasing power levels. It therefore strengthens the instruments for assessing and comparing the level of economic and social well-being across countries.

In three-quarters of the WAEMU area, the HDI remains below 0.5 [Burkina Faso (0.44), Benin (0.343), Togo (0.351), Niger (0.393), Mali (0.289), Guinea-Bissau (0.48)] according to UNDP (2023) data. Only Côte d'Ivoire and Senegal have

slightly exceeded 0.5, with 0.55 and 0.51 respectively. Paradoxically, human development in WAEMU struggles to improve even though these countries record annual budget deficits that reflect the importance of public spending (WDI, 2024). In Niger, it rose from 3.6% of GDP in 2019 to 5.43% in 2020, before returning to 5% in 2023 (World Bank, 2025; AfDB, 2024). In Guinea-Bissau, it worsened, rising from 6.5% of GDP in 2022 to 7.3% in 2023 (World Bank, 2025). In Côte d'Ivoire and Senegal, it stands at around 6% of GDP (Afrique Diplomatie, 2025; World Bank, 2024).

The persistent deterioration of public deficits and the low HDI values highlight, among other concerns, the issue of governance in managing and implementing public policies, especially in health and education, which are key indicators of human development. Moreover, all eight (8) WAEMU countries share borders with each other, and thus maintain relations in all domains—economic, political, and social. In this context, realities such as shortages of essential goods, terrorism, political instability, and corruption in some member countries tend to spill over into others in terms of migration flows, increased public spending, and declining quality of life. Everything is interconnected, and things that are close are more related (Tobler, 1970).

In light of the above, a new analysis of the effect of public spending on well-being in WAEMU requires a spatial approach to the role of governance on HDI, to account for interactions and influences among member countries (Benyacoub & Mourad, 2021; Le Gallo, 2000; Kuma, 2018). The objective is to study the direct and indirect effects of public spending on well-being.

By hypothesis, the well-being of a given WAEMU country is influenced directly by the governance of domestic public spending on investment, health, and education, and indirectly by that of neighboring countries. In a scientific framework, the remainder of this paper is structured as follows: a brief literature review, methodology, results and discussion, and finally, the conclusion.

## **2. Literature Review**

Pioneering empirical investigations into the analysis of the link between public expenditure and well-being stem from the controversy between classical and Keynesian theories.

### **2.1 Classical vs Keynesian**

Economic literature defines public spending as all expenditures made by public administrations and financed by revenues such as taxes, duties, and social contributions (Musgrave, 1959; Shelton, 2007). However, the accumulation of budget deficits and the crowding-out effect resulting from state intervention justify the pessimism of the classical-neoclassical school regarding public spending. Benisty and Pascallon (1982) explain the attitude of classical authors, notably Friedman et al. (1962), toward fiscal policy through the “crowding-out” effect. According to them, increased public spending raises interest rates to the detriment of the private sector as a result of government borrowing. The private sector also suffers from reduced income when the state is forced to raise taxes

and duties to finance its spending. Worse, Popescu and Villieu (2014) and Niyonahabonye (2022) argue that monetary creation to finance public needs could lead to inflationary pressures. In addition, Arruda (2023) mentions the use of debt which could plunge the country into a vicious circle of external dependence.

Another concern of classical theorists regarding public spending lies in governance. The risk is high that funds earmarked for socially beneficial investments such as health, education, road maintenance, and communication could be diverted toward useless or poor-quality projects. Worse still, in conflict-ridden regions, violence forces governments to allocate budgets to exorbitant security expenditures at the expense of development needs (Zongo, 2021).

In contrast, Keynesians argue that during economic downturns or crises, the state should increase its spending to stimulate demand and support economic growth. This position resonates with endogenous growth theorists. Since the 1980s, Romer (1989) and Lucas (2009) have demonstrated that technological progress—an engine of innovation and economic growth—stems from investments in physical and human capital made by both firms and governments. Barro (1990), another proponent of endogenous growth theory, emphasizes distinguishing between productive public expenditures, which directly stimulate economic growth, and unproductive expenditures. In any case, when the state intervenes to regulate economic cycles, redistribute income, or steer the national economy, it does so through fiscal policy, including public spending (Musgrave, 1996). These theoretical assertions have spurred numerous empirical investigations, particularly in WAEMU countries.

## **2.2 Synthesis of empirical studies**

Several empirical studies have established a correlation between public spending and well-being, both in WAEMU and other regions. However, the sign and significance of this correlation vary depending on methodologies and results. In Africa and particularly in WAEMU, most studies have focused on economic growth (Ouattara, 2014; Nubukpo et al., 2007), employment (Bathily & Bamba, 2023), and income inequalities (Aka et al., 2020). Methodologically, Ouattara (2014) relied on a system of simultaneous equations using Seemingly Unrelated Regressions (SURE), while Aka et al. (2020) adopted a microsimulated inter-industry model. Bathily and Bamba (2023) used a panel VAR based on the Abrigo & Love (2016) approach, applied to 25 Sub-Saharan African countries. Finally, Awoutcha (2023) employed an error correction model (MISC) to examine the effect of public education spending on basic schooling performance in Cameroon. Overall, the results remain mixed.

For Bathily and Bamba (2023), the relationship between public spending and economic growth is indirect, passing through private investment according to Yovo (2014), and through education infrastructure in the long run (Nangbé, 2010). Luc et al. (2021) confirmed the long-term effect of public spending on growth in CEMAC, while Ouattara (2014) confirmed the short-term effect in WAEMU. However, Ka & Allaya (2021) and Tangara et al. (2019) found that public health expenditures struggle to improve life expectancy in West Africa. Along similar lines, Aka et al. (2020) argue that an increase in public spending will not

prevent disparities in living standards across WAEMU countries during the 2015–2030 period.

Most of these works have limited their analysis to the effect of public spending on production growth, employment, or social inequalities. Yet, the HDI has the advantage of incorporating health, education, and average income simultaneously. On the other hand, WAEMU presents both similarities and heterogeneities in cultural, social, economic, and political terms. Its member countries maintain relations in all domains. In this configuration, a spatial analysis approach (Sanders, 2001; Safae et al., 2023) to governance of public spending on investment, education, and health is more appropriate to better capture the well-being of populations in WAEMU.

### **3. Methodology**

This section presents the data, the variables used, and the justification of the model adopted in the study.

#### **3.1 Data Sources and Study Variables**

- **Data Sources**

For this study, we collected secondary data from World Bank's World Development Indicators (WDI) and United Nations Development Programme (UNDP). The study period covers 2000 to 2022, allowing us to explore trends over more than two decades within WAEMU. Due to data unavailability, Guinea-Bissau was excluded from the sample.

- **Study Variables**

The dependent variable used is well-being, measured by the Human Development Index (HDI). The independent variables, expressed as a percentage of GDP, are public investment spending (DepInv), public military spending (DepMil), public health spending (DepSant), and public education spending (DepEdu). Four control variables were also retained in line with the literature: political stability (StaPo), control of corruption (ConCor), GDP per capita growth rate (CroiPIBh), and population growth (CroiDem).

Among governance indicators, Ahmad and Saleem (2014) distinguish political stability and control of corruption as significant factors affecting HDI. According to Tahir et al. (2021), cited by Ouedraogo (2024), GDP per capita growth is a key factor that impacts human development, as it improves purchasing power. Urbanization is also considered by Ouedraogo (2024) as an important determinant of quality of life, measured by HDI.

#### **3.2 Econometric approach: spatial model**

The econometric approach chosen to analyze the relationship between public spending and economic and social well-being in WAEMU is the spatial model.

##### **3.2.1 Justification of the spatial model**

Unlike time-series studies, which focus on temporal dependence among observations, spatial econometrics examines relationships between data based on geographic location (Sanders, 2001). Its relevance in the context of public economics lies first in the existence of geographic and economic disparities within WAEMU countries. The same model was used by Safae et al. (2023) to study the effect of public investment on regional economic growth in Morocco.

##### **3.2.2 Spatial weight matrix and autocorrelation**

Spatial analysis relies on the definition of a spatial weight matrix and the concept of spatial autocorrelation.

- **Spatial weight matrix**

The spatial weight matrix (or neighborhood matrix) quantifies proximity relationships between the countries studied. This square matrix, with dimension equal to the number of spatial units, contains elements that represent the way unit  $i$  and unit  $j$  are spatially connected. The diagonal elements are zero since no spatial unit can be its own neighbor. Le Gallo (2000) distinguishes between generalized weight matrices and contiguity matrices.

Generalized weights represent the intensity of interaction between two regions, independently of contiguity. For instance, a distance matrix may assume that interaction depends on the distance between two capitals. Contiguity is defined by whether two regions share a common border.

The neighborhood matrix  $W$  takes values 1 and 0, where 1 indicates a neighbor relationship and 0 otherwise. Each term  $W_{ij}$  is defined as follows:

$$w_{ij} = \begin{cases} 1 & \text{"if regions } i \text{ and } j \text{ are contiguous"} \\ 0 & \text{if not} \end{cases}$$

Two types of contiguity matrices exist :

- Rook contiguity considers neighbors that share an edge only.
- Queen contiguity includes neighbors sharing either an edge or a corner.

Given the geographical proximity between WAEMU countries, our analysis quantifies proximity using a first-order Queen contiguity matrix, as applied by Safae & Radouane (2023).

- **Spatial autocorrelation**

Spatial autocorrelation refers to the relationship between observed values of a variable across locations. It is crucial in spatial analysis. According to Le Gallo (2000), spatial autocorrelation is the positive or negative correlation of a variable with itself, based on the geographic distribution of the data. Servais et al. (2004) define it as the clustering of similar values in space. Various statistical tests are used to assess this autocorrelation. The most common measure is Moran's (Lim & Jeong, 2015). This index is defined by the following formula.

$$I_{Moran} = \frac{n}{\sum_{i=1}^n \sum_{j=1}^n w_{ij}} \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^n (x_i - \bar{x})^2}$$

Where :

$i, j$  represent the spatial units,  $n$  represents the number of spatial units,  $x_i$  represents the value of the variable in unit  $i$ ,  $\bar{x}$  represents the mean of  $X$  and  $w_{ij}$  represents the spatial proximity between  $i$  and  $j$ . Values of Moran's range from -1 to 1. Negative values indicate neighboring areas have very different values. Positive values indicate neighbors have similar values.

### 3.3 Model presentation

Choosing the appropriate econometric model for our study required estimating all spatial models. However, we began with the estimation of the non-spatial OLS model before moving to spatial models: SAR, SEM, and SAC. The models are compared using information criteria (AIC and BIC). The spatial model with the lowest AIC and BIC values is considered the most suitable. For each model, we estimated four equations to assess specifically the effect of investment, health, education, and military public spending on HDI.

- **OLS models** (eq. 1–4)

$$IDH_{it} = \beta_0 + \beta_1 DepInv_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(1)

$$IDH_{it} = \beta_0 + \beta_1 DepEdu_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(2)

$$IDH_{it} = \beta_0 + \beta_1 DepSant_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(3)

$$IDH_{it} = \beta_0 + \beta_1 DepMil_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(4)

- **SAR models** (eq. 5–8)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepInv_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(5)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepEdu_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(6)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepSant_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(7)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepMil_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \varepsilon_{it}$$

(8)

- **SEM models** (eq. 9–12)

$$IDH_{it} = \beta_0 + \beta_1 DepInv_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(9)

$$IDH_{it} = \beta_0 + \beta_1 DepEdu_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(10)

$$IDH_{it} = \beta_0 + \beta_1 DepSant_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(11)

$$IDH_{it} = \beta_0 + \beta_1 DepMil_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(12)

- **SAC models** (eq. 13–16)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepInv_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(13)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepEdu_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(14)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepSant_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(15)

$$IDH_{it} = \beta_0 + \rho WIDH_{it} + \beta_1 DepMil_{it} + \beta_2 CroiDem_{it} + \beta_3 CroiPIB_{it} + \beta_4 StaPo_{it} + \beta_5 ConCor_{it} + \lambda Wu_{it} + \varepsilon_{it}$$

(16)

Where:

$i$  = WAEMU countries (1 to 7)

$t$  = study period (2000–2022)

$\rho$  = coefficient capturing the relationship between the dependent variable of neighboring countries and that of country  $i$

$\lambda$  = coefficient measuring spatial correlation of errors

$W$  = spatial weight matrix,  $\varepsilon$  = error term

## 4. Results

### 4.1 Descriptive statistics

Table 1 presents the descriptive statistics of the study variables.

Table 1 : Statistiques descriptives

Variables	Moyenne	Ecart-type	Min	Max
IDH	0,430	0,07	0,26	0,547
DepInv	20,229	4,977	12,843	36,13
DepEdu	3,590	0,921	1,937	5,720
DepSant	4,337	1,05	2,469	6,597
DepMil	1,473	0,594	0,36	3,33
CroiDem	2,901	0,430	2,055	3,867
CroiPIBh	1,437	2,868	-7,314	11,94
StaPo	-0,592	0,753	-2,479	0,821
ConCor	-0,575	0,327	-1,249	0,248

Source: Authors, based on data from UNDP (2023) and WDI (2023)

The HDI in our sample ranges from 0.26 to 0.547, with a low average of 0.43. Public investment spending averages 20.229% of GDP, while education, health, and military spending average 3.59%, 4.337%, and 1.473% respectively. Population growth (2.901%) exceeds GDP per capita growth (1.437%). The wide variation in GDP per capita growth (-7.31 to 11.94) reveals strong economic disparities across the study area. Indicators such as political stability and control of corruption both show negative average values (-0.592 and -0.575).

## 4.2 Econometric estimation results

### 4.2.1 Neighborhood matrix and spatial autocorrelation

- **Neighborhood matrix**

Table 2 : Matrice de voisinage

	IDH	DepInv	DepEdu	DepSant	DepMil	CroiDem	CroiPIBh	StaPo
IDH	1,000							
DepInv	0,203***	1.000						
DepEdu	0,181**	0.335***	1.000					
DepSant	-0,22***	0.096ns	0.226***	1.000				
DepMil		0.099ns	0.329***	0.462***	1.000			
CroiDem	0,018ns					1.000		
CroiPIBh	-0,68***	0.276***	-0.076ns	0.146*	0.031ns	0.006ns	1.000	
StaPo	0,083ns	0.294***	0.176**	-0.059ns	0.002ns	0.066ns	0.098ns	1.000
ConCor	-0,039ns	-0,066ns	-0.066ns	-0.32***	-0.63***	-0.02ns	0.2***	0.3***

Source: Authors, data from UNDP (2023) and WDI (2023)

Table 2 shows the neighborhood matrix, which reveals first-order Queen contiguity. This indicates the presence of common borders between 6 out of the 7 WAEMU member states in the sample during 2000–2022. A value of “1” means two countries share a border, while “0” indicates no border.

- **Spatial autocorrelation**

Table 3 presents the spatial autocorrelation test results for HDI in WAEMU countries.

Table 3: Detection of global autocorrelation

TESTS		
IDH	Moran's I	Geary's C
	0.382**	0.427***
	(0.015)	(0.009)

Source: Authors, based on UNDP (2023).

Significance levels: \*\*\* = 1%, \*\* = 5%.

The Moran's I index is significantly positive at the 5% level (0.382), indicating a significant correlation among HDI values of WAEMU countries. In other words, these countries share similar well-being levels, justifying the choice of a spatial approach for this study.

### 4.2.2 Estimation of spatial models

Econometric estimates show that the most appropriate models for this study are SAC and SEM, as they display the lowest AIC and BIC values compared to OLS and SAR. The marginal effects of public health, education, and investment spending are presented in Table 4.

Table 4: Marginal Effects – Health, Education, and Investment Spending

	Depsant		DepEdu		DepInv	
	SEM	SAC	SEM	SAC	SEM	SAC
Constante	0,744*** (0,000)	0,690*** (0,000)	0,638*** (0,000)	0,563*** (0,000)	0,660*** (0,000)	0,619*** (0,000)
DepSant	-0,008** (0.034)	-0,011*** (0.001)				
DepEdu			0,017*** (0,001)	0,019*** (0,000)		
DepInv					0,007*** (0,000)	0,005*** (0,000)
Croidem	-0,088*** (0,000)	-0,100*** (0,000)	-0,088*** (0,000)	-0,099*** (0,000)	-0,130*** (0,000)	-0,125*** (0,000)
croiPIBh	0,003* -0,051	0,001ns -0,287	0,002* (0,055)	0,001ns (0,214)	-0,000ns (0,667)	-0,000ns (0,667)
StaPo	-0,010* -0,068	-0,000ns -0,978	-0,002ns (0,660)	0,011** (0,033)	0,008ns (0,109)	0,012*** (0,005)
Concor	0,012ns -0,332	0,024** -0,023	-0,015ns (0,314)	0,000ns (0,962)	-0,033*** (0,007)	0,019ns (0,129)
R <sup>2</sup>	0,671	0,6526	0,756	0,797	0,760	0,783
Rho( $\rho$ )		0,172*** 0		0,165*** (0,000)		0,124*** (0,000)
Lambda( $\lambda$ )	-0,019*** 0	-0,138*** 0	-0,025*** (0,000)	-0,166*** (0,000)	-0,004ns (0,473)	-0,102*** (0,000)
Log Likelihood	261,953	280,164	264,659	282,692	286,067	295,337
AIC	0,0017	0,0018	0,0013	0,0011	0,0012	0,0011
BIG	0,0019	0,002	0,0014	0,0012	0,0014	0,0013

Source: Authors, based on data from UNDP (2023) and WDI (2023)

Significance levels : \*\*\* = 1% , \*\* = 5% , \* = 10% and ns =Not Significant.

Public investment and education spending both have a positive and significant effect on HDI at the 1% level. Public health spending, on the contrary, has a significantly negative effect at the 5% level. Population growth has a consistently negative and significant impact on HDI. Political stability shows mixed effects: positive and significant in some equations, negative in others. GDP per capita growth and control of corruption are not statistically significant.

The spatial autocorrelation coefficients  $\rho$  (Rho) and  $\lambda$  (Lambda) are significantly different from zero at the 1% level, confirming interdependence among WAEMU countries.  $\rho$  is positive (0.124 to 0.165), indicating positive spatial correlation: an HDI increase in neighboring countries improves a country's HDI.  $\lambda$  is negative (-0.102 to -0.166), showing inverse correlation among spatial errors.

### 4.2.3 Direct, indirect and total effects

Table 5 presents the direct (domestic), indirect (neighbors), and total effects of public spending variables

Variables	Effet direct	Effet indirect	Effet total
DepInv	0,0034	0,0017	0,0051
CroiDemo	-0,0782	-0,0402	-0,1185
CroiPIBhbt	-0,0003	-0,0001	-0,0004
StaPo	0,0077	0,0040	0,0117
ConCor	-0,0118	-0,0060	-0,0178
Variables	Effet direct	Effet indirect	Effet total
DepEdu	0,0093	0,0076	0,0169
CroiDemo	-0,0488	-0,0401	-0,0889
CroiPIBhbt	0,0006	0,0005	0,0011
StaPo	0,0049	0,0040	0,0089
ConCor	0,0003	0,0002	0,0005

Source: Authors, based on WDI data (2023)

Investment spending positively affects well-being both directly and indirectly. A 1% of GDP increase in investment raises domestic HDI by 0.0034 units, and indirectly improves neighbors' HDI by 0.0017 units. Education spending also improves HDI directly (+0.0093) and indirectly (+0.0076). Health spending, however, shows a negative relationship, suggesting inefficiency in resource allocation. Political stability fosters well-being, while rapid population growth has a strong negative effect.

## 5. Discussion of Results

The analysis of the effect of public spending on population well-being in the WAEMU zone shows that public investment in infrastructure and education has had a significantly positive effect on the HDI of member countries from 2000 to 2022. These findings are consistent with those of Ouattara et al. (2014), Gupta et al. (2014), and Yovo (2017).

Public education spending also exerts a significantly positive effect on HDI, in line with the studies of Awoutcha et al. (2023) and Nangbé (2010). In contrast, our investigation shows that the evolution of public health spending is not followed by an improvement in HDI in WAEMU. For a 1% of GDP increase in health spending, well-being lags by about 8.3%. This result is consistent with Ka & Allaya (2021) and Tangara et al. (2019), who found that public health spending struggles to improve life expectancy in WAEMU countries.

The inverse relationship between health spending and well-being could be explained, on the one hand, by the unequal distribution of public resources in the health sector, and more importantly by inefficient use of funds allocated to health. Furthermore, healthcare provision is concentrated in urban areas, to the detriment of rural populations who face difficulties accessing quality care. Preventive healthcare systems also remain weak across WAEMU countries.

## Conclusion

The main objective of this study was to analyze the effect of public spending on population well-being in the WAEMU zone between 2000 and 2022. To this end, we focused on the direct and indirect effects of public investment, education, and health spending on HDI. Through literature review and spatial econometric modeling, the SAC and SEM models were deemed the most appropriate for capturing spatial dynamics among countries.

The results show that public investment and education expenditures have a positive and significant effect, both directly and indirectly, on HDI in WAEMU countries. In contrast, although military expenditures show a positive effect, it is not statistically significant. Health expenditures, however, have a significantly negative effect, raising questions about their current efficiency. Our results open on policy recommendations for each country and for all WAEMU member countries.

At the national level, each country should:

- Continue to increase investment in national projects while innovating to meet growing population needs.
- Allocate more resources to the development of education systems to strengthen human capital, build schools in rural areas, and promote equitable access.
- Reform health policies by prioritizing preventive systems to improve efficiency promoting the establishment of local health centers.

At the regional level, WAEMU member states should:

- Develop cross-border infrastructure and encourage community-based projects.
- Harmonize education systems and create regional university centers.
- Establish shared systems for the prevention and management of health crises.

Despite these contributions, the study faced some difficulties, particularly in data collection. These constraints led us to drop some explanatory variables initially planned, exclude Guinea-Bissau from the analysis, and use proxies for certain indicators.

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