

Examining the Impact of Trade Openness on Economic Growth in Burundi: An Application of the ARDL Model

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Abstract

This study demonstrates that, according to the ARDL model, the Burundian economy adjusts rapidly to growth shocks, with an adjustment coefficient of -0.418, thereby correcting 41.8% of the deviation each period. In the short run, trade openness slows growth due to intensified competition and the vulnerability of certain sectors, whereas in the long run, it slightly promotes growth through export diversification and access to new markets. Inflation shows no significant effect, interest rates stimulate growth in the short term, and fiscal deficits support growth in the long run.

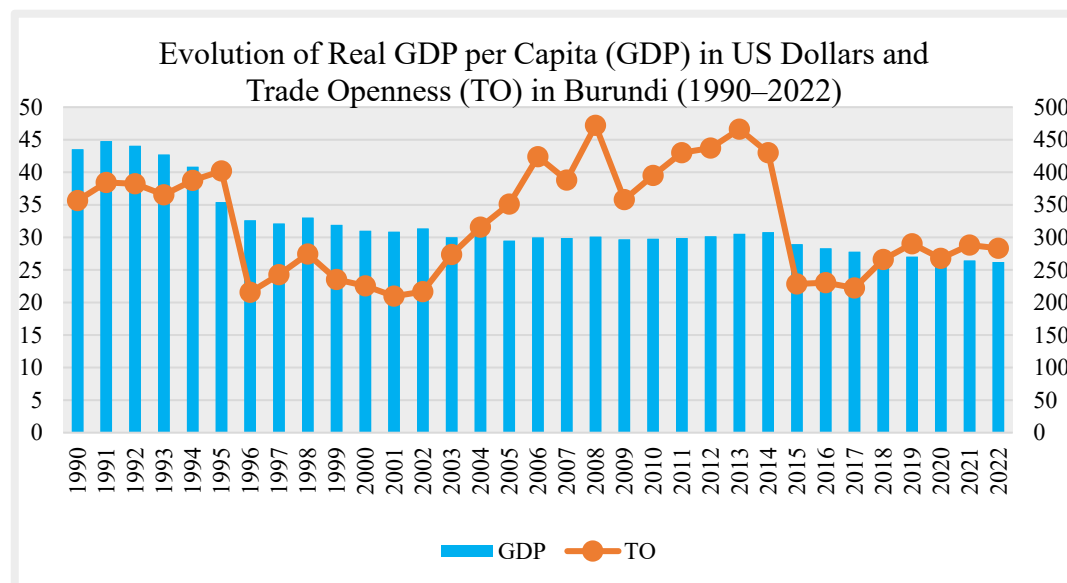
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1. Introduction

Over the past decades, trade openness and its impact on economic performance have attracted increasing attention, particularly in developing countries. In the context of globalization, trade integration enhances access to international markets, fosters competition, encourages innovation, and facilitates technology transfer. However, its effects depend on the structural and institutional specificities of each country.

Burundi, a landlocked country in East Africa, illustrates this dynamic. Its economy, largely agricultural and reliant on coffee and tea exports, continues to face low industrialization, limited infrastructure, and high vulnerability to external shocks. Between 1990 and 2022, the joint evolution of GDP per capita and the trade openness ratio highlights a tension between external integration and domestic development, underscoring the structural constraints that limit the transformation of trade gains into socio-economic progress.

Figure: Trend of Trade Openness (TO) and Real GDP per Capita



Source: Authors' computation based on World Bank data (2024)

Between 1990 and 2022, Burundi's economy experienced a highly unstable trajectory, closely tied to successive political crises. As shown in the figure below, in 1990 the country enjoyed relative stability, reflected in a per capita GDP of USD 435.1 and a trade openness ratio of 35.6%. However, this momentum was abruptly disrupted by the outbreak of the civil war in 1993, which led to a sharp deterioration of economic indicators: by 1997, per capita GDP had fallen to USD 321.1, while trade openness declined to 24.3%.

The following decade marked the beginning of a modest but fragile recovery. In 2008, trade openness peaked at 47.2%, yet per capita GDP remained low at USD 300.8, suggesting that intensified external trade did not translate into meaningful improvements in living standards. This disconnect between openness and growth persisted during 2009-2014, a period characterized by relatively high trade openness (fluctuating between 43% and 46%) alongside stagnant per capita GDP, underscoring the absence of inclusive growth.

The political crisis of 2015 further deepened the economic downturn: per capita GDP fell to USD 289.4 and trade openness contracted to 22.8%. By 2022, no signs of recovery were evident. Indicators remained weak, with per capita GDP at USD 262.2 and trade openness at 28.3%, reflecting the persistence of deep structural constraints hindering the country's economic development.

In addition, recent literature highlights a positive impact of trade openness on growth, as demonstrated by [3] in Ghana and [15] in Namibia. However, research specifically addressing Burundi remains limited and predominantly descriptive, often lacking dynamic approaches such as the Autoregressive Distributed Lag (ARDL) model. Against this backdrop, it becomes pertinent to assess the extent to which trade openness has influenced Burundi's economic growth between 1990 and 2022, taking into account reforms aimed at strengthening both regional and international integration. The objective of this study is therefore to empirically examine the short- and long-run effects of trade openness on Burundi's economic growth using the ARDL model.

2. Literature Review

The literature on trade openness and economic growth reveals both theoretical and empirical divergences. From a theoretical standpoint, classical economists such as [2] and the proponents of the Heckscher-Ohlin model argue that openness fosters specialization based on comparative advantage and enhances resource allocation, although the resulting gains remain essentially static. Endogenous growth models ([11]; [4]) and modern international trade theories ([10]; [7]) suggest that trade can stimulate long-term productivity through technology diffusion, research and development, economies of scale, and resource reallocation.

Empirical evidence is equally nuanced. Some studies, such as [12] for CEMAC (Economic and Monetary Community of Central Africa), [16] for Côte d'Ivoire, and [13] for China, highlight a positive impact of trade openness through regional integration, access to advanced technologies, and export-driven externalities. Other research points to conditional effects: [6] emphasize that the quality and diversification of exports largely determine the extent of gains, while [14] for WAEMU (West African Economic and Monetary Union) and [9] for Togo identify thresholds beyond which openness becomes less beneficial. Finally, a strand of the literature underscores limited or even negative effects. [1] in Morocco and [8] in Mali show that trade openness alone is insufficient without structural reforms, and [5] for the DRC (Democratic Republic of the Congo) illustrates the adverse impact of liberalization in a context of weak economic diversification.

3. Methodological Approach of the Study

If the objective is to examine the impact of trade openness on economic growth in Burundi using the ARDL (Auto-Regressive Distributed Lag) model, both in the short and long term, the ARDL representation can be expressed as follows:

$$\begin{aligned}\Delta \ln GDP_t = & \beta_0 + \sum_{j=1}^q \alpha_1 \Delta \ln GDP_{t-1} + \sum_{i=0}^p \alpha_2 \Delta TO_{t-1} + \sum_{j=0}^q \alpha_3 \Delta INFL_{t-1} \\ & + \sum_{j=0}^q \alpha_4 \Delta BD_{t-1} + \sum_{j=0}^q \alpha_5 \Delta INTR_{t-1} + \varphi_1 \ln GDP_{t-1} + \varphi_2 TO_{t-1} \\ & + \varphi_3 INFL_{t-1} + \varphi_4 BD_{t-1} + \varphi_5 INTR_{t-1} + \varepsilon_t\end{aligned}$$

Where:

Δ represents the first-difference operator; β_0 denotes the constant term; $\alpha_1, \dots, \alpha_5$: are coefficients measuring the short-term effects of the explanatory variables on economic growth; $\varphi_1, \dots, \varphi_5$: are parameters capturing the long-term dynamics of the model ; $\varepsilon \sim iid(0, \delta)$: represents the error term (white noise).

The study covers a 33-year period, from 1990 to 2022, thereby allowing for an analysis of long-term economic dynamics. The table below details the variables used in the analysis.

Table 1: Description of the Model Variables

Retained variable	Description	Expected sign	Data source
lnGDP	Logarithm of GDP per capita (constant 2010 US\$)		World Bank, 2024
TO	Trade openness (X + M) % GDP	-/+	Perspective Monde, 2024
INFL	Inflation, GDP deflator (annual %)	+	World Bank, 2024
BD	Budget deficit (% of GDP)	-/+	countryeconomy.com
INTR	Real interest rate (%)	+	World Bank, 2024

Source : Authors themselves

4. Model Estimation Results and Discussion

Table 2: ARDL Model Estimation Results for the Short and Long Term

ARDL (4,4,4,4,3) regression						
R-squared = 0.9861						
Adj R-squared = 0.9064						
D.lnGDP	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
Adjustment coefficient						
lnGDP						
L1.	-.4180557	.0388372	-10.76	0.000	-.525885	-.3102264
Long-Run						
dTO	.0167876	.0038699	4.34	0.012	.006043	.0275322
INFL	.0030582	.0073926	0.41	0.700	-.0174671	.0235834
INTR	-.0172116	.0092156	-1.87	0.135	-.0427983	.008375
BD	.0076124	.0032037	2.38	0.076	-.0012825	.0165072
Short-Run						
lnGDP						
LD.	-.1905459	.1168524	-1.63	0.178	-.5149802	.1338883
L2D.	.0160551	.2363966	0.07	0.949	-.6402871	.6723972
L3D.	-.290677	.1558232	-1.87	0.136	-.7233116	.1419576
dTO						
D1.	-.0057875	.0014203	-4.07	0.015	-.0097308	-.0018442
LD.	-.0038997	.0013461	-2.90	0.044	-.0076371	-.0001624
L2D.	-.0025891	.0009117	-2.84	0.047	-.0051205	-.0000578
L3D.	-.0008831	.0005035	-1.75	0.154	-.0022809	.0005147
INFL						
D1.	-.0005499	.0024267	-0.23	0.832	-.0072874	.0061877
LD.	-.0001182	.0018157	-0.07	0.951	-.0051593	.0049229
L2D.	.0010113	.0016703	0.61	0.578	-.003626	.0056487
L3D.	.001398	.0010939	1.28	0.270	-.0016393	.0044352
INTR						
D1.	.007573	.0030302	2.50	0.067	-.0008403	.0159863
LD.	.0055898	.0020833	2.68	0.055	-.0001944	.011374
L2D.	.004205	.0018508	2.27	0.086	-.0009337	.0093437
L3D.	.0029901	.0014004	2.14	0.100	-.000898	.0068783
BD						
D1.	-.0002118	.002219	-0.10	0.929	-.0063729	.0059492
LD.	-.0000995	.0023194	-0.04	0.968	-.0065392	.0063402
L2D.	-.0013934	.0011109	-1.25	0.278	-.0044779	.0016911
cons	2.406395	.2245737	10.72	0.000	1.782879	3.029912

Source : Authors, based on STATA 16 estimations

This study, using the ARDL model, demonstrates that the Burundian economy adjusts its growth rapidly following a shock, with an adjustment coefficient of -0.418, thereby correcting 41.8% of the long-term deviation in each period in a statistically significant manner. In the short term, trade openness hinders growth, causing decreases of 0.0058%, 0.0039%, and 0.0026% for each 1% increase, due to heightened competition, the closure of non-competitive industries, and job losses. In the long term, the effect becomes positive and significant (0.0168), reflecting gains from export diversification, access to new markets, technology diffusion, and specialization, before stabilizing after the third lag. Inflation has no significant effect, interest rates stimulate growth in the short term but are non-significant in the long term, and the budget deficit supports long-term growth while remaining non-significant in the short term.

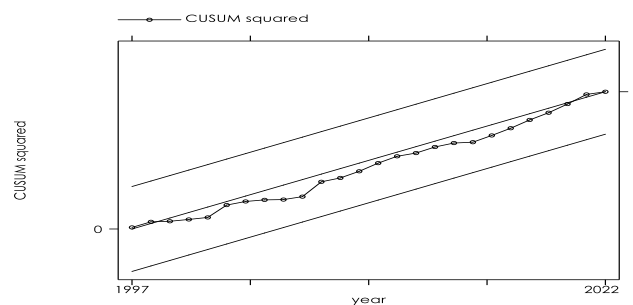
Table 3: Model diagnostic tests: residual normality, absence of error autocorrelation, error homoscedasticity, and model specification

<i>Hypothesis</i>	<i>Test</i>	<i>Statistic</i>	<i>Probability</i>	<i>Remarks</i>
Normality	Jarque-Bera	1.033	0.5965	Normally distributed residuals
Serial correlation (LM)	Breusch-Godfrey	0.627	0.4285	No serial correlation
Heteroskedasticity	Breusch-Pagan	2.07	0.1499	homoscedasticity
Specification error	Ramsey	2.35	0.0972	The model has no omitted variables

Source : Authors, based on STATA 16 estimations

The robustness tests confirm the validity and reliability of the model, with all probabilities exceeding 5%, leading to the acceptance of the null hypotheses. These results attest to the model's robustness, ensuring the relevance of the estimates and the soundness of the resulting economic conclusions.

Figure 4 : Model stability test



Source : Authors, based on STATA 16 estimations

The graph indicates that the curve consistently remains within the critical bounds, thereby confirming the structural stability of the ARDL (4,4,4,4,3) model and the absence of any breaks in its coefficients. The relationships among the variables remain stable over time, ensuring the reliability of the estimates and the suitability of the model for economic forecasting and policy recommendations.

5. Conclusion

The study employing the ARDL model examines the impact of trade openness on economic growth in Burundi. The findings reveal that the economy adjusts rapidly following a shock (adjustment coefficient: -0.418). In the short run, trade openness hampers growth due to heightened competition and the closure of non-competitive industries, whereas in the long run, it fosters growth through export diversification and access to new markets. Inflation has no significant effect; interest rates stimulate growth in the short run but exert limited influence in the long run, while the budget deficit supports long-term growth. These results suggest adopting a gradual approach to trade liberalization, providing temporary protection to vulnerable industries, and enhancing domestic competitiveness through investment, training, and innovation, while prudently managing interest rates and fiscal deficits. The study also opens avenues for future research by incorporating threshold models, foreign direct investment, and regional comparative analyses to better understand the mechanisms through which trade openness affects growth.

References

- [1] B. Mansouri, Effets des IDE et de l'ouverture commerciale sur la croissance économique au Maroc, Centre de conférences des Nations Unies, Addis-Abeba, Éthiopie (2009).
- [2] D. Ricardo, Principles of Political Economy and Taxation, Great Minds Series, PrometheusBooks, Amherst, New York (1996).
- [3] E. Ayaaba and I. L. Abonongo, Modelling the Relationship Between Trade Openness, Macroeconomic Variables and Economic Growth in Ghana Using ARDL Models, *American Journal of Theoretical and Applied Statistics*, **14** (4) (2025), 160–177.
<https://doi.org/10.11648/j.ajtas.20251404.15>
- [4] G. M. Grossman and E. Helpman, *Innovation and growth in the global economy*, MIT Press, 1993.
- [5] G. Umba, *Ouverture commerciale et croissance économique en RD Congo: une analyse en équilibre général calculable*, 2013.

- [6] M. Huchet-Bourdon, C. Le Mouél and M. Vijil, The relationship between trade openness and economic growth: Some new insights on the openness measurement issue, *The World Economy*, **41** (1) (2018), 59-76.
<https://doi.org/10.1111/twec.12586>
- [7] M. J. Melitz, The impact of trade on intra-industry reallocations and aggregate industry productivity, *Econometrica*, **71** (6) (2003), 1695-1725.
<https://doi.org/10.1111/1468-0262.00467>
- [8] O. Doucouré, Ouverture commerciale et croissance économique: le cas du Mali, Mémoire de DEA, *Université Cheikh Anta Diop de Dakar, Faculté des Sciences Économiques et de Gestion*, 2004.
- [9] P. Kpemoua, Ouverture commerciale et croissance économique au Togo, *Les Annales de l'université Marien Ngouabi*, **21** (2) (2022), 1.
- [10] P. Krugman, Scale economies, product differentiation, and the pattern of trade, *American Economic Review*, **70** (5) (1980), 950-959.
- [11] P. M. Romer, Endogenous technological change, *Journal of Political Economy*, **98** (5, Part 2) (1990), S71-S102. <https://doi.org/10.1086/261725>
- [12] P. Votsoma, V. Djekna and I. M. M. M. Ndjokou, Ouverture commerciale et croissance économique dans la Communauté économique et monétaire des États de l'Afrique centrale : le réexamen des preuves empiriques a-t-il de l'importance ? *Mondes en développement*, **205** (1) (2024), 51-70.
- [13] S. Démurger, Ouverture et croissance industrielle en Chine : étude empirique sur un échantillon de villes, *OECD Publishing*, No. **108** (1995).
- [14] T. D. T. Behanzin and M. A. Konte, Impact de l'ouverture commerciale sur croissance économique dans L'UEMOA, *La Revue Internationale des Economistes de Langue Française*, **6** (2) (2021), 106-124.
<https://doi.org/10.18559/rielf.2021.2.5>
- [15] T. Sunde, B. Tafirenyika and A. Adeyanju, Testing the impact of exports, imports, and trade openness on economic growth in Namibia: Assessment using the ARDL cointegration method, *Economies*, **11** (3) (2023), 86.
<https://doi.org/10.3390/economies11030086>
- [16] Y. Keho, The impact of trade openness on economic growth: The case of Cote d'Ivoire, *Cogent Economics & Finance*, **5** (1) (2017), 1332820.
<https://doi.org/10.1080/23322039.2017.1332820>