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Macroeconomic and Sociodemographic Drivers of Secondary School Enrollment in Mauritania: Evidence from an ARDL Approach (1986–2020)

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Abstract

This paper examines the factors related to secondary school enrollment in Mauritania over the period 1986–2020. Annual data from the World Development Indicators are analyzed using an autoregressive distributed lag (ARDL) approach and its associated error-correction model. The analysis considers the gross secondary school enrollment rate in relation to GDP per capita, urbanization, population growth, debt service, government expenditure, and foreign direct investment. The estimates point to a stable long-run relationship among the variables. The results show that urbanization and FDI are positively associated with secondary school enrollment, whereas population growth and debt service are associated with lower enrollment. GDP per capita also enters the long-run relationship with a negative coefficient, while government expenditure does not appear to have a statistically significant effect. The error-correction results indicate that deviations from the long-run relationship are corrected relatively quickly, although the adjustment process is oscillatory. The findings suggest that changes in demographic pressures, external debt obligations, and investment flows should be taken into account when designing policies aimed at expanding secondary education in Mauritania.

Keywords: secondary school enrollment; human capital; ARDL; Mauritania; urbanization; debt service; foreign direct investment.

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1. Introduction

Human capital accumulation plays a significant role in economic development, with education serving as one of its key foundations (Schultz, 1961; Becker, 1962). For developing countries, educational progress is often hampered by macroeconomic conditions and structural constraints that can limit the effectiveness of public policies. Mauritania provides a relevant example of this situation. The country remains heavily dependent on extractive activities—particularly iron ore, gold, and fisheries—making its economy vulnerable to fluctuations in commodity prices and other external shocks.

Furthermore, the Mauritanian education system continues to face several constraints, notably inadequate school infrastructure, rapid population growth, and the strain placed on state resources by public debt. Challenges also persist regarding access to education and the quality of educational services. While international literature has extensively examined the factors associated with educational outcomes, research specifically focused on Mauritania remains relatively scarce. Studies that jointly analyze these factors over a long period are even more limited. This situation highlights the value of an empirical analysis of the relationships between macroeconomic and socio-demographic conditions and secondary school enrollment in Mauritania.

This study is grounded in human capital theory—developed notably by Schultz (1961) and Becker (1962)—which posits that education is an investment capable of generating future returns. This approach makes it possible to examine the role of economic and socioeconomic conditions in the evolution of secondary schooling in Mauritania. Empirical studies conducted in various contexts also demonstrate that macroeconomic conditions can be linked to educational outcomes (Barro, 1991; Baldacci et al., 2004; Kousar et al., 2023). In sub-Saharan Africa, however, the significance of these relationships may vary depending on the production structure and institutional framework specific to each economy.

Against this backdrop, we investigate the short- and long-term relationships between secondary school enrollment and these various factors in Mauritania from 1986 to 2020, using an ARDL approach. The analysis thus seeks to answer the following question: which macroeconomic and sociodemographic factors are statistically associated with secondary school enrollment in Mauritania, and what explanations can be put forward to understand the observed long-term relationships?

The literature suggests a positive association between GDP per capita, urbanization, general government final consumption expenditure, foreign direct investment (FDI), and school enrollment rates. Conversely, debt service and population growth are expected to be negatively associated with school enrollment. However, since a continuous annual series of public expenditure specifically allocated to education is unavailable for Mauritania for the 1986–2020 period, general government final consumption expenditure is used as a broader budgetary indicator rather than a direct measure of education spending.

The analysis draws on annual data from the World Bank's World Development Indicators (WDI) covering the period 1986–2020. The gross secondary school enrollment rate serves as the dependent variable. To examine the relationships between this variable and the selected factors, we employ the Autoregressive Distributed Lag (ARDL) approach proposed by Pesaran et al. (2001), which allows for the simultaneous study of short- and long-term dynamics when variables exhibit different orders of integration.

This study contributes by examining—over the period from 1986 to 2020—the short- and long-term relationships between secondary school enrollment and various macroeconomic and sociodemographic factors that have rarely been studied together in the Mauritanian context. The findings also provide useful insights for guiding public policies aimed at improving access to secondary education.

The remainder of the article is organized into four sections. Section 2 reviews the empirical literature on factors associated with educational outcomes. Section 3 presents the data used and the methodological approach adopted. Section 4 is devoted to the presentation and discussion of the empirical results. Finally, Section 5 summarizes the main findings and offers some public policy recommendations.

2. Review of Empirical Literature

This review synthesizes the main macroeconomic and socio-demographic determinants of education in developing countries, with a view to motivating the empirical analysis conducted for Mauritania. Drawing on diverse contexts in developing countries, the literature predominantly points to a positive association between economic development and educational performance. In a synthesis of studies on developing countries, Schultz (1988) establishes a direct link between GDP per capita and the capacity to finance education, thereby supporting the hypothesis that higher income positively affects the supply of education. Similarly, Glick and Sahn (2000) show that in West Africa, improved household income significantly promotes investment in education, particularly for girls, by increasing school enrollment opportunities

and reducing household financial constraints. Similar results are reported by Yang and McCall (2014), who highlight a positive effect of GDP per capita on higher education enrollment rates. Likewise, Maharda and Aulia (2020), Msoma et al. (2026), and Acharya et al. (2025) confirm the positive role of per capita income in improving human development and school enrollment rates.

Beyond income, empirical studies on urbanization reveal contrasting results regarding its influence on educational development. In a study of 29 sub-Saharan African countries, Mutangadura and Lamb (2003) identify the proportion of the urban population among the main determinants of primary school enrollment, alongside public spending and national income. Similar results are reported by Ngounou et al. (2024), who show across a panel of 49 African countries (1996–2020) that urbanization significantly improves secondary and tertiary school enrollment rates, with a more pronounced effect in West Africa, North Africa, and lower-middle-income countries. Similarly, Van Maarseveen (2025) shows that exposure to cities during childhood increases primary school completion and literacy rates, including among children from poor urban households. Conversely, Khan et al. (2019) observe a negative effect of urbanization on human development in Pakistan. Finally, Mutisya et al. (2021) show that children from poor urban households remain significantly less likely to be enrolled in school than those from wealthier households, revealing significant inequalities in access to education. Although urbanization can contribute to educational expansion, studies on population growth mostly highlight an adverse effect on educational development, although some findings remain nuanced. In a seminal study on China, Ding (1983) shows that rapid population growth puts significant pressure on the education system due to insufficient school facilities and funding. Similar results are reported by Kousar et al. (2023), who find that in Pakistan, population growth is negatively and significantly associated with education attainment at the primary level, and by Oseni et al. (2020), who highlight a negative effect on primary school enrollment rates in a panel of 24 sub-Saharan African countries. Along the same lines, Msoma et al. (2026) emphasize that demographic pressures pose a challenge to the education system in Tanzania. Conversely, Acharya et al. (2024) find no significant effect of population growth on primary school enrollment in Nepal.

Faced with these structural constraints, empirical studies generally show that public education spending promotes human capital development, although its effectiveness depends on its composition and use. Baldacci et al. (2004) highlight a positive and significant effect of education spending on human capital accumulation, while emphasizing that improved

governance and inflation control can produce similar results, such that increased spending alone remains insufficient. Convergent results are reported by Kousar et al. (2023), Patel and Annapoorna (2019), Maharda and Aulia (2020), and Jackson et al. (2015), who show favorable effects on educational attainment, human resource development, the Human Development Index, and long-term educational outcomes. Yang and McCall (2014) also find a positive effect on higher education enrollment, while expenditure per student was negatively associated with it. In contrast, Okafor et al. (2017) and Keller (2006) report less favorable findings. Finally, Edeme (2019) emphasizes that the efficiency of spending is as important as its level.

Beyond the level and efficiency of public spending, constraints related to the sustainability of public finances constitute another factor likely to influence education financing. The empirical literature highlights a generally unfavorable relationship between debt service and education financing in developing countries. Using a panel of 35 sub-Saharan African countries over the period 1975–1994, Fosu (2007) shows that, while debt service actually paid has little or no effect on education spending, predicted debt service, reflecting the debt burden, has a substantial adverse effect on education spending. Using a sample of low-income countries, Thomas (2006) found that a reduction in debt service contributes to higher social spending, although the magnitude of this effect remains insufficient to achieve the Millennium Development Goals. More recently, Mbewe (2024), using a PMG-ARDL estimation of 15 countries in sub-Saharan Africa and South America, shows that debt service has no significant effect on education spending in the short run, but has a significant negative impact in the long run.

In this context of budgetary constraints, studies on the effects of foreign direct investment (FDI) on educational development have yielded mixed results. Feldmann (2025) shows, using a panel of 118 developing countries, that FDI stocks improve school enrollment rates, with a more pronounced effect in tertiary education than in secondary education, and girls benefiting more from this impact than boys. The author also emphasizes that a developed financial sector reinforces this positive effect, while FDI flows do not affect school enrollment rates. Similarly, Kousar et al. (2023) highlight a positive and significant effect of FDI on education attainment at the primary, secondary, and tertiary levels. Conversely, Khan et al. (2019) find that FDI is negatively associated with human development in Pakistan. Finally, Borensztein et al. (1998) show that the contribution of FDI to economic growth depends on the level of human capital in the host country, with a positive effect emerging only when the host country has reached a sufficient level of human capital. Generally, these results indicate that the relationship between

foreign direct investment (FDI) and education may depend on how foreign investment influences the demand for skills and the economic opportunities offered by the host economy. Overall, the empirical literature generally highlights a positive association between per capita income, urbanization, public education spending, and foreign direct investment, while population growth and debt service are more often associated with adverse outcomes. However, these relationships remain heterogeneous and depend on the structural and institutional characteristics of the economies, the indicators used, and the estimation methods employed. This diversity of results, combined with the limited number of studies devoted to Mauritania, justifies the joint analysis of these factors within an ARDL model that distinguishes their short-run and long-run relationships with secondary school enrollment.

3. Methodology

3.1 Data Description

This study uses time-series data covering the period 1986–2020 to analyze the determinants of educational development in Mauritania. The data are drawn from the World Bank's World Development Indicators (WDI) database, recognized for the reliability and international comparability of its indicators. To facilitate the interpretation of coefficients in terms of elasticities, a logarithmic transformation was applied to the GDP per capita variable. The other variables were retained as levels to preserve the statistical consistency of the analysis. In the absence of a continuous annual time series related to public expenditure specifically dedicated to education over the entire study period (1986–2020), we used general government final consumption expenditure as a percentage of GDP as a broader budgetary indicator for public consumption.

Table 1. Definition and Sources of Variables

Variable	Description	Source
EDUC	School enrollment, secondary (% gross)	World Bank's Database
LGDPPC	GDP per capita (constant 2015 US$).	World Bank's Database
GOVEX	General government final consumption expenditure (% of GDP).	World Bank's Database
DSERV	Public and publicly guaranteed debt service (% of GNI).	World Bank's Database
POP	Population growth (annual %)	World Bank's Database
URBAN	Urban population (% of total population).	World Bank's Database

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FDI	Foreign direct investment, net inflows (% of GDP).	World Bank's Database

3.2 Regression Specification

To analyze the factors associated with educational development in Mauritania, our model draws on key theoretical and empirical studies highlighting the links between income, human capital, and educational outcomes, as well as studies examining the role of public spending, urbanization, population growth, debt service, and foreign direct investment in educational development (Schultz, 1988; Barro, 1991; Glick and Sahn, 2000; Baldacci et al., 2004; Mutangadura and Lamb, 2003; Kousar et al., 2023; Ngounou et al., 2024; Feldmann, 2025).

The estimation of short-run and long-run relationships between the variables relies on the ARDL (Autoregressive Distributed Lag) approach proposed by Pesaran et al. (2001). This approach has the advantage of being applicable when the variables are integrated of order zero [I(0)], order one [I(1)], or a mixture of both. The stationarity of the variables is assessed using both the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit-root tests to determine their orders of integration.

The econometric specification used to examine the factors associated with secondary-school enrollment in Mauritania is specified as follows:

$$\boldsymbol{EDUC_t = C + \beta_1 LGDPPC_t + \beta_2 GOVEX_t + \beta_3 DSERV_t + \beta_4 URBAN_t + \beta_5 POP_t + \beta_6 FDI_t + \varepsilon_t}$$

Based on the existing literature, $\beta_1, \beta_2, \beta_4 \; and \; \beta_6 > 0$ whereas $\beta_3, \beta_5 < 0$.

where EDUC denotes the gross secondary-school enrollment rate; LGDPPC is the logarithm of GDP per capita; GOVEX is general government final consumption expenditure as a percentage of GDP; URBAN is the urban population share; DSERV is public and publicly guaranteed debt service as a percentage of GNI; POP is population growth; FDI is net foreign direct investment inflows as a percentage of GDP; and ε_t is the error term.

The above model describes the long-run relationship between educational development and its main determinants in Mauritania.

The ARDL-ECM model associated with this equation can be written as follows:

$$\boldsymbol{\Delta EDUC_t = \sum_{i=0}^{p} \gamma_t LGDPPC_{t-i} + \sum_{i=0}^{p} \pi_t GOVEX_{t-i} + \sum_{i=0}^{p} \varepsilon_t DSERV_{t-i} + \sum_{i=0}^{p} \rho_t URBAN_{t-i} + \sum_{i=0}^{p} \omega_t POP_{t-i} + \sum_{i=0}^{p} \omega_t FDI_{t-i} + \delta ECM_{t-1} + \varphi_t}$$

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where Δ denotes the first-difference operator, and p denotes the number of optimal lags retained for the dependent variable. The coefficients $\gamma_t, \pi_t, \varepsilon_t, \rho_t \; and \; \omega_t$ measure the short-run effects of the explanatory variables. The coefficient δ captures the speed of adjustment toward the long-run equilibrium and is expected to be negative and statistically significant. ECM_{t-1} denotes the residual term of the long-term relationship lagged by one year. φ_t is the short-term error term.

We will also perform standard diagnostic tests to verify the absence of autocorrelation of the residuals, normality, and heteroscedasticity, thus ensuring the validity of the model specification. Furthermore, the stability of the estimates will be assessed using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests.

4. Results and Discussion

The estimation strategy adopted in this study is based on the ARDL approach. The implementation of this approach requires several preliminary validity conditions to be satisfied. To this end, two preliminary checks are systematically conducted: first, the order of integration of the series is analyzed using the Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) unit-root tests; second, the existence of cointegration between the variables is examined using the bounds test. Meeting these methodological prerequisites supports the robustness of the estimates and the reliability of the econometric results.

4.1 Stationarity

To determine the order of integration of the variables, both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are applied, with specifications including both a constant and a deterministic trend. This step is essential within the ARDL approach based on bounds testing, which can accommodate variables integrated of order zero [I(0)] or order one [I(1)], but requires that none of the variables be integrated of order two [I(2)] (Pesaran et al., 2001). The results of the ADF and PP tests are presented in **Table 2**. They indicate that the variables EDUC, LGDPPC, GOVEX, DSERV, and POP are non-stationary in levels and become stationary after first differencing, indicating that they are integrated of order one [I(1)]. In contrast, the variables URBAN and FDI are stationary in levels and are thus integrated of order zero [I(0)]. The set of variables therefore exhibits an integration order limited to I(0) and I(1), with no I(2) series, thereby satisfying the prerequisite for applying the ARDL bounds-testing approach.

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Table 2. Results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests

	Variables	*statistic (Level)*	*statistic (1st differnece)*	*MacKinnon 5%*	*MacKinnon 10%*	*Order of integration*
Phillips-Perron test	***EDUC***	***-2.285801***	***-4.087671***			***I(1)***
	LGDPPC	***-2.313186***	***-5.288933***			***I(1)***
	GOVEX	***-2.071969***	***-4.836564***			***I(1)***
	DSERV	***-2.523696***	***-8.841934***	***-3.552973***	***-3.209642***	***I(1)***
	URBAN	***-5.341329***				***I(0)***
	POP	***-2.068618***	***-3.479855***			***I(1)***
	FDI	***-4.279273***				***I(0)***
Augmented Dickey-Fuller test	***EDUC***	***-2.426449***	***-4.087671***			***I(1)***
	LGDPPC	***-2.313186***	***-5.288933***			***I(1)***
	GOVEX	***-2.071969***	***-4.836564***			***I(1)***
	DSERV	***-2.523696***	***-8.841934***	***-3.552973***	***-3.209642***	***I(1)***
	URBAN	***-5.913970***				***I(0)***
	POP	***-1.523495***	***-3.355175***			***I(1)***
	FDI	***-6.096711***				***I(0)***
Notes: I(0) indicates stationarity in levels, whereas I(1) indicates stationarity after first differencing.						

4.2 Bounds Test

Table 3. presents the results of the bounds test applied to the ARDL model to test for the existence of a long-run relationship between the variables. The F-statistic (F = 5) substantially exceeds the upper critical bound at the 1% significance level (I(1) = 3.99), leading to the rejection of the null hypothesis of no long-run relationship. These results support the existence of a cointegrating relationship between the dependent variable and the explanatory variables, thereby justifying the estimation and interpretation of the long-run coefficients of the ARDL model. However, given the relatively small sample size, only 35 annual observations, the use of asymptotic critical values necessitates caution when interpreting the results of the bounds test. A long-term relationship is therefore acknowledged, although its statistical robustness must be assessed with due regard for the limitations imposed by the finite sample size.

Table 3. Bounds Test for Cointegration

Test Statistic	**Value**	**Significance level**	**Critical bounds**	
			I(0)	**I(1)**
F-statistic	5.008530	10%	1.99	2.94
k	6	5%	2.27	3.28

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		2.5%	2.55	3.61
		1%	2.88	3.99

4.3 Selection of the Optimal ARDL Model

The selected ARDL specification is (1,3,0,1,3,2,3), where the lag orders correspond to EDUC, LGDPPC, GOVEX, URBAN, DSERV, POP, and FDI, respectively. Candidate models were compared using the Akaike Information Criterion (AIC), and the selected specification has the lowest AIC among the top 20 models (Figure 1). As reported in Appendix 1, which presents the key goodness-of-fit statistics for the optimal ARDL model, the model shows an adjusted R^2 of 0.988 and an R^2 of 0.995, suggesting a very good in-sample fit. However, this level of performance alone is not sufficient to assess the model's quality, particularly given the relatively small sample size and the presence of lagged variables. The model is therefore assessed jointly on the basis of the cointegration test, the statistical significance of the estimated coefficients, diagnostic tests, and parameter-stability analysis.

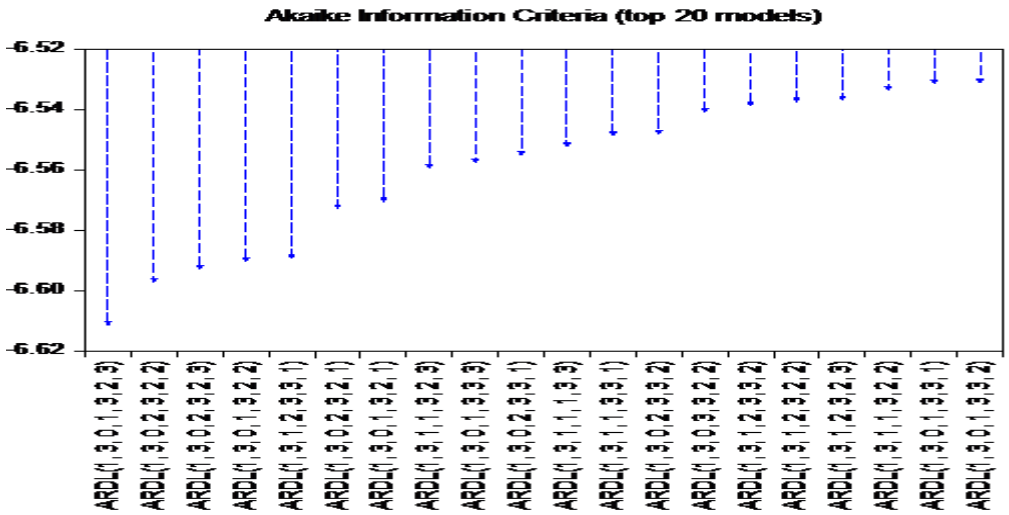

Figure 1. Akaike Information Criterion (AIC) for the Top 20 ARDL Models

4.4 Robustness Tests

The reliability of the ARDL estimates is supported by a series of diagnostic tests, the results of which are presented in Table 4. Regarding serial correlation in the residuals, the Breusch-Godfrey test does not allow rejection of the null hypothesis of no serial correlation ($p = 0.24$). In terms of model specification, the Ramsey RESET test ($p = 0.47$) provides no evidence of functional-form misspecification. The assumptions regarding the distribution of the errors are also satisfied: the Jarque-Bera test does not reject the null hypothesis of normally distributed residuals ($p = 0.74$), while the White ($p = 0.56$) and ARCH ($p = 0.12$) heteroscedasticity tests do not reject the null hypothesis of homoscedasticity.

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Table 4. Diagnostic and Robustness Tests of the Estimated ARDL Model

Statistical test	**Statistic (p-value)**	**Decision rule**	**Null hypothesis**
Ramsey RESET	0.73 (0.47)	Prob > 0,05	Model is correctly specified
Serial correlation LM	1.61 (0.24)	Prob > 0,05	No serial correlation
ARCH	2.56 (0.12)	Prob > 0,05	No ARCH effects (Homoscedasticity)
WHITE	0.93 (0.56)	Prob > 0,05	Homoscedastic errors
Jarque-Bera	0.58 (0.74)	Prob > 0,05	Residuals are normally distributed
Notes: Values in parentheses are the corresponding p-values. The null hypothesis is not rejected when the p-value exceeds 0.05.			

Regarding parameter stability, the CUSUM and CUSUMSQ tests provide no evidence of parameter instability. Both statistics remain within the critical bounds at the 5% significance level (Figures 2 and 3).

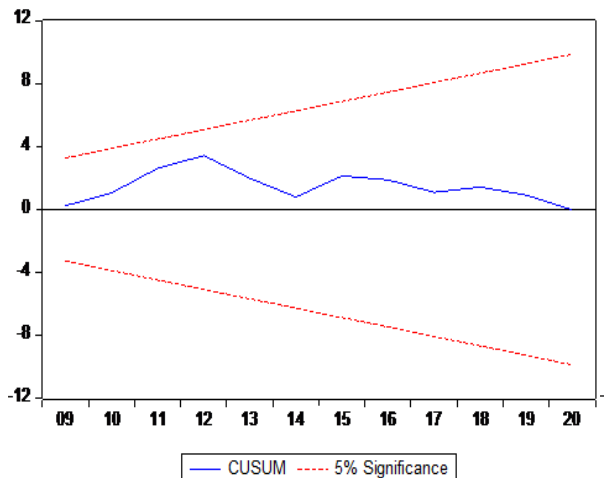

Figure 2. CUSUM test

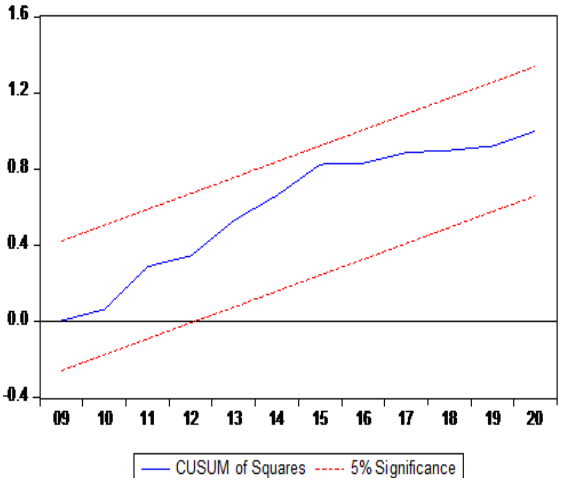

Figure 3. Square CUSUM test

4.5 Long-run Coefficients and Error-Correction Model

Table 5 presents the long-run estimates from the ARDL model. The results indicate that, with the exception of public spending, all explanatory variables are statistically significant. More specifically, GDP per capita, debt service, and population growth exhibit significant negative relationships. In contrast, urbanization and foreign direct investment have significant positive coefficients. Finally, the coefficient of public spending remains statistically insignificant.

The long-run estimates reveal contrasting effects that should be interpreted in the structural and socioeconomic context of Mauritania. The main mechanisms that may help explain the signs and magnitude of the estimated coefficients are discussed below:

- GDP per capita has a modest negative effect (−0.43), a counterintuitive result given the generally expected relationship between income and educational development. This result could, however, be explained, at least in part, by Mauritania's productive structure, characterized by a strong dependence on extractive activities, particularly iron ore, gold, and fisheries resources. In an economy where extractive activities play a significant role, growth in national income does not necessarily translate into a proportional accumulation of human capital. This interpretation is consistent with Gylfason (2001), who finds a negative association between natural-resource abundance, public education expenditure, and gross secondary-school enrollment. It also aligns with the analyses of Birdsall et al. (2001), according to which resource-abundant economies tend to invest less in education because of weaker incentives for human capital accumulation.
- Debt service also exhibits a negative coefficient of −1.43, suggesting that an increase in debt service obligations can reduce the fiscal space available for financing educational development. This relationship is consistent with a fiscal crowding-out mechanism, in which the resources mobilized to meet debt obligations reduce the fiscal space available for other public expenditures.
- Population growth has the most pronounced negative effect, with a coefficient of −3.28. This result could be explained by the fact that a rapid increase in population can place substantial pressure on the capacity of the education system, particularly when the expansion of demand for schooling is not accompanied by a proportional increase in educational infrastructure and teacher recruitment. In this context, growth in the school-age population could constrain secondary-school enrollment when the system's capacity remains limited.
- Urbanization has a positive coefficient of 1.79, indicating a favorable association with secondary-school enrollment. This result could be explained by the increasing concentration of the population in urban areas, which facilitates access to educational infrastructure and services, notably due to the greater geographical proximity of schools and public services. Urbanization thus appears to be a factor likely to promote access to secondary education, even if its benefits may remain unevenly distributed across different parts of the country.
- Foreign direct investment (FDI) has a positive effect of 0.20, which is relatively modest but favorable to educational development. This result could be explained by the indirect effects of FDI on the transformation of economic activity, the increased demand for skills,

and greater demand for human capital. In the Mauritanian context, where FDI has increased significantly since 2000 and remains primarily directed towards extractive activities, the estimated positive effect could reflect the growing demand for skills associated with the development of foreign-financed activities, rather than a direct effect of FDI on the education sector.

- Public spending, although showing a positive sign, is not statistically significant. This result therefore does not allow us to conclude that there is a statistically established long-run effect in the sample considered. Importantly, this result should not be interpreted as evidence that education expenditure itself is ineffective, because the public spending indicator used in this study does not isolate education expenditure. The lack of significance could nevertheless be consistent with several mechanisms, including delays in the transmission of educational policies, absorption capacity constraints, or the variable efficiency of public resource allocation. In Mauritania, the challenge lies not only in increasing the volume of public expenditure, but also in ensuring that such expenditure is effectively translated into infrastructure, human resources, and educational services that are accessible to the population.

Table 5. Long-run Coefficients and Error-Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPPC	-0.425104	0.055963	-7.596149	0.0000
GOVEX	0.151359	0.093755	1.614419	0.1324
URBAN	1.789410	0.097694	18.31642	0.0000
DSERV	-1.431047	0.500292	-2.860423	0.0143
POP	-3.279281	0.894952	-3.664197	0.0032
FDI	0.195059	0.076506	2.549602	0.0255
C	2.680044	0.404169	6.631004	0.0000
EC = EDUC - (-0.4251*LGDPPC + 0.1514*GOVEX + 1.7894*URBAN -1.4310*DSERV -3.2793*POP + 0.1951*FDI + 2.6800)				

4.6 Short-run Coefficients

The short-run results (Appendix 2) reveal short-run dynamics that differ, for some variables, from the corresponding long-run relationships. The coefficient on the lagged error-correction term, CointEq(-1), is estimated at −1.08 and is negative and highly significant. The coefficient lies within the range associated with stable oscillatory adjustment (−2, 0), and its absolute value exceeds unity, indicating an oscillatory convergence characterized by an overshooting effect.

Thus, approximately 108% of the previous period's disequilibrium is corrected in the following period, resulting in an overshooting adjustment before converging back toward the long-run equilibrium. This dynamic could reflect the responsiveness of the Mauritanian economy to deviations from long-run equilibrium. Finally, the CUSUM and CUSUMSQ tests provide no evidence of parameter instability over the sample period.

Conclusion

This article aimed to examine the main macroeconomic and sociodemographic factors statistically associated with secondary-school enrollment in Mauritania and to assess their short- and long-run dynamics. To this end, an autoregressive distributed lag (ARDL) model was estimated using annual data covering the period 1986–2020, with the gross secondary-school enrollment rate as the dependent variable.

The empirical results highlight contrasting dynamics. In the long run, urbanization has a strongly positive effect on school enrollment, while population growth and debt service constitute significant constraints. FDI inflows exhibit a moderate positive association with secondary-school enrollment, while GDP per capita has a negative coefficient, a result that may be associated with the specific characteristics of a productive structure heavily reliant on extractive activities. Public spending, for its part, shows a positive sign but is not statistically significant. In the short run, deviations from equilibrium are rapidly corrected, with an error-correction coefficient of −1.08 indicating a rapid but oscillatory adjustment toward the long-run equilibrium. Furthermore, the CUSUM and CUSUMSQ tests provide no evidence of parameter instability over the sample period.

In terms of public policy implications, these results suggest several avenues for action. Faced with demographic pressure, public authorities should consider strengthening school infrastructure and teacher training, particularly in peri-urban areas and other regions. Managing debt service and improving the allocative efficiency of public spending also appear important for preserving fiscal space for education. Finally, better coordination between urbanization, FDI, and skills development could help strengthen the positive effects of these economic transformations on education.

Despite the merits of the approach used, the study has some limitations, notably the relatively small size of the annual sample and the aggregated nature of the data. The analysis also does not directly measure education-specific public expenditure. Future research could utilize data disaggregated by sex, region, and level of education, while paying greater attention to the role of institutions, governance, and the quality of educational services.

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Appendix 1. Estimation Results of the Selected ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EDUC(-1)	-0.087371	0.240851	-0.362760	0.7231
LGDPPC	-0.137378	0.068697	-1.999773	0.0687
LGDPPC(-1)	-0.035178	0.058370	-0.602678	0.5579
LGDPPC(-2)	-0.114878	0.058149	-1.975590	0.0717
LGDPPC(-3)	-0.174811	0.084793	-2.061609	0.0616
GOVEX	0.164584	0.107242	1.534688	0.1508
URBAN	-5.158081	1.736291	-2.970747	0.0117
URBAN(-1)	7.103834	1.992812	3.564729	0.0039
DSERV	-0.523877	0.286732	-1.827062	0.0927
DSERV(-1)	-0.694286	0.252799	-2.746390	0.0177
DSERV(-2)	-0.027322	0.244069	-0.111943	0.9127
DSERV(-3)	-0.310595	0.178299	-1.741988	0.1071
POP	-4.387719	1.480076	-2.964522	0.0118
POP(-1)	4.104821	1.691775	2.426340	0.0319
POP(-2)	-3.282898	1.319831	-2.487363	0.0286
FDI	-0.035150	0.031129	-1.129180	0.2809
FDI(-1)	0.130072	0.035251	3.689864	0.0031
FDI(-2)	0.067436	0.051449	1.310748	0.2145
FDI(-3)	0.049744	0.048643	1.022636	0.3267
C	2.914203	0.792548	3.677005	0.0032
R-squared	0.995669	**Mean dependent var**		0.221768
Adjusted R-squared	0.988811	**S.D. dependent var**		0.073356
S.E. of regression	0.007759	**Akaike info criterion**		-6.610632
Sum squared resid	0.000723	**Schwarz criterion**		-5.694547
Log likelihood	125.7701	**Hannan-Quinn criter.**		-6.306976
F-statistic	145.1881	**Durbin-Watson stat**		2.549550
Prob(F-statistic)	0.000000			

Appendix 2. Selected short-run dynamic coefficients from the ECM equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDPPC)	-0.137378	0.032308	-4.252069	0.0011
D(LGDPPC(-1))	0.289689	0.051062	5.673263	0.0001
D(LGDPPC(-2))	0.174811	0.050088	3.490063	0.0045
D(URBAN)	-5.158081	0.794298	-6.493889	0.0000
D(DSERV)	-0.523877	0.138364	-3.786228	0.0026
D(DSERV(-1))	0.337917	0.149260	2.263941	0.0429
D(DSERV(-2))	0.310595	0.111773	2.778809	0.0167
D(POP)	-4.387719	0.759402	-5.777861	0.0001
D(POP(-1))	3.282898	0.617308	5.318085	0.0002
D(FDI)	-0.035150	0.017640	-1.992629	0.0695
D(FDI(-1))	-0.117180	0.036287	-3.229299	0.0072
D(FDI(-2))	-0.049744	0.028393	-1.751984	0.1053
CointEq(-1)*	**-1.087371**	0.136518	-7.965010	0.0000