(Nov 2026) Trade liberalization in developing countries: What are the effects of trade liberalization in CEMAC countries on overall unemployment, youth unemployment, and unemployment rates by gender? A practical study using the Beta regression method.
***International Journal of Economic Perspectives*,*20*(11) 39 -55**
ISSN: 1307-1637 ABDC
Retrieved from https://ijeponline.com/index.php/journal

Trade liberalization in developing countries: What are the effects of trade liberalization in CEMAC countries on overall unemployment, youth unemployment, and unemployment rates by gender? A practical study using the Beta regression method.

Jacques HAKIZIMANA
jacques.hakizimana@umng.cg
orcid: 0009-0004-2405-9274
Faculty of Economic Sciences (FSE)
Marien Ngouabi University (Congo-Brazzaville)
Laboratory for Economic and Social Research and Studies (LARES)

Abstract

The countries of the Central African Economic and Monetary Community (CEMAC) are facing unemployment due to increased trade liberalization. This situation places the region among those with the highest unemployment rates. With this in mind, the objective of this study is to examine the impact of trade openness on unemployment rates (overall, among youth, among young men, and among young women) within CEMAC. A beta regression is applied to data from 2002 to 2022 for the six CEMAC countries to obtain the results. The results indicate that, in CEMAC countries, trade openness reduces total unemployment, including among young men and young women. These results corroborate those of the Tobit model, used to assess robustness. These results confirm the hypothesis formulated in this study: trade openness reduces unemployment in CEMAC countries. This finding indicates that trade openness reduces unemployment in CEMAC countries, suggesting that economic policy should prioritize measures to strengthen trade openness. This would entail, among other things: (i) fostering a trade-friendly environment, particularly by reducing trade barriers such as tariffs; (ii) significantly improving the business climate; (iii) prioritizing trade agreements; and (iv) promoting and encouraging export-oriented production activities.

***Keywords**: trade liberalization; unemployment; Panel; CEMAC*
***JEL**: F16; E24; N17; C23*

1. Introduction

Unemployment, particularly among youth, is considered a growing global threat (Ayhan, 2016) and poses significant challenges to policymakers in both developed and emerging countries due to its economic, social, and psychological consequences. Unemployment diminishes a nation's productive capacity, decreases household incomes, and depletes human capital, thereby intensifying poverty (Uddin et al., 2023; Siregar et al., 2022; Restrepo et al., 2021). The International Labor Organization (ILO) states that unemployment leads to brain drain, criminal activity, and the proliferation of illicit enterprises. Unemployment breeds social alienation and destitution, sometimes resulting in suicide (Chen et al., 2022; Taris, 2002; Bolton & Oatley, 1987).

Unemployment constitutes a significant impediment to economic advancement, and mitigating it via job creation is essential to economic policy (ILO, 2020). The United Nations, through the Sustainable Development Goals (SDGs), particularly Goal 8, encourages nations to reduce

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

International Journal of Economic Perspectives,*20*(11) 39 -55
ISSN: 1307-1637 ABDC
Retrieved from https://ijeponline.com/index.php/journal

unemployment by implementing policies that promote entrepreneurship and job creation, in order to achieve full and productive employment and decent work for all by 2030.

To address unemployment, several elements have been recognized, including psychological and social aspects (Gunarathne & Jayasinghe, 2021), contextual factors (Couch et al., 2020), and economic and political issues (Samuel et al., 2021). In this final category, recent years have exhibited a significant interest in trade liberalization (Nwosa et al., 2020; Nwaka et al., 2015; Gozgor, 2014).

The literature examines the effects of trade liberalization on unemployment through the lens of international trade theory. These foundations highlight two main opposing schools of thought. The first group includes authors who argue that trade liberalization reduces unemployment (Gonese et al., 2023; Marzan et al., 2020). These authors support this view by drawing on, among other things, absolute advantage (Smith, 1776), comparative advantage (Ricardo, 1817), the mobility of multinational corporations (Ajayi, 2006), and the Heckscher-Ohlin model (Heckscher & Ohlin, 1991).

Conversely, proponents of the second group, drawing on the theory of protectionism for infant industries, known as “educational protectionism” (List, 1941), and on the theory of firm relocation (Blinder, 2006), argue that trade liberalization hinders job creation, thereby exacerbating unemployment. Just as in theory, empirical studies yield ambiguous results. Some indicate that trade liberalization generally reduces unemployment (Marzan et al., 2020; Asaleye et al., 2017). Conversely, studies by Famode et al. (2020) and Alkhateeb et al. (2017) indicate that trade liberalization increases unemployment.

The discrepancies between theoretical and empirical arguments regarding the impact of trade liberalization on unemployment underscore the need for ongoing debate, as the issue remains unresolved. It is therefore crucial to examine the impact of trade liberalization on unemployment in developing countries, particularly within the CEMAC region.

Despite numerous agreements concluded by CEMAC countries to strengthen trade integration, trade integration remains weak. Research on the Index of Regional Integration in Africa (IIRA) indicates that most CEMAC countries rank among the lowest in Africa. For example, among the 54 African countries, Cameroon ranks 46th, the Central African Republic 45th, and the Democratic Republic of the Congo 28th. Their trade integration scores are 0.255, 0.282, and 0.386, respectively. These data highlight the low level of trade integration among CEMAC countries compared to other African states, as illustrated by Eswatini, which ranks first with a trade integration score of 0.730; South Africa, ranked fourth with a score of 0.625; and Senegal, ranked ninth with a score of 0.472.

In addition to this low level of trade integration, CEMAC countries face high unemployment rates. Statistics from the International Labor Organization indicate that, in 2022, the average unemployment rate in the CEMAC region was 10.89% for total unemployment and 19% for youth unemployment among those aged 15 to 24. The rates for young men and young women are approximately 20% and 18%, respectively. In the same year, the global total unemployment rate stood at 5.9%, 8% in Africa, and 7.2% in sub-Saharan Africa. These figures illustrate how the CEMAC region remains one of the hardest hit by unemployment, compared to global, African, and sub-Saharan unemployment rates.

CEMAC countries have fragile institutions and lack economic diversification. They rank at the bottom of the World Bank’s “Ease of Doing Business” index, with Cameroon at the top (167th) and Chad at the bottom (189th). All countries in the region score below average, with Cameroon recording the highest score at 46.5 on a scale of 0 to 100. Furthermore, the economies of CEMAC

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

countries continue to rely on specialization in the primary sector, with exports consisting mainly of raw materials, of which oil and gas accounted for over 77% of total CEMAC exports (BEAC, 2021).

In addition to the aforementioned limitations, the choice of CEMAC countries as the focus of this study is justified by the scarcity of research on this topic in the region. While several studies have examined the correlation between trade openness and unemployment, few have specifically studied this relationship in CEMAC countries. Current research focuses on the relationship between trade openness and economic growth (Ekodo & Ngomsi, 2017; Koutima-Banzouzi, 2023). This analysis expands current knowledge on the correlation between trade openness and unemployment by exploring a new area of study: the CEMAC countries. Furthermore, unlike the commonly used measure of trade openness, defined as the share of exports and imports relative to gross domestic product, we employ an alternative measure: *the "trade freedom index*," which has received little attention.

Consequently, the research question of this study is as follows: What are the effects of trade openness on unemployment in CEMAC countries? The objective is to examine the effects of trade openness on unemployment in CEMAC countries. The hypothesis posited is that trade openness reduces unemployment in CEMAC member countries. It is based on the premise that trade liberalization can stimulate economic growth by improving access to goods and services, optimizing resource allocation, and increasing total factor productivity through the diffusion of technology and knowledge (Barro & Sala-i-Martin, 1997), all of which are essential for job creation.

The following sections of this article are structured as follows. The second section is devoted to the literature review; the third discusses the methodology; the fourth presents the results and their analysis. The fifth and final section presents the conclusion and its implications for economic policy.

2. Literature Review

Analysis of the effects of trade liberalization on unemployment highlights two broad categories of research with divergent theoretical and empirical conclusions. Some studies indicate that trade liberalization reduces unemployment, while others demonstrate the opposite. This literature review first includes studies showing that trade liberalization reduces unemployment. It then presents studies showing that trade liberalization increases unemployment.

2.1. Trade Liberalization: A Factor in Reducing Unemployment

Authors who argue that trade openness reduces unemployment draw on free trade theory, which emphasizes the economic benefits of international trade. More specifically, this encompasses classical free trade theories (the theory of absolute advantages and the theory of comparative advantages) as well as contemporary free trade theory (Smith, 1776; Ricardo, 1817), the Heckscher-Ohlin-Samuelson (HOS) model (Heckscher & Ohlin, 1991), and the theory of multinational enterprises (Ajayi, 2006).

The theory of absolute advantage (Smith, 1776), based on the concept of the division of labor, asserts that every economy should focus on sectors where it holds an absolute advantage. A nation must concentrate on producing goods whose production costs are lower than those of other economies or nations. Consequently, the economy in question must produce these goods in substantial volumes to meet domestic demand and export them to economies with high production costs. To meet both domestic and international demand, it is essential to increase the workforce in the relevant industries, thereby reducing unemployment.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

In 1817, Ricardo introduced the theory of comparative advantage, or the "principle of comparative costs," which is based on three fundamental assumptions: labor as the sole factor of production, unrestricted labor mobility within a nation, and the immobility of labor across international borders. This theory asserts that a country can benefit from international trade by specializing in the production of goods for which it possesses a comparative advantage, even in the absence of an absolute advantage. This can therefore lead to increased employment in the manufacture of large volumes of that product for export.

Unlike the first two models, which treat labor as the sole factor of production, the HOS model incorporates capital as an additional factor of production. Datt et al. (2009) estimate that, in economies producing capital-intensive goods, trade liberalization leads to higher unemployment and lower wages. In labor-intensive economies, trade liberalization reduces unemployment. In conclusion, the theories of absolute advantage, comparative advantage, and the HOS theory argue that trade liberalization mitigates rising unemployment by promoting a better allocation of resources and enhancing productivity and competitiveness.

In practice, numerous studies (Gonese et al., 2023; Nwosa et al., 2020; Marzan et al., 2020) demonstrate that trade openness reduces unemployment, despite variations in methodologies, measures of trade openness, and the stages of development of the economies analyzed.

Gonese et al. (2023) examine the impact of economic openness and exports on unemployment in the Southern African Development Community (SADC) countries. The results of the PMG (Pooled Mean Group) model, using data from 1980 to 2019, indicate that trade openness and exports hurt the unemployment rate. Nwosa et al. (2020) apply the ARDL (Autoregressive Distributed Lag) methodology to secondary data from 1980 to 2018 to examine the impact of trade openness on unemployment in Nigeria. As in the previous scenario, the results indicate that trade liberalization has a negative effect on unemployment in Nigeria.

Marzan et al. (2020) examine the effects of trade openness on unemployment across 34 Organization for Economic Co-operation and Development (OECD) countries from 2004 to 2018. The results of their analysis, based on Generalized Method of Moments (GMM) estimates, indicate that increased trade openness is associated with greater job creation, thereby reducing the unemployment rate and promoting economic development. Similarly, Gachoki (2022) uses exports as an indicator of trade openness, employing the ARDL estimation technique, and analyzes data from 1980 to 2019 to study the impact of trade openness on women's sectoral employment in Kenya. The results demonstrate a positive correlation between trade openness and women's employment in the agricultural sector, which reduces female unemployment in this sector.

2.2. Trade openness, a factor contributing to rising unemployment

From a theoretical perspective, authors who argue that trade liberalization can exacerbate unemployment rely on protectionist arguments to support their thesis. These include the theory of protection for infant industries, or "educational protectionism " (List, 1941), and the theory of business relocation (Blinder, 2006). The main argument is that trade liberalization intensifies competition among firms, which can lead to the relocation or closure of uncompetitive firms, resulting in job losses and rising unemployment.

Nguyen (2022) empirically examines the interaction between economic growth, foreign direct investment, trade openness, and unemployment in South Asia. The study focuses on four countries

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

in the sample, using total exports and imports as a percentage of GDP to measure trade openness, employing the vector autoregressive (VAR) model, and covering the period from 1998 to 2017. The results indicate that trade liberalization in South Asia is associated with higher unemployment rates.

Alauddin et al. (2021) examine the influence of trade openness on the unemployment rate in 12 least developed countries (LDCs) from 1995 to 2016. The analysis uses the sum of exports and imports as a percentage of gross domestic product (GDP) to measure trade openness, employing the least squares dummy variable (LSDV) method to mitigate bias associated with small cross-sectional units. The results suggest that increased trade openness is associated with higher unemployment rates. This finding is consistent with that obtained by Kpognon et al. (2020) in their study titled: "Trade Openness and Youth Employment in Sub-Saharan Africa: Should the Labor Market Be Regulated?" This study examined a sample of 41 sub-Saharan African countries over the period 2002 to 2017, using ordinary least squares (OLS) regression and the two-stage least squares method with instrumental variables (IV-2SLS). In this study, trade openness was measured by the ratio of total exports and imports to GDP.

In parallel with the aforementioned research based on panel data, Famode et al. (2020) conducted an econometric analysis to examine the correlation between trade openness and unemployment in the Democratic Republic of the Congo. They used the vector error correction method to estimate, drawing on data covering the period from 1991 to 2017, with total exports and imports as a percentage of GDP serving as indicators of trade openness. The results indicate that trade openness has a positive and significant impact on unemployment. An approximately 1% increase in trade openness leads to a 0.46 percentage point rise in the unemployment rate. Meanwhile, Hossain et al. (2018) conducted a similar study in Bangladesh. The Vector Error Correction Model (VECM) was used with data from 1991 to 2017. The results indicate that trade openness positively influences the unemployment rate.

2.3. Lessons Learned from the Literature Review

The reviewed literature, both theoretical and empirical, indicates that the effects of trade liberalization on unemployment are inconsistent. Factors that may explain these discrepancies in the results include, among others, the diversity of methodologies used, the stage of development of the economies in question, and the indicators of trade liberalization. Various methods have been used, including VECM, IV-2SLS, OLS, and GMM. All of these methods appear unsuitable for a percentage-dependent variable, whose values range from 0 to 1. This study differs from previous research by using beta regression, a method suited to endogenous variables that take values between 0 and 1, or that are represented as rates, percentages, or fractions (Ferrari & Cribari-Neto, 2004).

The empirical studies reviewed use exports and the total of exports and imports, expressed as a percentage of gross domestic product, as indicators of trade openness. Nevertheless, other indicators of trade openness, such as the trade freedom index, which includes the weighted average tariff rate and the share of non-tariff barriers, are highlighted in the economic literature. The Trade Freedom Index, as an indicator of trade openness, appears to have been neglected or, at the very least, underutilized in previous research.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

This article's contribution is essentially threefold. The first contribution lies in the application of a methodology that has been neglected in previous research, even though it is the most appropriate for models in which the values of endogenous variables, ranging from 0 to 1, represent rates, fractions, or percentages (Ferrari & Cribari-Neto, 2004). The second contribution stems from the use of the trade freedom index, which facilitates the assessment of "restrictions on quantity, price, regulation, customs, and investment," as well as direct government intervention, unlike the conventional measure of trade openness, which is calculated as the sum of exports and imports as a percentage of GDP. The third aspect concerns the enrichment of the existing literature on the correlation between trade openness and unemployment by introducing a novel context characterized by minimal trade integration despite considerable efforts, and associated with the scarcity of research on this topic in this region.

3. Methodology

This section analyzes the following subsections: data sources, variable selection and description; model specification and estimation methodology.

3.1. Data Sources, Selection, and Description of Variables

This study uses data from TheGlobalEconomy.com, the Center for Prospective Studies and International Information (CPII), and the World Bank (World Development Indicators). The analysis covers the period 2002–2021 and draws on the economic literature to select variables. The study period was determined by data availability. The selected variables include unemployment rates (overall, among youth aged 14–25, among young men, and among young women) as the dependent variable, and trade openness as the independent variable. Economic growth rate, capital investment, the consumer price index, urban population growth rate, stability, and the absence of violence serve as control variables.

Unemployment: The dependent variable in this study is defined in accordance with the International Labor Organization's definition. It refers to the proportion of the labor force that is unemployed but available and actively seeking employment during a given reference period. Unemployment constitutes a major obstacle for economic policy and remains at the center of scientific debate. We analyze overall unemployment, unemployment among youth aged 15 to 24, and the unemployment rates for young men and young women aged 15 to 24.

Trade openness: a key indicator that assesses an economy's capacity to engage in international trade, taking into account domestic production. It is quantified by the share of imports and exports in gross domestic product, expressed as a percentage. The Trade Freedom Index assesses this by considering "restrictions on quantity, price, regulation, customs, investment, and direct government intervention." This study assesses trade openness using the Trade Freedom Index. Numerous studies (Nwosa et al., 2020; Nwaka et al., 2015; Gozgor, 2014) highlight the importance of trade openness in combating unemployment. This study uses an estimation method that divides the unemployment rate by 100.

The economic growth rate refers to the change in gross domestic product (GDP), defined as the aggregate gross value added of all domestic producers within the economy, plus taxes on products and minus subsidies, excluding the value of products. Numerous studies (Hjazeen et al., 2021) have

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

examined the relationship between economic growth and unemployment, concluding that economic growth is associated with a decline in unemployment.

The Consumer Price Index quantifies the overall change in the prices of consumer goods and services. It provides data on inflation when prices rise (index above 100) or on deflation when prices fall (index below 100). The results of Abugamea's (2018) study indicate that inflation has a positive and significant influence on unemployment.

Urban population growth rate: This variable is included because the literature shows that it strongly influences unemployment. Numerous studies (Maijama'a et al., 2019) indicate that population growth increases labor demand, exacerbating unemployment.

Capital investment: numerous studies (Alrabba, 2017) highlight negative correlations between private investment and unemployment. The results of Alrabba's (2017) study indicate that an increase in private investment is associated with reductions in unemployment of 2.64% and 1.58% in the second and fourth periods, respectively.

Political stability and absence of violence and terrorism: an indicator developed by the United Nations Development Program. It assesses public perception regarding the likelihood of destabilization or the overthrow of the current regime through unconstitutional means, political violence, and terrorism. The score ranges from -2.5 to 2.5. A score close to -2.5 indicates significant instability, while a value close to 2.5 denotes strong stability. Brada et al. (2006) demonstrate a negative correlation between political stability and unemployment rates. The expected indication is therefore negative.

Gross enrollment rate in secondary education: this is the ratio of the number of enrollments in secondary and higher education, respectively, by age group, to the population officially eligible for education at the corresponding levels. Mincer (1991) emphasizes that the primary benefit of education lies in its role in mitigating the risk of unemployment, thereby illustrating an inverse correlation between unemployment and educational attainment. Consequently, the expected signs for these variables are negative. The table below summarizes the variable descriptions.

Table 1

3.2. Model specification

Drawing on the employment analysis framework established by Islam and Nazara (2000) as well as the work conducted by Anjum and Perviz (2016), the effects of trade liberalization on unemployment can be expressed in implicit form as follows:

$$chom = f(ouv\,;\, X), \qquad (1)$$

Where chom denotes unemployment, ouv represents trade openness, and X represents the vector of additional variables that explain unemployment. The economic literature indicates that, in addition to trade openness, factors such as the growth rate, inflation, the population growth rate, investment, and the quality of institutions can also influence unemployment.

Numerous studies have highlighted the impact of these characteristics. The Phillips curve highlights an inverse correlation between unemployment and inflation. Hjazeen et al. (2021) demonstrate that an increase in the growth rate is correlated with a decrease in the unemployment rate. Maijama'a et al. (2019) highlight the positive correlation between the population growth rate and the unemployment rate. Conversely, other researchers (Alrabba, 2017) show the cumulative

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

negative effects of private investment and institutional quality on unemployment. Taking all these variables into account and assuming that the implicit function (1) is linear, we obtain:

$$chom_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + +ipccor_{it} \quad (2)$$

Since cross-sectional data generally contain specification errors, it is important to account for them by including the error term in equation (2). Thus, our estimation model is written as follows:

$$chom_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + \varepsilon_{it} \quad (3)$$

To analyze the effects of trade openness on unemployment, four types of unemployment are considered: total unemployment, youth unemployment, unemployment among young men, and unemployment among young women. Thus, taking these other types of unemployment into account, the estimation equations are as follows:

$$chomj_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + ipccor_{it} + \varepsilon_{it} \quad (4)$$

$$chomt_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + ipccor_{it} + \varepsilon_{it} \quad (5)$$

$$chomjg_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + ipccor_{it} + \varepsilon_{it} \quad (6)$$

$$chomjf_{it} = ouv_{it} + invst_{it} + ipc_{it} + pop_{it} + polest_{it} + tcrss_{it} + tbsc_{it} + ipccor_{it} + \varepsilon_{it} \quad (7)$$

with,

$chomt_{it}$	:	Overall unemployment rate
$chomj_{it}$	:	unemployment rate for young people aged 14 to 25
$chomjg_{it}$	:	unemployment rate among young men
$chomjf_{it}$	:	unemployment rate among young women
ouv_{it}	:	trade openness
$invst_{it}$	:	capital investment
ipc_{it}	:	consumer price index
pop_{it}	:	urban population growth rate
$polest_{it}$	:	political stability and absence of violence
$tcrss_{it}$	:	gross domestic product growth rate
$tbsc_{it}$	:	secondary school enrollment rate
$ipccor_{it}$	:	corruption perception index
ε_{it}	:	margin of error

Source: author

3.3. Estimation procedure

We apply beta regression to assess the impact of trade openness on unemployment in the CEMAC (Ferrari & Cribari-Neto, 2004; Ünlü & Aktaş, 2017). Beta regression is an alternative to the classical ordinary least squares linear regression model when the fundamental assumptions (normality, absence of autocorrelation, homoscedasticity) are not met, as is the case in our study, particularly when the dependent variable is constrained to lie between 0 and 1.

In the ordinary least squares regression model, the normality assumption is essential for conducting hypothesis tests, particularly with small sample sizes. Furthermore, simple least squares regression is not suitable for regression with a dependent variable represented as an index, rate, proportion, or fractional data, which generally vary between 0 and 1. Nevertheless, when the dependent variable is restricted to the interval (0, 1), the use of ordinary least squares regression can yield estimated values for the variable of interest that exceed its lower or upper bounds. Thus, conclusions drawn from the normality assumption may be misleading.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

Ferrari and Cribari-Neto (2004) propose a beta regression model to address these concerns, in which the dependent variable is constrained to the standard unit interval (0, 1), encompassing rates and proportions. The proposed model assumes that the endogenous variable follows a beta distribution. The beta distribution is highly adaptable for modeling proportions, as its density takes various forms depending on the values of its two defining parameters.

Beta regression is a model that considers the mean of the dependent variable y, conditional on the independent variables x, denoted by μ(x). Since y lies in the interval (0, 1), it is imperative to ensure that μ(x) also lies in (0, 1). To do this, we generally use the link function for the conditional mean, denoted by g(-). This is essential because, without it, the linear combinations of covariances would not be restricted to the interval [0, 1]. It is formally expressed as follows:

$g(\mu_x) = \mathrm{X}\beta$

Or$\mu_x = g^{-1}(X\beta)$,

where$g^{-1}(.)$ represents the inverse of the function$g$. For example, the default logit link function implies that:

$ln\left[\frac{\mu_x}{(1-\mu_x)}\right] = \mathrm{X}\beta$: The conditional variance of the beta distribution is:

$Var(y|x) = \frac{[\mu_x(1-\mu_x)]}{(1+\psi)}$ The parameter ψ is called the "scale factor" because it rescales the conditional variance. We use scale links to ensure that ψ > 0. There are different approaches to applying beta regression (simple beta regression; beta regression, adding a categorical variable using the variable-factor syntax; beta regression, adding covariates for scale; beta regression as above, but using a probit link for the conditional mean and a square root link for the conditional variance; beta regression with robust standard errors). In this study, given the issues of autocorrelation and heteroscedasticity in the errors, we opt for beta regression with robust standard errors.

4. Results and Discussion

The various estimation results are presented first. Next, we examine the results of the assessment of the impact of trade openness on unemployment within the CEMAC.

4.1. Results

The results of the descriptive statistics, the correlation matrix, the pre-estimation tests (heteroscedasticity, autocorrelation, and the Hausman test), and the estimation are presented in turn.

Table 2.

Descriptive statistics (Table 2) indicate that, over the period examined, average unemployment rates stood at 9.82% for overall unemployment and 18.26% for youth unemployment. The highest unemployment rates are 22.67% and 42.8%, respectively, and the lowest are 0.63% and 1.5%. These results indicate a significant disparity between unemployment rates and their averages. The average level of trade openness, an explanatory variable in this study, is 54.31. The maximum level is 62, while the minimum level over the period is 45.

Table 3.

The results of the correlation. The unemployment rates and trade openness (Table 3) indicate a positive and significant relationship at the 5% significance level across the entire CEMAC region. This reveals a comparable trend between these variables, suggesting that an increase in trade openness

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

is correlated with a decrease in unemployment. The results of the multicollinearity test indicate no multicollinearity among the explanatory factors. According to Sadi (2020), multicollinearity is confirmed when the average variance inflation factor (VIF) for all variables exceeds 6, and the maximum individual VIF exceeds 10; however, this does not apply to the variables in our study. The results regarding the different VIF values of our four models are summarized in Table 4.

Table 4.

The results of the preliminary estimation (Table 5) support the fixed-effects model (Hausman test) and raise concerns regarding autocorrelation and heteroscedasticity.

Table 5. Source:

The results of the homoscedasticity and autocorrelation tests for the errors presented in Table 5 indicate that the associated probabilities are below the 5% threshold. This allows us to reject the null hypothesis (H0) and accept the alternative hypothesis (H1). Thus, the error terms exhibit serial correlation, but the errors are heteroscedastic. To address the issues of homoscedasticity and autocorrelation of errors, as well as the nature of our dependent variable, the unemployment rate, expressed as a percentage and scaled from 0 to 1, the beta regression method with robust standard errors is more appropriate for estimation. Regarding the estimation results, we first present those from the beta regression. Next, we present those related to robustness testing using the Tobit model. These results are summarized in Tables 6 and 7.

Table 6.

Robustness test of the results

Table 7

The estimation results obtained using the beta regression, the chi-square test indicates that, in all four models (the model on overall unemployment; the model focused on youth unemployment; the model concerning unemployment among young men; and the model relating to unemployment among young women), the probabilities associated with the chi-square statistic are significant at the 1% level. This means that, in each of the four models, at least one explanatory variable contributes to explaining unemployment, suggesting that the models are of good quality and that the results are valid.

4.2. Discussion of the Results

This article examines the impact of trade openness on unemployment in the CEMAC region. The estimates obtained using the beta regression method highlight a key finding: *"trade openness contributes to reducing unemployment in the CEMAC region*." This result is corroborated by the negative, statistically significant coefficients on the trade openness variable in the four models (total unemployment, youth unemployment, unemployment among young men, and unemployment among young women), with significance levels of 1%, 5%, 1%, and 10%, respectively.

This result indicates an inverse correlation between trade openness and unemployment within the CEMAC. An increase in trade openness is correlated with a reduction in unemployment. The results indicate that, within the CEMAC, a 1 percentage point increase in trade openness, all else being equal, reduces the labor force unemployment rate by approximately 2.02 percentage points.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

Similarly, for the 15–24 age group, a 1-point increase in trade openness, all else being equal, reduces youth unemployment by 1.15 percentage points. A 1 point increase in the trade openness index leads to a 2.48% decrease in unemployment among young men and a 1.60% decrease among young women.

This finding, that trade openness helps reduce unemployment within the CEMAC, corroborates previous studies by Gonese et al. (2023), Marzan et al. (2020), and Nwosa et al. (2020), conducted in SADEC countries, OECD countries, and Nigeria, respectively. However, it contradicts the findings of Alauddin et al. (2021), Kpognon et al. (2020), and Famode et al. (2020), which were conducted respectively in the 12 least developed countries, the 41 countries of sub-Saharan Africa, and the Democratic Republic of the Congo.

5. Conclusion and Implications for Economic Policy

The countries of the Central African Economic and Monetary Community (CEMAC) have some of the highest unemployment rates in the world. This study examined the impact of trade liberalization on unemployment, focusing on total unemployment, youth unemployment among those aged 15 to 24, and unemployment rates for young men and young women. A beta regression was applied to data from 2002 to 2022 for the six CEMAC countries to obtain these results. The results indicate that trade liberalization reduces overall unemployment, including among youth, young men, and young women. These results are further corroborated by those obtained using the Tobit model, which was used to assess resilience. However, the estimates from this model are lower than the coefficients from the beta regression. The results confirm the hypothesis proposed in this study: trade openness reduces unemployment in CEMAC countries.

Given the finding that trade openness reduces unemployment in CEMAC countries, the economic policy implications are to give greater priority to policies that enhance trade openness. This would involve, among other things:

(i) ensuring a trade-friendly environment, particularly by easing trade barriers such as tariffs;
(ii) significantly improving the business climate;
(iii) prioritizing trade agreements;
(iv) encouraging and stimulating export-oriented production activities.

The econometric results of this study indicate that trade liberalization reduces unemployment in the CEMAC region. Nevertheless, given the significance of the identified coefficients, the magnitude of this reduction appears to be very small. In this context, what role could labor market regulation play in mitigating unemployment linked to trade liberalization? Is there a threshold beyond which trade liberalization could exacerbate unemployment in the CEMAC region? The answers to these questions form the basis of our next study.

Competing interest: The authors declare no conflict of interest
Finding: The Author declares that no financial support was received for this research
Data availability statement: The data supporting this study are available upon reasonable request addressed to the corresponding author

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

References

Abugamea, G. (2018). *"Determinants of Unemployment: Empirical Evidence from* Palestine," MPRA Working Paper No. 89424

Ajayi, S. I. (2006). Foreign Direct Investment and Economic Development in Africa. *Paper presented at the ADB/AERC International Conference [online]*.

Alauddin, M., & Khan, R. H. (2021). Effects of Trade Liberalization on Unemployment Rates: Evidence from Selected Least Developed Countries (LDCs). *Journal of Business Administration*, 42(1), 59–76.

Alkhateeb, T. T. Y., Mahmood, H., Sultan, Z. A., & Ahmad, N. (2017). The relationship between trade openness and employment in Saudi Arabia. MPRA Paper No. 109451, published on August 29, 2021, at 5:35 PM UTC. https://mpra.ub.uni-muenchen.de/109451/

Alrabba, M. I. M. (2017). Determinants of the unemployment rate in Jordan: a multivariate approach. *International Journal of Economics and Finance*, 9(11), 109–117.

Anjum, N., & Perviz, Z. (2016). The effect of trade openness on unemployment in labor- and capital-abundant countries. *Bulletin of Business and Economics (BBE)*, *5*(1), 44–58.

Asaleye, A. J., Okodua, H., Oloni, E. F., & Ogunjobi, J. O. (2017). Trade openness and employment: evidence from Nigeria. *Journal of Applied Economic Sciences*, 12(4).

Ayhan, F. (2016). Youth unemployment is a growing global threat. *Current Issues in Economics*, (7), 262–269.

BEAC (2021). Annual Report. https://www.beac.int/wp-content/uploads/2022/12/RAPPORT-

Beck, N., & Katz, J. N. (1995). What to do (and not to do) with time-series and cross-sectional data. American Political Science Review, 89(3), 634–647. Bentivogli, C., & Pagano, P. (1999). Trade, Job Loss, and Job Creation in European Manufacturing. *Open Economies Review*, 10, 165–184.

ILO (1982), "Resolution concerning statistics on the labor force, employment, unemployment, and underemployment, adopted at the Thirteenth International Conference of Labor Statisticians (October 1982)," Geneva

Blinder, A. S. (2006). Education for the Third Industrial Revolution. *American Prospect*, 44–46.

Bolton, W., & Oatley, K. (1987). A longitudinal study of social support and depression among unemployed men. *Psychological Medicine*, 17(2), 453–460.

Chen, S. H., Yang, T. Y., Yang, Y. T., & Wang, C. Y. (2022). The dynamic effect of unemployment and crime rates on the suicide rate as a function of economic growth. *Discrete dynamics in nature and society*, 2022, 1–10.

Couch, K. A., Fairlie, R. W., & Xu, H. (2020). Early evidence on the effects of COVID-19 on unemployment among minorities—Journal *of Public Economics*, *192*, 104287.

Dutt, P., Mitra, D., & Ranjan, P. (2009). International trade and unemployment: theory and cross-country evidence. *Journal of International Economics*, 78(1), 32–44.

Ekodo, R., & Ngomsi, A. (2017). Trade openness and economic growth in the CEMAC zone. *Journal of Economics and Development Studies*, 5(3), 58–67.

Famode, D. M., Makalamba, P. M., & Ngobula, K. N. (2020). Econometric evaluation of the relationship between trade openness and unemployment in Africa: the case study of the Democratic Republic of the Congo. *International Journal of Economics and Business Administration*, 6, 23–29.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

Ferrari, S. L. P., & Cribari-Neto, F. (2004). Beta regression for modeling rates and proportions. Journal of Applied Statistics, 31(7), 799–815. https://doi.org/10.1080/0266476042000214501

Friedrich List, *The National System of Political Economy*, published in German, 1841 (English translation, London 1885; reprinted in New York: Augustus M. Kelley, 1991).

Gachoki, C. M. (2022). Trade openness and women's employment: an empirical sectoral analysis of Kenya. *International Journal of Science and Business*, 16(1), 42–58.

Gonese, D., Sibanda, K., & Ngonisa, P. (2023). Trade openness and unemployment in selected Southern African Development Community (SADC) countries. *Economics*, 11(10), 252

Gozgor, G. (2014). The impact of trade openness on the unemployment rate in G7 countries. *The Journal of International Trade & Economic Development*, 23(7), 1018-1037.

Gunarathne, L., & Jayasinghe, C. L. (2021). Factors influencing the duration of unemployment among science and arts graduates in Sri Lanka. *Advanced Journal of Social Science*, *8*(1), 96–120.

Heckscher, E. F., & Bertil Gotthard Ohlin. (1991). The Heckscher-Ohlin Trade Theory. Translated, edited, and introduced by Harry Flam and M. Flanders. Cambridge: MIT Press

Hjazeen, H., Seraj, M., & Ozdeser, H. (2021). The relationship between economic growth and unemployment in Jordan. *Future Business Journal*, 7(1), 42.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal*, 7(3), 281–312.

Hossain, M. I., Tahrim, F., Hossain, M. S., & Rahman, M. M. (2018). The relationship between trade openness and unemployment: empirical evidence from Bangladesh. *Indian Journal of Economics and Development*, *6*(8), 1–12.

ILO (2003). International Training Compendium on Labor Statistics, Module 1: Statistics on Employment, Unemployment, and Underemployment: Labor Force (Geneva, ILO Bureau of Statistics, Policy Integration Department).

Islam, I., & Nazara, S. (2000). Estimating employment elasticity for the Indonesian economy: a technical note on the Indonesian labor market.

Koutima-Banzouzi, J. M. (2023). The effect of trade liberalization on GDP growth in the Congo. *Theoretical Economics Letters*, 13(1), 30–47.

Kpognon, K., Ondoa, H. A., & Bah, M. (2020). Trade openness and youth employment in sub-Saharan Africa. *Journal of Economic Integration*, 35(4), 751–777.

Maijama'a, R., Musa, K. S., Yakubu, M., & Mohammed, N. (2019). Impact of population growth on unemployment in Nigeria: a dynamic OLS approach. *Journal of Economics and Sustainable Development*, 10(22), 79–89.

Marzan, M. H., Chen, X., Sarker, M., & Akter, S. (2020). "The Impact of International Trade on Unemployment: Data from OECD Countries." IOSR *Journal of Economics and Finance* (IOSR-JEF) e-ISSN, 2321(5933), 52–59.

Mincer, J. (1991). Education and Unemployment.

Nguyen, A. T. (2022). The relationship between economic growth, foreign direct investment, trade openness, and unemployment in South Asia. *Asian Academy of Management Journal*, 27(2), 21–40.

Nwaka, I. D., Uma, K. E., & Tuna, G. (2015). Trade openness and unemployment: Empirical evidence for Nigeria. *The Economic and Labor Relations Review*, 26(1), 117–136.

Nwosa, P., Keji, S., Adegboyo, S., & Fasina, O. (2020). Trade openness and unemployment rates in Nigeria. *Oradea Journal of Business and Economics*, 5(2), 52–62.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

Nwosa, P., Keji, S., Adegboyo, S., & Fasina, O. (2020). Trade openness and unemployment rates in Nigeria. *Oradea Journal of Business and Economics*, *5*(2), 52–62.

Restrepo, B. J., Rabbitt, M. P., & Gregory, C. A. (2021). The impact of unemployment on food spending and food adequacy: Evidence from COVID-19-related business closures. *Applied Economic Perspectives and Policy*, 43(1), 185–204.

Siregar, E. S., & Batubara, I. (2022). The Effect of Unemployment on Poverty in Mandailing Natal. *Adpebi International Journal of Multidisciplinary Sciences*, 1(1), 120–125.

Smith, A. (1937). *The Wealth of Nations [1776]* (Vol. 11937). n.p.

Taris, T. W. (2002). Unemployment and mental health: a longitudinal study

Trefler, D. (2004). The ins and outs of the Canada–U.S. Free Trade Agreement. *American Economic Review*, 94(4), 870–895.

Uddin, I., & Rahman, K. U. (2023). Impact of corruption, unemployment, and inflation on economic growth: evidence from developing countries. Quality & Quantity, 57(3), 2759–2779. https://doi.org/10.1007/s1113 5-022-01481-y

Ünlü, H., & Aktaş, S. (2017). Beta regression for indicative values of the well-being index of Turkish provinces. *Journal of Engineering Technology and Applied Sciences*, 2(2), 101–111.

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

(Nov 2026) Trade liberalization in developing countries: What are the effects of trade liberalization in CEMAC countries on overall unemployment, youth unemployment, and unemployment rates by gender? A practical study using the Beta regression method.
***International Journal of Economic Perspectives*,*20*(11) 39 -55**
ISSN: 1307-1637 ABDC
Retrieved from https://ijeponline.com/index.php/journal

Table 1. Summary of Variables

Variables	Abbreviation	Source	Sign
Total unemployment	unemployed	https://www.theglobaleconomy.com/	-
Youth unemployment (ages 15–24)	unemployed	https://www.theglobaleconomy.com/	-
Unemployment among young men	chomjh	https://www.theglobaleconomy.com/	-
Unemployment among young women	chomjf	https://www.theglobaleconomy.com/	-
Trade liberalization	ouv	https://www.theglobaleconomy.com/	Negative
Consumer Price Index	CPI	Global Development Indicators	Negative
Investment	invest	https://www.cepii.fr/	Negative
Economic growth rate	tcrss	https://www.theglobaleconomy.com/	Negative
Rural population	popu	Global development indicators	Positive
Corruption Perceptions Index	ipccor	WDI	Negative
Political stability and absence of violence	polest	the globalEconomy.com	Negative
Secondary school enrollment rate	Tsc	CPII	Positive

Source: author

Table 2. Descriptive statistics

	Mean	Maximum	Minimum	Observations
Total unemployment	0.10	0.22	0.01	126
Youth unemployment	0.18	0.42	0.01	126
Unemployment among young men	0.17	0.48	0.02	126
Unemployment among young women	0.19	0.46	0.004	126
Trade openness	54.31	62	45	126
Capital investments	24.77	59.72	6.4	126
Number of students in secondary education	42.02	75.53	14.77	126
Enrollment in higher education	4.36	13.13	0.96	126
Economic growth	3.31	38	-36.39	126
Political stability and absence of violence	-0.78	0.41	-2.7	126
Consumer Price Index	106.54	169.94	65.58	126
Rural population	3.88	8.10	0.67	126
Corruption Perceptions Index	22.87	37	16	126

Table 3. Matrix of correlation coefficients between variables

	CHOMJ	CHOMT	CHOMH	CHOMJF	OUV	INVEST	TBSC	TBSS	TCRSS	CCCR	POLEST	INFL	POPUR
CHOMJ	1												
CHOMT	0.996*	1											
CHOMJH	0.988*	0.977*	1										
CHOMJF	0.992*	0.996*	0.963*	1									
OUV	0.181**	0.191**	0.159***	0.196**	1								
INVEST	0.207**	0.209**	0.186**	0.209**	0.279**	1							
TBSC	0.876*	0.886*	0.832*	0.898*	0.328*	0.379*	1						
TBSS	0.820*	0.796*	0.880*	0.760*	0.206**	0.220**	0.629*	1					
TCRSS	-0.123	-0.130	-0.127	-0.130	-0.077	0.062	-0.120	-0.086	1				
CCCR	0.396*	0.357*	0.500*	0.310*	0.059	-0.16***	0.179**	0.718*	-0.109	1			
POLEST	0.561*	0.571*	0.508*	0.595*	0.281*	0.397*	0.800*	0.287*	0.028	-0.076	1		
INFL	-0.036	-0.013	-0.034	-0.027	0.117	0.005	0.085	-0.025	-0.318*	0.083	-0.230**	1	
POPUR	0.283*	0.287*	0.204**	0.328*	0.144	0.430*	0.390*	0.122	0.143	-0.261**	0.558*	-0.386*	1

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

Table 4. Results of the multicollinearity test (VIF)

	chomj		chomt		chomjg		chomjf	
Variables	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Starting a Business	1.17	,853	1.170	0.853	1.170	0.853	1,170	0.853
Investment	1.410	0.709	1,410	0.709	1,410	0.709	1.410	0.709
Secondary school enrollment rate	3.660	0.273	3.660	0.273	3,660	0.273	3,660	0.273
Political stability	3.780	0.265	3.780	0.265	3.780	0.265	3.780	0.265
Economic growth	1,090	0.920	1,090	0.919	1.090	0.919	1.090	0.919
Corruption Perceptions Index	1.310	0.766	1.310	0.766	1.310	0.766	1.310	0.766
Political stability	3.780	0.265	3.780	0.265	3.780	0.265	3.780	0.265
Inflation	1.050	0.954	1.050	0.954	1.05	0.954	1.050	0.954
Urban population	1,710	0.584	1,710	0.585	1,710	0.585	1,710	0.585
Average		**1,900**		**1,900**		**1,900**		**1,900**

Table 5. Preliminary estimation tests

Tests	Null hypothesis: H0	Chomj	Chomt	Chomjh	Chomjf
Homoscedasticity	Constancy of variance	168.89	350.07	337.15	65.53
	Homoscedastic errors	(0.000)	(0.000)	(0.000)	(0.000)
Autocorrelation	No autocorrelation	7.707	15.106	12.826	28.031
		(0.0391)	(0.0116)	(0.0159)	(0.0032)
Hausman	Presence of random effects	114,870	111,960	113.65	114.76
		(0.000)	(0.000)	(0.000)	(0.000)

Table 6. Marginal effects of different unemployment rates relative to trade openness (beta regression)

Variables	unem	chomt	chomjg	chomjf
Trade openness	**-0.0202*** **	**-0.0152** **	**-0.0248*** **	**-0.0159* **
	(-2.800)	(-2.467)	(-3.570)	(-1.914)
Investment	-0.0326***	-0.0302***	-0.0276***	-0.0469***
	(-3.290)	(-3.145)	(-3.118)	(-3.363)
Secondary school enrollment rate	0.0676***	0.0589***	0.0645***	0.0754***
	(27.16)	(26.31)	(25.43)	(26.86)
Economic growth	0.00170	0.00107	0.000967	0.000716
	(0.409)	(0.308)	(0.238)	(0.162)
Corruption	0.0468***	0.0337***	0.0637***	0.0372***
	(9,085)	(8,302)	(11.98)	(6,755)
Political stability	-0.270***	-0.234***	-0.233***	-0.262***
	(-4.335)	(-4.125)	(-3,534)	(-3.947)
Inflation	0.0143	0.0119	0.0102	0.0144
	(1.209)	(1.129)	(0.848)	(1.038)
Urban population	0.111***	0.0891***	0.0808***	0.125***
	(5.223)	(4.270)	(4.031)	(4.309)
Constant	-4.544***	-4.778***	-4.556***	-4.536***
	(-12.61)	(-14.90)	(-12.25)	(-11.28)
Observations	126	126	126	126
chi2	1247	1185	1170	1235
chi2p	0.000	0.000	0.000	0.000

t-statistics in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,

***International Journal of Economic Perspectives*,*20*(11) 39 -55**
ISSN: 1307-1637 ABDC
Retrieved from https://ijeponline.com/index.php/journal

Table 7 Marginal effects of different unemployment rates relative to trade openness (Tobit regression)

Variables	unem	chomt	chomjg	chomjf
Trade openness	**-0.00292*** **	**-0.00138** **	**-0.00360*** **	**-0.00276** **
	(-2.794)	(-2.607)	(-3.269)	(-2.559)
Investment	-0.00145**	-0.000863**	-0.000701	-0.00241***
	(-2.192)	(-2.581)	(-1.011)	(-3.534)
Secondary school enrollment rate	0.00903***	0.00483***	0.00834***	0.0104***
	(18.40)	(19.43)	(16.19)	(20.54)
Economic growth	0.000214	0.000167	0.000281	0.000257
	(0.328)	(0.522)	(0.420)	(0.393)
corruption	0.00611***	0.00227***	0.00962***	0.00325***
	(5.539)	(4.072)	(8,304)	(2,856)
Political stability	-0.0599***	-0.0332***	-0.0523***	-0.0711***
	(-5,299)	(-5,814)	(-4,419)	(-6,106)
Inflation	0.000220	-0.000181	-0.000867	-0.000129
	(0.137)	(-0.227)	(-0.520)	(-0.0791)
Urban population	0.0137***	0.00659***	0.00752	0.0187***
	(3.000)	(2.843)	(1.564)	(3.959)
Constant	-0.243***	-0.112***	-0.250***	-0.233***
	(-3.721)	(-3.369)	(-3.636)	(-3.448)
Observations	126	126	126	126
chi2	258.6	262.8	247.1	273.8
chi2p	0.000	0.000	0.000	0.000

t-statistics in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

© 2026 by The Author(s). ISSN: 1307-1637 International journal of economic perspectives is licensed under a Creative Commons Attribution 4.0 International License.
Submitted: 02 Aug 2026, Revised: 09 Sep 2026, Accepted: 27 Oct 2026,