



## RESEARCH ARTICLE

## Level of education and financial inclusion in the West African Economic and Monetary Union (WAEMU)

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ARTICLE INFO	ABSTRACT
Received: Apr 21, 2024 Accepted: Jul 13, 2024	The aim of this study is to analyze the effect of education level on financial inclusion in the WAEMU zone. To achieve this goal, we used macroeconomic data from WAEMU countries, except from Guinea Bissau for lack of data over the period 2000-2022. Methodologically, we used the AMG (Augmented Mean Group) method of Eberhardt and Teal (2010). The results show that the level of education is a determining factor in explaining financial inclusion. Indeed, primary education has a negative and significant effect on financial inclusion, while secondary education and tertiary education have a positive and significant impact on financial inclusion. In terms of policy implications, the study suggests that policy-makers integrate financial education into curricula according to level of education, accompanied by ongoing teacher training and close collaboration with the financial sector to develop effective programs.
<b>Keywords</b> Level of education Financial Inclusion WAEMU	
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### INTRODUCTION

It is acknowledged worldwide that improving financial inclusion leads to inclusive development (Mader, 2018; Hendriks, 2019; Siddik, 2017). Economists such as Honohan and Beck (2007), Bruhn and Love (2014) have highlighted the importance of financial inclusion policies in meeting the needs of excluded populations, particularly the poorest.

Despite progress in recent decades, around 2 billion adults worldwide have no bank account; most of them living in developing economies (Demirguc-Kunt et al., 2015). Young adults represent a particularly vulnerable group when it comes to financial inclusion, with lower rates of savings and access to financial services than in high-income economies (Demirguc-Kunt et al., 2015). In sub-Saharan Africa, challenges such as illiteracy, lack of financial means and lack of documentation hamper access to formal financial services (Ahmad et al., 2023; Wentzel et al., 2016). To remedy this situation, financial institutions, microfinance organizations and mobile operators are increasingly turning to digital financial services, particularly in rural areas, where these services are often preferred due to their accessibility and lower cost (N'dri and Kakinaka, 2020). With the advent of modern financial services and technologies such as the Internet, education has become a crucial issue.

Education is the foundation of learning and plays a vital role in building the foundations of financial understanding. The basic skills acquired at this stage, such as reading, mathematics and critical

thinking, are essential for understanding basic financial concepts. It also provides a solid foundation for the development of social and emotional skills, which are essential for making informed financial decisions. Countries that invest in education tend to benefit from a more educated population, capable of understanding basic financial concepts and accessing financial services more easily.

As Ahmad et al (2023) point out, in sub-Saharan Africa, challenges such as illiteracy hinder access to formal financial services. We believe that a high level of education can boost financial inclusion in the WAEMU. Based on data from BCEAO (2023) and the World Bank (2023), the gross elementary school enrolment rate falls between 2017 and 2019 from 94.5% to 91.3%, while the rate of access to financial services increases between 2017 and 2019 from 7% to 7.2%. In higher education, the enrolment rate rose from 6.5% in 2010 to 6.8% in 2011, while the rate of access to financial services fell from 6.4% in 2010 to 6.1% in 2011. The question that arises from these findings is to what extent can the level of education improve financial inclusion in WAEMU? Thus, this study aims to analyze the effect of the level of education on financial inclusion in WAEMU.

Some research has shown that education is closely linked to financial inclusion (Demirgüç-Kunt et al., 2018). Asongu and Nwachukwu (2018), for their part, analyze education quality thresholds on financial inclusion. Another body of literature focuses on the influence of financial education on financial inclusion (Hasan et al., 2021). Yan and Qi (2020) emphasize the ability of family education to stimulate financial inclusion. Kazemikhasragh and Buoni Pineda (2022) highlight the catalytic role of technology in explaining financial inclusion during the COVID19 pandemic. Unlike these works, we contribute to the literature by focusing on the influence of education level rather than education per se, insofar as education level is a prerequisite. Methodologically, we adopt the Augmented Mean Group (AMG) method, which not only captures heterogeneity, but also takes into account inter-individual dependence. This method is adapted to study countries belonging to a monetary zone, and their heterogeneity due to different educational systems. The rest of the article is organized as follows: First, we present a synthesis of previous work through a literature review, followed by the methodology, and finally the interpretation and discussion of the results.

## LITERATURE REVIEW

Over the decades, several theories have emerged, shedding light on the complex relationship between education and financial inclusion. Becker (1964;) sees education as an investment in human capital. Raising educational skills has a direct impact on individual productivity and improved financial status. Bandura and Walters (1977) developed social learning theory, deepening our understanding of the link between education and financial inclusion. This theory highlights the essential role of observation in the financial learning process. Applied to the financial context, education enables individuals to make more informed financial decisions, plan their financial future more effectively and make the most of the financial products available to them. Improved education can thus contribute to better management of personal finances and more responsible use of financial services (Carpena et al., 2011).

Empirically, Oumarou and Mayoukou (2021) use Ordinary Least Squares (OLS) and Generalized Least Squares (GLS) estimation to analyze the determinants of financial inclusion in West African Economic and Monetary Union (WAEMU) countries. Their findings reveal that real GDP, cell phone penetration rate and literacy rate have a positive effect on financial inclusion. Le et al (2019) use panel data from twenty Asian countries over a six-year period (2011-2016) to investigate the main determinants of financial inclusion via the random effects model. The findings of the study indicate that the level of literacy plays a significant role in financial inclusion in Asian countries. Indeed, people with higher levels of literacy seem to benefit from greater financial inclusion. This is because these individuals have a better understanding of the advantages and disadvantages of financial services and providers. Their ability to grasp the nuances of financial services makes them more likely to use them wisely, contributing to better integration into the financial system. The study by Altarawneh, et al. (2020) looks at the factors that influence the level of financial inclusion, focusing specifically on Brazil and Romania. The results from the study's logit model indicate that income

and education are positively related to greater financial inclusion, particularly formal account ownership. This means that individuals with higher levels of income and education are more likely to hold a formal financial account. Asongu and Nwachukwu (2018) set their sights on the quality of education, in particular the educational quality thresholds at which the dissemination of information via cell phones enhances inclusive human development. The empirical results are based on fixed-effects regressions with data from 49 sub-Saharan African countries for the period 2000-2012. When education levels are higher, there is a greater likelihood of having access to financial services. This suggests that education plays a key role in the spread of financial inclusion. For their part, Kpodar, and Andrianaivo (2011) study the impact of information and communication technologies (ICT), in particular the deployment of mobile telephony, on economic growth in a sample of African countries from 1988 to 2007. They address endogeneity issues using the Generalized Method of Moments (GMM) estimator. The results reveal that ICT can enhance access to financial services, particularly for populations with higher levels of education. More specifically, populations with a higher level of education benefit more from this ICT-facilitated financial inclusion. Hasan et al (2021) argue that the influence of technology on financial inclusion depends on financial literacy. Their investigation was made possible by using data from the rural population of Bangladesh. Empirical results from logistic regression and probit regression revealed that knowledge of different factors related to financial services had a significant impact on people's ability to participate in and use financial services. Empirical results showed that knowledge of various factors related to financial services had a significant impact on access to financial services. Using a sample of 22,242 people from 27 emerging countries, Yan and Qi (2020) examined the impact of family education on individuals' financial decisions and financial inclusion. The results show that improving the quality of family education is positively related to the likelihood of opening a bank account. More importantly, these relationships are particularly pronounced among the groups of individuals most often excluded: those living in poverty, in rural communities and unemployed. Kazemikhasragh and Buoni Pineda (2022) analyze financial inclusion using the econometric technique of ordinary least squares. In addition, the impact of interactions between education level, technology use, university degree during Covid-19 restrictions is assessed. The study confirms that Latin American and Caribbean countries can increase financial inclusion by modifying their gender-based social aspects to facilitate the use of technology and access to credit.

This literature review shows a lack of convergence of results. Various aspects of education are discussed. In our case, we focus on the level of education.

## METHODOLOGY

To investigate the effect of education level on financial inclusion in WAEMU, panel data econometrics is used. We adopt the non-stationary panel data procedure. The first estimators for heterogeneous non-stationary panel data were proposed by Pesaran and Smith (1995). This is the Mean Group (MG) estimator. However, this estimator is not concerned with cross-sectional dependence and assumes that these unobservable variables are not taken into account, or models them by a linear trend. Pesaran's (2006) Common Correlated Effects Mean Group (CCEMG) estimator allows for cross-sectional dependence, with unobservable variables over time having a heterogeneous impact on panel members. The Augmented Mean Group (AMG) estimator was developed by Eberhardt and Teal (2010) as an alternative to Pesaran's (2006) CCEMG. In the CCEMG, the unobservable common factor is treated as a nuisance, an element to be taken into account that is of no particular interest for the empirical analysis. Unlike CCEMG, the AMG estimator is a pooled regression model augmented with year indicator variables and estimated by OLS in first difference. As with MG, each regression model includes a constant that captures time-invariant effects. In Monte Carlo simulations (Bond and Eberhardt 2009), AMG achieved similar results to CCEMG in terms of bias or RMSE in panels with non-stationary variables (cointegrated or not) and multifactorial error terms (cross-sectional dependence). For these reasons, we apply the AMG estimator to the study of the relationship between level of education and financial inclusion. We follow Asongu and Nwachukwu (2018), Yan and Qi (2020), Kazemikhasragh and Buoni Pineda (2022) and retain the following econometric specification:

**Model 1:**

$$FI_{it} = \alpha_i + \alpha_1 PEDUC_{it} + \alpha_2 GDPPCTA_{it} + \alpha_3 INFL_{it} + \alpha_4 DEP\_INTRATE_{it} + \alpha_5 UNEMP_{it} + \alpha_6 POSTAB_{it} + \alpha_7 INVEST_{it} + \alpha_8 GINI_{it} + \varepsilon_{i,t} \tag{1}$$

**Model 2 :**

$$FI_{it} = \alpha_i + \alpha_1 SEDUC_{it} + \alpha_2 GDPPCTA_{it} + \alpha_3 INFL_{it} + \alpha_4 DEP\_INTRATE_{it} + \alpha_5 UNEMP_{it} + \alpha_6 POSTAB_{it} + \alpha_7 INVEST_{it} + \alpha_8 GINI_{it} + \varepsilon_{i,t} \tag{2}$$

**Model 3 :**

$$FI_{it} = \alpha_i + \alpha_1 TEDUC_{it} + \alpha_2 GDPPCTA_{it} + \alpha_3 INFL_{it} + \alpha_4 DEP\_INTRATE_{it} + \alpha_5 UNEMP_{it} + \alpha_6 POSTAB_{it} + \alpha_7 INVEST_{it} + \alpha_8 GINI_{it} + \varepsilon_{i,t} \tag{3}$$

Where FI, refers to financial inclusion, PEDUC denotes the gross elementary school enrollment rate, SEDUC is the gross secondary school enrollment rate, TEDUC represents the gross enrollment rate in tertiary education, GDPPCTA the gross domestic product per capita, INFL which represents inflation, DEP\_INTRATE the deposit interest rate, UNEMP the unemployment rate, POSTAB political stability, INVEST denotes the foreign direct investment rate, GINI represents the inequality index of a income distribution. The variable  $\varepsilon_{it}$  is the error term for country i at time t.

The table below summarizes the variables and data sources.

**Table 1: Summary of variables and data sources**

VARIABLES	ABREVIATIONS	SOURCES
Financial accessibility index	FI	FMI
Elementary school gross enrollment rate	PEDUC	WDI
Gross secondary school enrollment rate	SEDUC	WDI
Gross enrolment rate in tertiary education	TEDUC	WDI
Gross domestic product per capita	GDPPCTA	WDI
Inflation	INFL	WDI
Investment rate	INVEST	WDI
Interest rate on deposits	DEP_INTRATE	WDI
Unemployment rate	UNEMP	WDI
Political stability	POSTAB	WDI
GINI index	GINI	SWIID

Source: Author, based on literature

Average financial inclusion (FI) in the WAEMU zone over the period 2000-2022 is 0.05%, with a maximum value of 0.094% and a minimum value of 0.006%. Financial inclusion in the WAEMU zone therefore registers a fairly low ratio. This indicates significant variability in the degree of financial inclusion within WAEMU. The elementary school gross enrolment ratio (PEDUC) has an average of 84.75% with a standard deviation of 23.11%, and varies from 31.85% to 128.25%. The gross secondary school enrolment rate averages 33.97%, with a standard deviation of 15.61%. It varies from 6.11% to 66%. As the standard deviation is below the average for both levels of education, we can see that the proportions are relatively similar for all countries in the zone. The gross enrolment rate in tertiary education (TEDUC) has an average of 6.64% and a standard deviation of 4.066%. It shows a relatively low maximum value (16.808%), which indicates inaccessibility to higher education in the zone.

Analysis of the Gini index (GINI) reveals a situation marked by a relatively high level of income or wealth inequality in the WAEMU zone, with an average of 45.01%. It shows a standard deviation of 5.2%, a minimum of 34.11% and a maximum of 55.8%.

**Table 2: descriptive statistics**

Variables	Mean	Std.Dev.	Min	Max
FI	0.0503189	0.0269291	0.0063718	0.09465
PEDUC	84.75598	23.11061	31.84692	128.2516
SEDUC	33.97351	15.61392	6.11352	66.0008
TEDUC	6.639	4.066494	0.77851	16.80814
GDPPCTA	903.7281	501.1688	192.8777	2613.379
INFL	2.831282	4.603565	-7.594284	48.229
DEP_INTRATE	7.060965	1.002395	5.095	8.5791
UNEMP	5.360447	3.276666	0.47	14.809
POSTAB	-.5986168	0.7593075	-2.520798	0.8215
INVEST	2.229862	2.426487	-2.720693	13.438
GINI	45.01099	5.200227	34.11	55.8

Source: Author, based on data from IMF (2023), WDI (2023)

**Results of unit root and cointegration tests**

In panel data econometrics, the choice of stationarity test is based on the assumption of inter-individual independence. Given that the study period (T) is greater than the number of individuals (N), we use the Breusch-Pagan (1980) test to assess the independence hypothesis. The results of Breusch-Pagan's (1980) Lagrange multiplier (LM) test of inter-individual independence are shown below.

**Table 3: Inter-individual independence test**

	Primary(1)	Secondary(2)	Tertiary(3)
Breusch-Pagan LM test of independence:	7,26 *** (0.000)	18,97*** (0.0015)	20,60*** (0.0083)

**Source:** Author, based on data from IMF (2023), SWIID (2023), WDI (2023)

Note: \*\*\*, \*\* and \* represent the different significance levels, 1%, 5% and 10% respectively.

If the p-value is below the critical threshold of 1%, the null hypothesis of no dependence is rejected. There is therefore dependence between the individuals in the study sample. Consequently, the unit root tests performed are second-generation tests. We perform the tests of Pesaran (2003; 2007). The results of these tests are summarized in the table below.

**Table 4: Results of Pesaran tests 2003 (CADF) and 2007 (CIPS)**

Variables	CADF (2003)		CIPS (2007)		
	In level	In first difference	In level	In first difference	
FI	-2.130 (0.156)	-4.504*** (0.000)	-1.009 (0.156)	-7484*** (0.000)	I(1)
PEDUC	-1.947 (0.305)	-3.544*** (0.000)	0.510 (0.305)	-4.866 *** (0.000)	I(1)
SEDUC	-1.782 (0.476)	-3.866*** (0.000)	-0.061 (0.476)	-5.744*** (0.000)	I(1)
TEDUC	-1.495 (0.765)	-3.846*** (0.000)	-0.722 (0.765)	-5.689*** (0.000)	I(1)
GDPPCTA	-2.149 (0.144)	-3.956 (0.000)	-1.649** (0.050)	-	I(0)
INFL	-5.115*** (0.000)	-	-9.152*** (0.000)	-	I(0)

DEP_INTRATE	-1.925 (0.326)	-3.409*** (0.000)	-2.220** (0.013)	-	I(0)
UNEMP	-1.158 (0.950)	-3.921*** (0.000)	1.642 (0.950)	-5.894*** (0.000)	I(1)
POSTAB	-2.161 (0.137)	-5.287*** (0.000)	-1.094 (0.137)	-9.621*** (0.000)	I(1)
INVEST	-1.824 (0.431)	-4.702*** (0.000)	-0.174 (0.431)	-8.025*** (0.000)	I(1)
GINI	-3.542*** (0.000)	-	-4.862*** (0.000)	-	I(0)

Source: Author, based on data from IMF (2023), SWIID (2023), WDI (2023)

Note: \*\*\*, \*\* and \* represent the different significance levels, 1%, 5% and 10% respectively.

The results obtained at level indicate that the variables FI, PEDUC, SEDUC, TEDUC, DEP\_INTRATE, UNEMP, POSTAB, INVEST are not stationary at the different significance levels. Furthermore, the results obtained in first difference show that these variables become stationary at the 1% threshold. The variables in the model are therefore all stationary at level and in first difference. This means that there may be a presumption of a long-term relationship between the variables under study. To elucidate these relationships, we perform the Pedroni cointegration test.

**Table 5: Pedroni's cointegration test (1999)**

	Primary(1)	Secondary(2)	Tertiary(3)
Phillips-Perron t	-2.5004 (0.0062)	-2.4707 (0.0067)	-2.4315 (0.0075)
Augmented Dickey-Fuller t	-2.0659 (0.0194)	-2.0233 (0.0215)	-1.9581 (0.0251)

Source: Author, based on data from IMF (2023), SWIID (2023), WDI (2023)

Note: \*\*\*, \*\* and \* represent different significance levels, respectively 1%, 5% and 10%.

## ESTIMATION RESULTS AND DISCUSSION

The results of the estimation by the Augmented Mean Group model are summarized in Table 6. % Gross secondary and tertiary enrolment rates positively influence financial inclusion at the respective 1% thresholds. People with secondary education tend to have better skills and qualifications, making them more attractive to employers and enabling them to access better-paid jobs. Furthermore, an increase in tertiary education enrolment rates has a significant impact on the development of entrepreneurship by providing individuals with technical skills and business knowledge. This knowledge ensures better-paid jobs. With higher incomes, individuals have a greater capacity to save and invest in financial products and services. On the other hand, the gross elementary school enrolment rate has a negative influence on financial inclusion at the 10% threshold. This result reflects the fact that knowledge and use of services depends on the individual's level of education. Admittedly, the quality of education (Asongu and Nwachukwu, 2018), financial education on financial inclusion (Hasan et al., 2021), family education (Yan and Qi, 2020) are likely to boost financial inclusion, but the level of education attained is decisive.

The level of development, through GDP per capita, is an undeniable tool for explaining financial inclusion. Indeed, the coefficient of GDP per capita is positive and significant at the 1% level in all three levels of education. Townsend et al (2007) state that in economies with higher GDP per capita, financial institutions are better equipped to offer a wider range of financial services. Thus, higher GDP per capita contributes to greater financial inclusion.

The inflation rate weighs on the ability of WAEMU economies to achieve their financial inclusion objective. This result confirms the predictions of Boyd et al (2001). Indeed, higher inflation hampers the development of the financial system. An undeveloped financial system is unable to provide adequate and accessible financial services, and thus hinders financial inclusion. The deposit interest rate is significant and positively influences financial inclusion at thresholds of

1% in model 1, 5% in model 2 and 10% in model 3. These results are in line with Thaler and Sunstein (2008), who found that individuals often tend to have a preference for immediate gratification, which can lead them to spend rather than save. The unemployment rate has a negative and significant influence on the degree of financial inclusion at the 1% threshold in model 1 and the 5% threshold in model 2. When unemployment rises, individuals who lose their jobs may face financial difficulties and be excluded from the formal financial system. This in turn reduces access to financial services and hence financial inclusion. Williams et al (2023) reach similar conclusions.

**Table 6: Estimation results**

Variables	(1)	(2)	(3)
PEDUC	-0.0280* (0.0153)	-	-
SEDUC	-	0.8654*** (0.2257)	-
TEDUC	-	-	0.0095*** (0.003)
GDPPCTA	0.0381*** (0.0042)	0.0352*** (0.0072)	0.0380*** (0.0063)
INFL	-0.0001*** (0.0001)	-0.0023* (0.0014)	-0.0001** (0.0001)
DEP_INTRATE	0.0031*** (0.001)	0.0223** (0.0098)	0.0024* (0.0013)
UNEMP	-0.0017*** (0.0006)	-0.0015*** (0.0007)	-0.0009*** (0.0068)
POSTAB	0.0014 (0.0015)	0.0012 (0.0019)	-0.0011 (0.0016)
INVEST	-0.0086** (0.0004)	-0.0011 (0.0008)	-0.0008** (0.0004)
GINI	-0.0515 (0.0886)	-0.0153 (0.074)	-0.0796 (0.0944)
INTERCEPT	0.0665 (0.3756)	-0.1508 (0.2261)	0.7406*** (0.3547)

Source: Author, based on data from IMF (2023), SWIID (2023), WDI (2023)

Note: Values in brackets are standard deviations\*\*\*, \*\* and \* represent different significance levels, respectively 1%, 5% and 10%.

Investment has a negative and significant impact on financial inclusion at the 5% threshold. The GINI index and political stability are non-significant.

## CONCLUSION

The aim of this study was to analyze the effect of level of education on financial inclusion in the WAEMU zone. In order to achieve this objective, this study uses the AMG method of Eberhardt and Teal (2010) on a sample of 7 WAEMU countries over the period 2000-2022. At the end of the estimation, the results showed that the level of education improves financial skills, favors access to economic opportunities and reinforces confidence and financial autonomy. In addition, gross secondary and tertiary enrolment rates were found to have a positive impact on financial inclusion, while primary enrolment rates had a negative impact.

In light of the results of our study, a few economic policy implications emerge. First, authorities should develop policies aimed at integrating financial education courses into school curricula from an early age, to equip students with the knowledge and skills needed to make informed financial decisions. Secondly, specific training programs should be set up to help teachers deliver financial education courses effectively. This ongoing training is essential to ensure that teachers are well prepared to pass on this crucial knowledge. Economic policies should also encourage collaboration between schools and the financial sector to develop effective financial education

programs. Partnerships with financial institutions can provide additional resources and reinforce the impact of these initiatives.

## AUTHORS' CONTRIBUTIONS

Author (MVK) conceived the project, carried out the statistical analysis and contributed to the drafting of the manuscript. Co-author (KAAK) participated in data collection and drafted the manuscript. All authors read and approved the final manuscript.

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