

**How to Cite:**

Koffi, M. V., & Konan, Y. C. (2025). Urbanization and financial inclusion in WAEMU countries: Heterogeneity approach. *International Journal of Economic Perspectives*, 19(9), 65–74. Retrieved from <https://ijeponline.org/index.php/journal/article/view/1146>

# Urbanization and financial inclusion in WAEMU countries: Heterogeneity approach

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**Abstract**--The objective of this study is to evaluate the effect of urban development on financial inclusion in the WAEMU zone. Methodologically, we use Swamy's (1970) random coefficient model to capture the heterogeneity of the dynamics between urbanisation and financial inclusion. The results reveal this heterogeneity. Urbanisation is a determinant of financial inclusion only in Burkina Faso, Côte d'Ivoire, Senegal and Togo. On the other hand, urbanisation has a negative influence on financial inclusion in Mali. There is no relationship between urbanisation and financial inclusion in Benin. To benefit from the virtues of urbanisation, it must be able to generate decent jobs.

**Keywords**--Urbanisation, Financial inclusion, WAEMU

**JEL:** R0 O180 G51

## 1. Introduction

Throughout humanity's history, urbanization has been a key factor in the development process (Bairoch, 1988). Firstly, cities play an important role in the structure of the economy and society of both developed and developing countries, offering people the opportunity to benefit from education, employment and good health. Secondly, urbanisation involves the agglomeration of people and businesses and reduces production costs. Thirdly, the concentration of people and businesses in cities facilitates access to finance, the promotion of business ideas and the existence of a larger local market. However, this relationship is not self-evident (Jacobs, 1969). Large cities face many environmental and ecological

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Submitted: 27 July 2025, Revised: 09 August 2025, Accepted: 12 September 2025

problems associated with urbanisation, including poor quality housing (slums), pollution, crime and overcrowding (a typical problem is traffic).

The United Nations Habitat forecasts that the proportion of the world's population living in cities will rise from 56% in 2021 to 68% in 2050. This translates into an increase of around 2.2 billion urban residents. African cities are the fastest-growing in the world. In sub-Saharan Africa, the urban population has increased tenfold over the last fifty years, from 32 million in 1960 to 458 million in 2020. This transformation is set to have a significant impact on Africa's economic, social and political landscape in the decades to come.

According to the OECD's report on the dynamics of urbanisation in Africa (2022), urbanisation has improved access to services, infrastructure and economic opportunities for hundreds of millions of people. In large cities, hourly wages are twice as high as in rural areas and underemployment is less widespread: urban workers work 30% more hours than rural workers. The proportion of workers in skilled jobs is around 50% for men and 25% for women in large and medium-sized cities, compared with just 18% and 11% respectively in rural areas. Cities facilitate access to services and infrastructure. Children in large cities receive an average of almost five years more education than children in rural areas. In large cities, 80% of households are connected to the electricity network, compared with just 20% in rural areas. More than half of households in large cities have a bank account, compared with just 20% in rural areas. As Africa is the continent with the highest urban growth, its impact on financial inclusion should be felt more strongly. Although there have been some notable advances, promoting financial inclusion in developing countries remains a challenge. The rate of adults with an account in developing countries is 68% for women and 74% for men, compared with 97% and 96% respectively in developed countries (World Bank 2021). In the West African Economic and Monetary Union, less than half of adults have an account, i.e. 46.3% (BCEAO, 2022), despite strong urban growth (OECD, 2025).

Like the facts, empirical work is mixed on the beneficial effects of urbanisation on financial inclusion. Bossone and Sarr (2016) show that urbanisation through new payment technologies, such as virtual currencies, contributes to financial inclusion by channelling urban transaction flows towards financing mechanisms for sustainable development. Lyons, Grable and Zeng (2017) add a nuance by showing that in highly urbanised areas, access to formal credit is reduced, whereas it was almost 'neutral' in less urbanised areas, suggesting that a certain number of infrastructures play little or no role in financial inclusion. Anouba et al (2023) highlight a positive correlation between urbanisation and the demand for financial services in WAEMU, but stress the need for appropriate infrastructure to support this growth dynamic. Unlike this work, this study takes heterogeneity into account by using a random coefficient model to capture the heterogeneous dynamics of urbanisation in WAEMU countries.

## **2. Review of Littérature**

The analysis of the relationship between urbanisation and financial inclusion, although still recent in scientific circles, is linked to theoretical reflections on urban development that have been developed over several centuries. This

theoretical basis argues in favour of the fact that urbanisation, through the structuring of the economic space and the development of infrastructures, encourages the supply of financial services to be adapted to a wider population, and thus contributes to financial inclusion. The dynamics of economic growth, as envisaged by a number of theorists (Lösch, 1954), are at the root of the appropriation and growth of the urban population. Urban economic development leads to a concentration of people and of production and service units, enabling economies of scale that stimulate innovation and entrepreneurship, as well as the transition of activities from the informal to the formal sector (Champion and Hugo, 2004).

Urbanization, by bringing together individuals and businesses, generates greater consumption of financial services, leading financial institutions to densify in areas of high population concentration. For Celerier and Matray (2017), an increase in the density of bank branches reduces the number of unbanked households, especially for people traditionally excluded from the financial market such as low-income households or those living in rural areas. Opportunities for financial inclusion are multiplied in urban areas where access to financial institutions is facilitated.

Urbanisation does not only have beneficial effects on financial inclusion. Some studies, for example (Peng et al, 2017), show that in areas such as highly urbanised megacities, obstacles such as a lack of confidence in formal institutions or the cost of accessing credit are barriers to financial inclusion. In addition, the physical and social infrastructure, such as transport and access to information, in these areas can dampen demand for formal financial services.

Empirically, research into urbanisation and financial inclusion reveals dynamics that are both complementary and sometimes opposed. Bossone and Sarr (2016) show that urbanisation through new payment technologies, such as virtual currencies, contributes to financial inclusion by channelling urban transaction flows towards financing mechanisms for sustainable development. Li (2024) sheds further light on the subject, showing that inclusive finance plays a role in urbanisation in China, but that it acts in a distorted way depending on the type of urbanisation: it favours the population that settles there, but at the same time, urbanisation can be detrimental to people on modest incomes. All in all, the complexity of the relationship between urbanisation and financial inclusion requires special management to avoid maladjustments. To go further, Lyons, Grable and Zeng (2017) add a nuance by showing that in highly urbanised areas, access to formal credit is reduced, whereas it was almost 'neutral' in less urbanised areas, suggesting that a certain number of infrastructures play little or no role in financial inclusion. The work of Li et al (2022) also warns against the risk of public over-investment in land urbanisation, which could lead to a waste of resources if poorly managed. Villanthenkodath and Pal (2024), for their part, observe that globalisation favours financial inclusion (and more particularly inclusion in urban areas) but that the dynamism of demographic growth could thwart its extension. This shows once again that financial inclusion must go hand in hand with structural reforms if inequality is to be avoided. The work of Cicchiello et al (2021) highlights the obstacles to inclusion in the least developed countries, pointing out that women and rural populations are still poorly served

and that specific policies are needed to improve their access to financial services. Finally, Anouba et al (2023) highlight a positive correlation between urbanisation and demand for financial services in the WAEMU, but stress the need for appropriate infrastructure to support this growth dynamic. These analyses clearly illustrate that urbanisation and financial inclusion are intertwined in multifaceted relationships, alternating between complementarities and tensions depending on the context and policies applied.

### **3. Methodology**

#### **3.1. Econometric specification**

In order to examine the relationship between urbanisation and financial inclusion, we use a method that is widespread and widely used today, namely panel data. Standard regression models for panel data, such as fixed and random effects models, incorporate panel-specific heterogeneity by including a set of nuisance parameters that essentially provide each panel with its own constant term. However, all panels share common slope parameters. Falsely ignoring slope heterogeneity can distort results (Pesaran and Smith, 1995).

As Klein (1953) observed, it is unlikely that the inter-individual differences observed in a cross-sectional sample can be explained by a simple regression equation with a few independent variables. In such situations, the vector of coefficients in a regression model can be treated as random to account for inter-individual heterogeneity. Models with random coefficients are more general in that they allow each panel to have its own vector of slopes drawn randomly from a distribution common to all the panels (Swamy, 1970).

We follow Swamy (1970) and Pala (2019) to examine the relationship between urbanisation and financial inclusion in the countries of the West African Economic and Monetary Union (WAEMU). This choice is not insignificant. The concept of urbanisation varies from one WAEMU country to another. If we refer to the work of Ignace and Benoit (2021), in Benin, for example, an urban area is any heterogeneous area that includes the main town of a commune with at least 10,000 inhabitants and at least one of the following infrastructures: post office and telecommunications, treasury collection office, water supply system, electricity supply system, health centre, general secondary school with 2nd cycle. In Burkina-Faso, the nomenclature is identical except for the number of inhabitants. In Côte d'Ivoire and Senegal, the demographic criterion is used, i.e. 10,000 inhabitants. In Mali and Guinea Bissau, towns with populations of 5,000 and 1,500 respectively are considered urban. In Togo, any prefecture capital is de facto an urban municipality. In Niger, any capital city, departmental or district capital is considered urban. On this basis, the dynamics of urbanisation differ from one country to another, showing a certain heterogeneity in the zone.

Moreover, its link with financial inclusion is more heterogeneous due to the gap in financial inclusion between these countries (the most advanced countries, such as Côte d'Ivoire, have a lower level of inclusion than the least advanced countries, such as Togo (BCEAO, 2019)). The specification of the Swamy model is given by:

$$FI_i = \alpha_i + \beta_{0i}URBAN + \beta_{1i}INF + \beta_{2i}EDUC + \beta_{3i}VULEMPLOY + \beta_{4i}GDPCTA + \beta_{5i}POS + \varepsilon_i$$

(1)

Where,  $i = 1 \dots 7$ ; FI represents financial inclusion; URBAN, urbanisation; INF, inflation rate; EDUC, gross primary enrolment ratio; VULEMPLOY, vulnerable employment; GDPCTA, GDP, per capita and POS, number of outlets.

### 3.2. Data

The study of the relationship between urbanisation and financial inclusion in the WAEMU zone covers the period 2000-2022 and covers 7 countries. Guinea-Bissau was excluded for lack of data. The definition of the variables and the data sources are given in the table below.

**Table 1:** Data source

Variables	Definition	Source
POS	Points of sale	IMF
FI	Affordability index	IMF
URBAN	Urbanisation	WDI
INF	Inflation	WDI
GDPCTA	GDP Per Capita	WDI
EDUC	Gross primary school enrolment rate	WDI
VULEMPLOY	Vulnerable jobs	WDI

Table 2 shows that, on average, less than half the population of the WAEMU is urban, representing 36% of the population.

**Table 2:** Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
POS	109.346	100.225	27	534
FI	11.541	13.242	5	50.778
URBAN	36.959	11.142	16.208	52.661
INF	2.27	2.949	-3.233	14.29
EDUC	88.067	21.713	44.683	128.252
GDPCTA	993.736	492.4	281.325	2649.173
VULEMPLOY	80.73	8.172	62.554	93.991

The average value of the financial inclusion index is 11.54%. This distribution is very wide, with a minimum value of 5% and a maximum value of 50.77%. Inflation remained stable at around 3% on average.

### 4.1. Results of Coefficient Homogeneity Tests

One possibility for testing slope homogeneity is to apply the F-test on the difference of the sum of squares of the pooled ordinary least squares (OLS) residuals and the section unit-specific OLS regression (Baltagi, 2013). The main drawback of the latter test is the assumption of homoscedastic error variance. Pesaran et al (1996) proposed a Hausman-type test for  $N > T$  comparing the FE

estimator and unit cross-sectional OLS, but the procedure is not applicable to panel data models with only strictly exogenous regressors or autoregressive models (Pesaran and Yamagata 2008). Based on a standardised version of the Swamy test (Swamy 1970), Pesaran and Yamagata (2008) proposed a homogeneity test. Based on the Pesaran and Yamagata (2008) test, Blomquist and Westerlund (2013) presented a consistent HAC extension. The results of these tests are contained in the table below.

**Table 3:** Slope homogeneity test results

Tests		Statistics	p-value
Pesaran and Yamagata (2008)	Delta	6.033***	0.000
	adj.Delta	7.929***	0.000
Blomquist and Westerlund (2013)	Delta (HAC)	-2.652***	0.008
	Adj.Delta (HAC)	-3.486***	0.000

Note:(\*),(\*\*),(\*\*\*) indicate the respective significance levels of 10%, 5% and 1%.

The null hypothesis of slope homogeneity can be rejected in all cases because the probability values are less than 0.05. The slope coefficients are not homogeneous. There is heterogeneity between the countries in the sample; we should use heterogeneous panel techniques.

#### 4.2 Results of Unit Root and Cointegration Tests

Unit root tests on panel data have undergone a remarkable evolution in recent years. Current tests are based on the idea that dependencies between individuals in the panel should be taken into account. These tests are known as second-generation unit root tests. But before carrying out these tests, the inter-individual dependency needs to be confirmed. When the time dimension outweighs the individual dimension, the Breush and Pagan (1980) test, based on the Lagrange multiplier, is appropriate. The results of this test show a statistic ( $\chi^2(21) = 92.797$ ) and a probability of ( $Pr = 0.0000$ ). The hypothesis of inter-individual independence cannot therefore be rejected. On the basis of this result, the de Pesaran (2007) second-generation unit root test was selected for this study. The second-generation unit root test for panels, which takes cross-sectional dependence into account. Table 4 presents the results of this test.

**Table 4:** Unit root test results

Variables	Test de Pesaran (2007)	
	Level	First Difference
FI	1.056 (1.000)	29.243*** (0.010)
URBAN	1.076 (1.000)	55.583*** (0.000)
INF	71.278***(0.000)	-
EDUC	19.731 (0.139)	92.036*** (0.000)
VULEMPLOY	5.726 (0.973)	47.805*** (0.000)
GDPCTA	13.480 (0.489)	112.305 *** (0.000)
POS	13.462 (0.490)	106.083*** (0.000)

Note:(\*),(\*\*),(\*\*\* indicate significance levels of 10%, 5% and 1% respectively.

The results indicate that the null hypothesis of unit root can be rejected and that all the variables are integrated of order 1. Under these conditions, a cointegration test is necessary to study the series. To this end, we perform the cointegration test proposed by Pedroni (2004). The results are shown in Table 5.

**Table 5:** Cointegration test

	Statistic	p-value
Modified Phillips-Perron t	2.2959**	0.0108
Phillips-Perron t	-4.1728***	0.0000
Augmented Dickey-Fuller t	-4.2076***	0.0000

Note:(\*),(\*\*),(\*\*\* indicate the respective significance levels of 10%, 5% and 1%.

These results show that the cointegration hypothesis cannot be rejected. Note:(\*),(\*\*),(\*\*\* indicate the respective significance levels of 10%, 5% and 1%. These results show that the cointegration hypothesis cannot be rejected.

### 4.3. Estimation Results and Discussion

The results of the Swamy random coefficient model are presented in table 6. The model shows that urbanisation has a positive influence on financial inclusion in Burkina-Faso, Côte d'Ivoire, Senegal and Togo. On the other hand, urbanisation has a negative influence on financial inclusion in Mali. The coefficient of urbanisation appears insignificant in Benin. The most convincing argument in favour of a positive link between urbanisation and development comes from spatial economics and the theory of agglomeration economies. The basic proposition is that people and firms linked by physical proximity interact more effectively than they do in dispersed environments, making them more productive. These interactions take the form of exchanges of inputs and outputs, competition, information exchange, mutual learning and shared logistics. Larger, denser cities encourage more frequent and diverse interactions, which accelerate the spread of new ideas and techniques. The larger the city, the greater the opportunity and pressure for people and businesses to specialise in particular skills, tasks and functions. This division of labour results in better and/or cheaper products and services. For Ndanshau and Njau (2021)

Inflation has a positive influence on financial inclusion in Benin and Mali. From a theoretical point of view, it is explained that financial inclusion can contribute to the implementation of an effective price stability policy. In addition, monetary policy decisions can also contribute to increasing financial inclusion (Anarfo et al., 2019).

There is a negative relationship between per capita income and financial inclusion. Previous work in Africa (Oyelami et al., 2017) found that an increase in per capita income was positively related to the degree of financial inclusion in these countries. The prevalence of vulnerable employment weighs on financial inclusion in all countries except Senegal. Raichoudhury (2020) uses a panel of 27

Indian states over a four-year period (2012-2015). He finds that income and employment opportunities are the most important determinants of financial inclusion. Similar results are found by Ndanshau and Njau (2021) in the case of Tanzania.

Increasing the number of outlets increases financial inclusion in Burkina Faso and Côte d'Ivoire. Our results are consistent with the work of Eze and Dumani (2020) in Nigeria. Primary education reduces the level of financial inclusion in all countries. The link between education and financial inclusion can be strongly influenced by an individual's financial knowledge. An increase in the level of education increases financial knowledge, which promotes financial inclusion. Koffi and Kouadio (2024) find a positive effect of secondary and tertiary education levels on financial inclusion in their investigation in the WAEMU zone. However, the effect is negative for primary education. This result is similar to those of Koffi and Kouadio (2024).

**Table 6:** Results of the random coefficient model

Variables	URBAN	INF	EDUC	VULEMPOY	GDPCTA	POS	_cons
UEMOA	8,302*** (0.000)	0,030 (0.902)	-0,435* (0.05)	-3,170 (0.157)	-0,031** (0.019)	-1,270 (0.97)	66,215 (0.795)
Côte d'Ivoire	7,601*** (0.000)	-0,453 (0.108)	-0,495*** (0.000)	-7,468*** (0.0008)	-0,026 (0.012)	10,75* (0.056)	342 (0.169)
Benin	2,75 (0.177)	0,597* (0.084)	-0,544 (0.544)	-7,906*** (0.004)	-0,035*** (0.004)	-9,875 (0.235)	796*** (0.0021)
Burkina-Faso	10,437*** (0.000)	-0,112 (0.66)	-0,823*** (0.000)	-5,078** (0.016)	-0,016* (0.053)	21,812*** (0.007)	-84 (0.762)
Mali	-5,844*** (0.000)	0,485*** (0.003)	-0,359*** (0.003)	-1,228 (0.206)	-0,079*** (0.000)	-33,375*** (0.000)	223* (0.053)
Niger	8,953*** (0.000)	-0,286** (0.044)	0,479*** (0.000)	0,929*** (0.001)	0,002 (0.721)	3,503 (0.402)	-268,875*** (0.000)
Sénégal	13,191*** (0.000)	0,002 (0.993)	-0,760*** (0.000)	0,492 (0.669)	-0,021* (0.058)	4,843 (0.472)	-515,5*** (0.002)
Togo	8,476*** (0.000)	0,224 (0.417)	-0,519*** (0.006)	-1,945** (0.015)	-0,046*** (0.000)	-5,75 (0.422)	17 (0.907)

Note:(\*),(\*\*),(\*\*\*) indicate the respective significance levels of 10%, 5% and 1%.

## 5. Conclusion

It is increasingly recognised that urban development is linked to the level of economic development. In this context, we set ourselves the objective of evaluating the effect of urban development on financial inclusion in the WAEMU zone. Methodologically, we use Swamy's (1970) random coefficient model to capture the heterogeneity of the dynamics between urbanisation and financial inclusion. The estimation results reveal this heterogeneity. Urbanisation is a determinant of financial inclusion only in Burkina Faso, Côte d'Ivoire, Senegal and Togo. On the other hand, urbanisation has a negative influence on financial inclusion in Mali. The coefficient of urbanisation appears insignificant in Benin. The study recommends that the EU authorities take account of the specific characteristics of each country when implementing urbanisation policies, even

though most of these countries share a colonial past. Also, in order to benefit from the effects of urbanisation on financial inclusion, urbanisation must be able to create decent employment.

### **Disclosure statement**

The authors report there are no competing interests to declare.

### **Funding**

No funding was received.

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