International Journal of Innovative Research and Scientific Studies, 8(11) 2025, pages: 88-101

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Economic growth, cyclical volatility and the moderating role of trade openness policy. An empirical evidence from MENA countries

Kamel Garfa[1], Elsayed A. Embaby[2], Mohamed F. Abd El-Aal[3*], Abdelsamiea Tahsin Abdelsamiea[4]

[1]*Department of Economics, College of Business, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia.*
[2]*Regional Director of Al-Tayseer Arab Finance Company, Saudi Arabia.*
[3]*Department of Economics, Faculty of Commerce, Arish University, North Sinai, Egypt.*
[4]*Economics department, faculty of commerce, Mansoura university, Egypt.*

Corresponding author: Mohamed F. Abd El-Aal (*Email: Mohammed.fawzy@comm.aru.edu.eg*)

Abstract

This article analyzes the relationship between economic growth, cyclical volatility, and trade openness policy in the MENA region from 1990 to 2023. There are two primary stages to the analysis. First, the most appropriate panel estimation technique is chosen among OLS, Fixed Effects Model (FEM), and Random Effects Model (REM). Second, a Dynamic System-GMM approach is applied, complemented by the Johnson – Neyman approach to assess the moderating effects of trade openness. The analysis is conducted separately for two MENA sub-groups: Oil-Exporters and Oil-Importers. The results reveal distinct patterns between the two sub-groups. MENA oil importers report a statistically significant -negative relationship- between economic growth and cyclical volatility. As for, MENA oil exporters, this connection is -positive-, indicating that oil revenues stabilize economic swings. Trade openness has a positive correlation with economic growth in both categories. ALSO, trade openness serves as an important -moderator-, lowering the negative effects of cyclical volatility on growth in both sub-groups. even though, the range of moderating influence varies: oil exporters have a wider and more flexible range of relevance, whereas oil importers have a smaller range, necessitating more accurate policy calibration. The study illustrates that, while trade openness typically promotes economic growth in the MENA area, its moderating effect on volatility varies depending on each subgroup's economic structure. Oil exporters benefit from increased volatility resistance, whereas oil importers must implement more focused openness measures to prevent the amplification of instability effects on GDP. The findings suggest that policymakers in MENA oil-importing countries should carefully balance trade liberalization in order to avoid unexpected volatility-induced downturns. Oil-exporting countries, on the other hand, should use openness to stabilize their economies while diversifying them to reduce reliance on oil. Improving trade integration and enacting counter-cyclical policies can assist both groups create economic resilience and long-term success.

Keywords: Cyclical volatility, Dynamic system-GMM, Economic growth, Fixed-random effect, MENA, Trade Openness policy.

DOI: 10.53894/ijirss.v8i11.10813
Funding: This study received no specific financial support.
History: Received: 10 September 2025 / **Revised:** 21 October 2025 / **Accepted:** 24 October 2025 / **Published:** 4 November 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Publisher: Innovative Research Publishing

1. Introduction

The global economy has become increasingly integrated, characterized by a great surge in international trade. The rising share of international trade in global output has amplified the influence of foreign trade on cyclical fluctuations, both within and across countries. Understanding the factors that drive fluctuations in external trade is therefore crucial for macroeconomic forecasting and the coordination of regulatory policies.

Global trade continues to expand at a faster rhythm than output growth, implying that an increasing share of domestic production and economic growth is closely tied to global demand. As a result, national economies have become more dependent on factors emerging from international markets. Although the debate on the impact of trade openness on business cycle volatility predates recent global events—notably the COVID-19 pandemic—there has been a renewed interest in discussions concerning the concept of a "*secure and open trade*" and its consequences for macroeconomic instability and long-term sustained growth.

The accepted thesis is that, more outward-oriented economies, will be more exposed to external shocks, so trade openness policies should be able to manage such disturbances and thereby mitigating eventual economic growth volatilities. It is clear that openness exposes economies to external shocks, potentially amplifying cyclical instability. However, we might also argue that, as openness can consolidate competitiveness, openness policies may better prepare countries to face various economic disturbances. While openness may increase a country's vulnerability, openness policies should be appropriately designed to mitigate shocks impact and re-enforce long-run economic growth.

In line with these considerations, and given the importance of understanding the effects of growing cyclical volatility on economic growth, as well as the eventual moderating role of trade openness, the main goal of this paper is to evaluate two fundamental aspects:

- First, *the relevance of the traditional dichotomy between economic growth and cyclical volatility*. Once the existence of an interaction between these two phenomena is validated, it becomes legitimate to conclude to the importance of stabilizing cyclical dynamics.
- Second, in light of the ongoing debate on the validity of a positive relationship between trade openness and economic growth, this study seeks to assess whether openness acts as a source of cyclical stability or instability. *This will be done by exploring the relationship between trade openness policies, cyclical volatility, and economic growth*.

More precisely, the current paper is focusing on a re-examination of the relationship between output volatility as a proxy of macroeconomic instability, economic growth and the moderate role of the trade openness policy, for a panel of 18 MENA countries over an annual data period, 1990-2023. It advances the literature on this relationship in the following directions:

The literature almost exclusively focuses on linkages among advanced and major emerging market economies, with limited attention to MENA region. Our study extends the geographical coverage of this literature to this region. Moreover, taking into account the heterogeneity of this region, we consider two sub-groups, *i*) the *MENA Oil-Exporters* which comprises the six Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Iraq), and Algeria, Iran Libya, *ii*), *The MENA Oil-Importers* (Tunisia, Egypt, Jordan, Mauritania, Morocco, Syria, Lebanon, Turkey).

We employ *conventional econometric strategy* and choose the most appropriate method among OLS, FEM, and REM. And, to reinforce our findings, we include many robustness tests, and implement the *Dynamic System-Generalized Method of Moments* (GMM).

Moreover, we conduct the *Johnson–Neyman* (JN) test to analyze whether trade openness policy moderates the relationship between macroeconomic instability and economic growth. This helps identifying the specific ranges of the trade openness for which the relationship between the predictor (cyclical instability) and dependent variables (economic growth) becomes statistically significant.

Finally, when studying trade openness, empirical studies almost tend to use "*observed openness indicators"*. In our paper, we construct what we call the "*trade openness policy*", an indicator that reflects only trade openness policies, and which is independent of the countries' structural factors.

The paper continues as follows: In section 2 we describe theoretical and empirical literature review and we develop research hypotheses helping better illuminate the foundation of our study. Section 3 illustrates the data collection and presents some stylized facts. Section 4 describes the methodology and/or the construction of the different specifications to be estimated. This section revisits in detail the strategy used to measure key indicators, such as *cyclical instability* and *trade*

openness policy. Section 5 reports our empirical results and discusses principal findings. Finally, the last section is the conclusion.

2. Theorical Considerations and Literature Review

What is the nature of the relationship between cyclical instability and economic growth? *Does trade openness acts as a destabilizing factor, or does it contribute to enhance economic performance*? These are questions for which unanimity remains contested. This paper addresses these important questions providing empirical investigations based on two capital considerations:

The relationship between economic growth and macroeconomic instability. For a long time, economic literature has been characterized by a growing proliferation of studies focusing on economic growth determinants, with traditional exogenous theories and recently with endogenous theories. However, little attention has been oriented to study the effects of cyclical volatility on long-run economic growth. This can be due to the traditional dichotomy between growth (trend) and fluctuations (cycle), i,e. an implicit independence of economic growth from the domain of cyclical fluctuations. Economic growth, often associated with improvements in production, employment, and income, could, however, be affected by cyclical instability dynamics such as economic crises, external shocks, etc. Such instabilities can therefore make economic growth more volatile and harder to sustain.

In this context, several studies tried to test the relationship between cyclical instability and economic growth. Kormendi and Meguire [1] demonstrated that economic growth is positively correlated with cyclical volatility, and there is a significant positive relationship between openness and economic growth. Grier and Tullock [2] found that economic growth is positively correlated to output variability and negatively correlated to public expenditure variability. Ramey and Ramey [3] using a panel of 92 countries, found a negative correlation between instability and growth, and countries with higher volatility tend to experience the lowest growth rates. Kim, et al. [4] using an ARDL model, examined the link between trade openness, economic growth, and growth volatility. They concluded that an intensification of foreign trade promotes economic growth while amplifying long-run growth volatility. Openness stimulates economic activity and dampens short-run economic fluctuations, resulting in a negative short-run correlation between growth and volatility. The degree of impact of openness is highly heterogeneous, as it remains dependent on factors such as the level of development, financial systems, human capital, levels of corruption. Raju and Acharya [5] concluded that a clearly negative relationship between economic growth and cyclical volatility seems confirmed only for developing countries.

Based on this first assessment, we propose the following first hypothesis:

H_1: Macroeconomic instability has a negative relationship with economic growth.

The relationship between economic growth and trade openness. The relationship between economic growth, trade openness, and macroeconomic (in)stability remains a central concern in both theoretical and policy-oriented studies. Despite extensive empirical investigation, the existing evidence remains mixed and inconclusive.

Certainly, the various gains emerging from trade openness have been defended for a long time. These gains can be static, arising from the reallocation effects of international trade related to the exploitation of comparative advantages (inter-industry trade), or dynamic (intra-industry trade) stemming from increasing returns to scale, monopolistic competition, and the international transmission of technological progress. Coe and Helpman [6] and Edwards [7] highlighted the positive relationships between total factor productivity growth and trade openness, R&D, FDI, and human capital. Balavac and Pugh [8] explored the role of trade openness, export diversification, and institutions as potential predictors of output volatility. They found that diversification could mitigate the volatility effects associated to openness, and that the impact of openness largely depends on the level of export diversification. Cheung and Ljungqvist [9] using fixed-effects panel regressions, demonstrated that trade openness has a positive and significant impact on economic growth in OECD countries. Investments in physical capital contribute to increased productivity and supports steady economic growth. Le, et al. [10] employing a dynamic-GMM, emphasized the positive impact of openness on FDI, as well as its moderating role in reinforcing the positive effects of political stability on FDI attractiveness. Monyela and Saba [11] using a Vector Error Correction Model, showed that trade openness promotes growth and facilitates economic development. Banday and Aneja [12] examined the impact of openness on economic growth and macroeconomic stability in BRICS countries using an ARDL approach. They found that openness is associated with a positive effect on economic growth.

Despite the arguments cited above, it is important to admit the existence of more complex realities which suggest rather a positive correlation between openness and growth instability. In this regard:

- While the relationship openness-economic growth has been largely examined, the link between openness and growth instability remains relatively underexplored.
- The thesis that openness is inherently beneficial to growth cannot be universally accepted only on the basis of a simply positive correlation between openness and economic growth. It is entirely possible that it is the economic growth which attracts greater external trade, rather than the reverse.
- Most of the findings in favor of trade openness should be interpreted with caution, as they largely depend on what we use as empirical approach and openness indicators. More reliable measures of *trade openness policies* need to be employed, taking into account structural economic factors such as a country's size, geographical proximity, and other relevant characteristics.

Based on this secund assessment, we then propose the following hypothesis:

H_2: Trade openness has a positive relationship with economic growth.

Finally, in continuity with the two points mentioned above, we aim to explore whether openness is a factor of business cycles (in)stability. More concretely, based on the idea that openness might influence the way economic growth and

cyclical instability interact, the seek to study the moderating role of openness. This would permit to:

- Understand whether openness is beneficial during periods of economic instability, and how countries can manage their trade policies to mitigate the negative impact caused by cyclical instability.
- Clarify how countries can navigate over economic volatility periods while maximizing the benefits of increased trade.
- Demonstrate under what conditions openness should be encouraged to enhance economic growth while minimizing the negative effects of cyclical instability.

Hence, we propose the following hypothesis:

$H_{3:}$ Trade Openness plays a moderating role on the relationship between economic growth and macroeconomic instability.

3. Data and Some Stylized Facts

The sample includes 18 MENA countries, with annual data covering the 1990-2023 period. They can be divided to two sub-groups, MENA Oil-Exporters (Algeria, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, Libya, Iraq, Iran) and MENA Oil-Importers (Tunisia, Syria, Morocco, Turkey, Egypt, Jordan, Mauritania, Lebanon). All variable definitions and data sources are displayed in Table 1 (Appendix). Before moving to empirical specifications, we present some stylized facts concerning the mean and standard deviation of annual per capita growth rates over the past three decades (see Table 2). Several observations can be drawn:

- The average of mean growth rate for MENA countries is higher than that of OECD countries, while their growth rates volatility (standard deviations) is markedly more important. MENA countries exhibit higher cyclical volatility than developed economies, particularly in countries such as Kuwait, Libya, Iraq, Syria, and Lebanon.
- For MENA countries, the standard deviations of growth rates are significantly higher than the average growth rates. This does not appear to hold for OECD countries which exhibit average growth rates that are very close to, or even higher than, the standard deviations of their growth rates. Developed countries are significantly more stable and tend to experience more sustained growth.

Table 2.
Descriptive statistics: Growth and Growth volatility.

MENA Countries	**Real GDP Growth**	**Real GDP Growth volatility**	**OECD**	**Real GDP Growth**	**Real GDP Growth volatility**
	(*Mean*)	**(*Standard Deviation*)**		**(*Mean*)**	**(*Standard Deviation*)**
MENA Oil-Exporters			1.1.		
Algeria	2.65	2.35	1.2. *USA*	2.5	1.75
Bahrain	4.48	3.2	France	1.53	2.2
Kuwait	5.09	17.6	Italy	0.79	2.83
Oman	3.55	3.25	Germany	1.38	2.09
Qatar	7.44	8.14	Canada	1.24	2.15
Saudi Arabia	3.29	3.31	Austria	1.76	2.16
UAE	3.93	3.73	Netherlands	2.06	1.72
Libya	2.42	21.37	Spain	1.94	3.23
Iran	3.15	3.79	United-King	1.89	2.98
Iraq	5.82	19.81	Japan	0.84	1.93
MENA Oil-Importers			Belgium	1.79	1.94
Tunisia	3.15	3.03	Switzerland	1.62	1.69
Syria	1.37	8.56	Denmark	1.82	2.08
Morocco	3.59	4.03	Finland	1.54	3.27
Turkey	4.64	4.45	Norway	2.22	1.66
Egypt	4.37	1.56	Sweden	2.02	2.44
Jordan	4.24	2.89			
Mauritania	3.38	4.37			
Libanon	4.24	10.46			
Average	3.93	6.99	Average	1.71	2.35

The used data is the GDP per capita growth (annual %) (constant 2015 US$). 1990-2023. Source: WDI.

Obviously, these simple statistics are not sufficient to confirm the existence of a negative correlation between growth and cyclical volatility, nor also the idea that countries with higher volatility tend to have the lowest average growth rates. We may refer to Figure 1 showing the relationship between the mean and the standard deviation of real GDP growth rates. If we take the plot reporting the entire sample of countries (MENA and OECD), we can a priori see a positive growth–volatility relationship. But, when taking only the OECD sample, a clearly negative relationship emerges between growth–volatility. When taking the full MENA sample, the positive relationship between growth and volatility is distinguished. Now, when we disaggregate the MENA region, we can easily notice that this positive relationship persists only for the

MENA Oil-Exporters, but the situation is inversed with *MENA Oil-Importers* where the relationship becomes clearly negative, as it's the case for the OECD countries. Therefore, the MENA Oil and Gaz exporters countries tend to experience more common events concerning a confirmed positive relationship between average growth rates and cyclical volatility, contrary to what is observed either for developed countries or MENA Oil-Importers.

The question is to explain the origin/main determinants of such a relationship between cyclical volatility and economic growth in MENA countries by focusing too particularly on the role that could be played by trade openness policy.

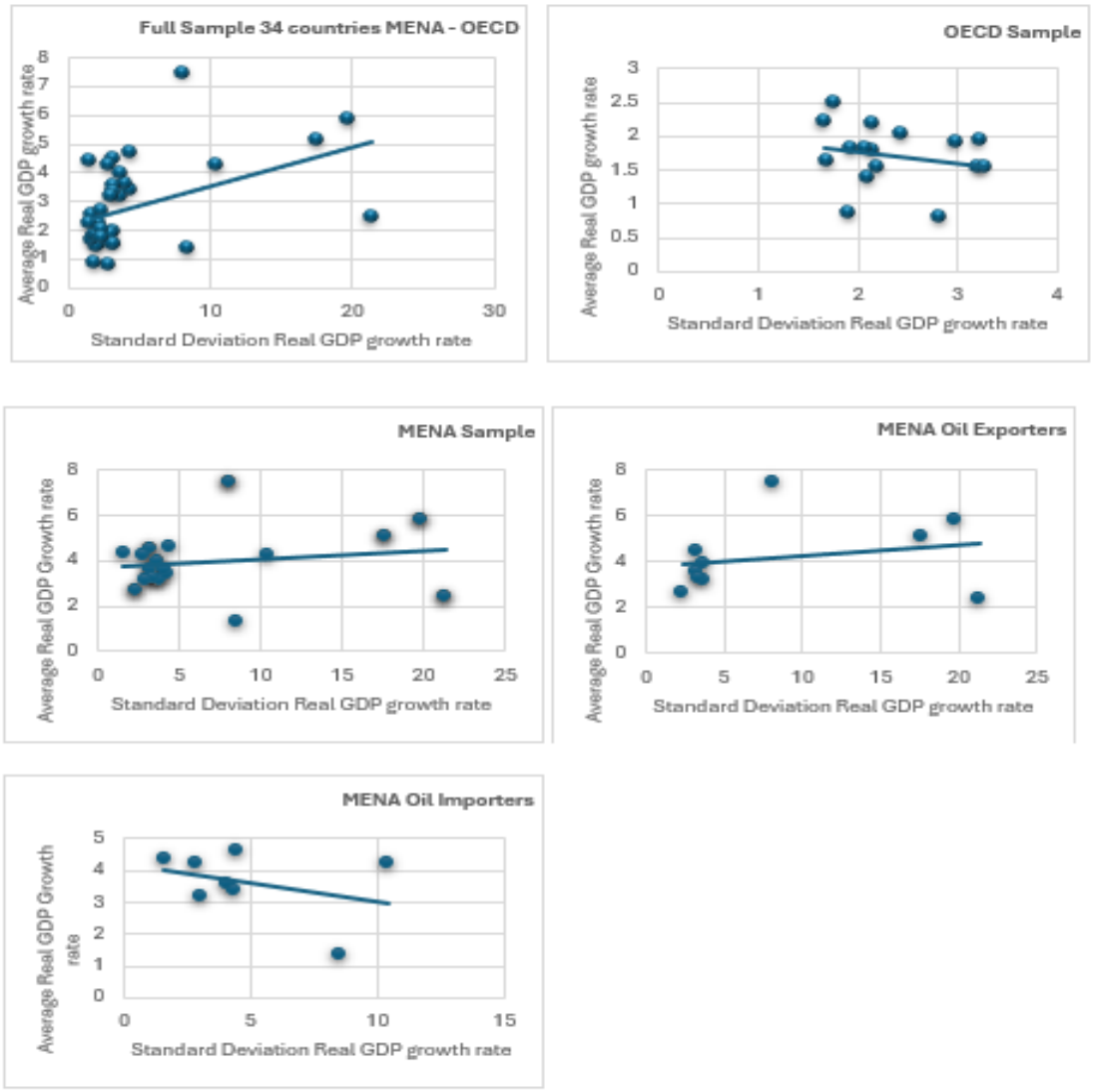

Figure 1.
Mean growth and Standard Deviation of output growth.

4. Methodology and Models Construction

This section describes the methodology and the various models to construct and estimate permitting to evaluate all of the hypotheses presented earlier in Section 2.

4.1. The Interaction Economic Growth – Cyclical Volatility: Model (1)

Here, we try to study the relationship between macroeconomic instability and economic growth. The following specification is estimated:

$$y_{i,t} = \alpha_0 + \alpha_1 Ins_{i,t-1} + \rho X_{it-1} + \beta_i + \beta_t + \mu_{it} \quad (1)$$

With i country, t time, β_i unobserved country-specific effects, β_t time-fixed effect. (I_{ns}) is the cyclical instability indicator (as described below). The endogenous variable $y_{i,t}$ is the GDP growth rate. This panel data specification accounts for both country-specific effects, invariant over time, and time-specific effects, invariant across countries. Its advantage lies in reducing the bias due to omitted variables, while also increasing the degrees of freedom and enhancing estimation efficiency. This first specification is augmented with a set of control variables X_{it}, often applied in business cycle literature: two indicators reflecting the volatility of policies instruments (money supply/GDP ratio, government expenditure/GDP ratio) and an indicator reflecting the instability of the external environment (terms of trade volatility). These variables are supposed affecting both economic growth and its volatility, and by including them, we can isolate the impact of instability

on economic growth[1]. A negative coefficient is expected for these indicators.

The variable of interest is the correlation coefficient α_1: If it is negative, we conclude to a negative relationship between economic growth and volatility, and inversely. In this case, a country facing a significant cyclical volatility will tend to have lower average growth.

Measuring cyclical instability (Ins). Economic fluctuation or cyclical instability is measured by series of deviations (either positive or negative) of GDP growth rates from its trend. The procedure involves removing the trend or non-stationary component of the series and retaining only the cyclical or stationary component. Growth rate instability will be nothing more than the fluctuation in growth rates that is unexplained by the non-stationary trend components.[2] The equation to be estimated can be written as follows:

$$Y_{i,t} = \alpha + \beta t + \gamma Y_{i,t-1} + \xi_{i,t}$$

With Y_t *the real GDP growth rate*; *t* trend; $\xi_{i,t}$ the stationary residual. The variability relative to the trend, describing economic instability (I_{ns}), will be calculated as a time average, over the studied period, of the squared annual residuals (standard deviation $\xi_{i,t}$) from the equation estimated by OLS. This equation will be then estimated for each country, providing for each one a series of residuals.

4.2. Economic Growth and Trade Openness Policy: Model (2)

Now, we try to examen the relationship between economic growth and trade openness. We estimate the following equation:

$$y_{i,t} = \alpha_0 + \alpha_1 TOP_{i,t-1} + \rho X_{it-1} + \beta_i + \beta_t + \mu_{it} \qquad (2)$$

With, i country, t time, β_i unobserved country-specific effects, β_t time-fixed effect. (*TOP*) represents the *Trade Openness Policy* (as explained below). The endogenous variable $y_{i,t}$ is the GDP growth rate. Here, the variable of interest, describing the relationship between economic growth and openness policy, is the coefficient α_1. In this secund model, an additional conditional information set is included in X_{it} representing a set of control variables often applied in growth literature. It concerns the average investment as share of GDP and Human capital (average years of total schooling, age 25 plus total). A positive coefficient is expected for these variables: Higher investment in physical capital (infrastructure, machinery, etc.) and higher human capital tend to promote better productivity and consolidate economic growth.

Measuring Trade Openness Policy: Traditionally, the literature tends to adopt an "*observed openness*" indicator given by the sum of export and import (% of GDP). In our study, we adopt a "*Trade Openness Policy*" indicator. The traditional one, although easy to measure remains subject to certain econometric critiques. Estimates using such indicator may be not robust due to the endogeneity of this indicator which must be corrected for its structural determinants. This critique is based on the idea that a country's observed openness is jointly determined either by country-specific structural factors and the degree to which the economic policy is oriented towards external trade. Hence, it may be necessary to construct an *openness indicator that reflects only openness policy, regardless of structural factors*[3]. The variable (TOP) introduced in model (2) will be measured by the difference between the observed openness and its *normal value* estimated by taking into account certain structural factors. More specifically, it will be calculated as a residual from normalization equations, expressed as the gap between the actual value of observed openness and its estimated value based on the main structural determinants of a country's global trade.[4] These exogenous factors are:

- *The development degree of a country*, given by GDP per capita (*Log* $y_{i,t}$). More a country is developed, more it tends to be competitive, and more its external trade is important.
- *The size of a country*, measured by its population (*Log* $pop_{i,t}$), assumed to be negatively associated to openness. The larger a country is, the less specialized it will be, and the less outward-oriented will be.[5]
- *The importance of a country's mineral and oil resources*. These resources tend to amplify a country's exchanges and do not reflect its willingness to be outward-oriented. In our study, we introduce a dummy variable ($dummy_i$) taking the value 1 if the country is considered an Oil-Exporter and 0 if not.[6]
- *The distance of a country from the major international markets*. The greater this distance, the higher the transport costs of a country, which tends to reduce its external trade. This factor is given by the average distance separating a country from key international markets, *Logdisti*.[7]

In the normalization equations, estimated by OLS, the dependent variable is the observed trade openness (sum of export and import (% of GDP)). The estimated equation is as follows, and the results are presented in Table 3.

$Obs.trade_{i,t} = a + b.Log\ y_{i,t} + c.Log\ pop_{i,t} + d.dummy_i + e.Log\ dist_i + \zeta_{it}$

For observed trade openness, we found that only the two coefficients related to population (significant at the 5% level) and the dummy variable have the expected sign. The explanatory power of the model is relatively satisfactory (R^2), with the set of explanatory variables explaining 25% of the endogenous variable.

[1] Notice that since we aim to estimate panel regressions with both intertemporal and cross-sectional variation, to integrate policy volatility, we compute a five-year rolling standard deviation of government expenditure-to-GDP ratios and monetary aggregates-to-GDP ratios for each country. The same is done for the terms of trade.

[2] This approach is grounded in real business cycle theory, which examines the standard deviation of the per capita GDP gap. Initially, the trend GDP for each country's per capita GDP data is estimated, and the gap between actual and trend GDP is then calculated.

[3] We can consult Rodrik & Rodriguez (1999), Serranito (2001), Edwards (1998), and Harrison (1996).

[4] The higher this residual (measuring the trade openness policy), the more the country is considered outward-oriented as it tends to trade more than what its structural characteristics would predict.

[5] These first two series—population and output per capita—will be introduced as lagged series in order to eliminate any potential simultaneity bias.

[6] This variable can be measured by the ratio of mineral and oil exports to GDP, but is difficult to obtain for MENA countries. The dummy variable used is taken from "Global Development Finance & World Development Indicators".

[7] We selected the G7 countries as the international potential markets, and calculated the average distance separating each MENA country from these 7 countries.

Table 3.
Determination of *Trade Openness Policy* and Normalisation equations.

Structural factors	**Dependent variables**
	Observed trade openness: (X+M)/GDP in %
Constante	5.433 (0.216)
Log Population	-0.042*** (-1.756)
Log GDP/capita	-0.055** (-1.826)
Dummy*i*	29.156 (0.106)
Log Distance	3.011 (0.336)
R^2	0.25

Note: OLS regressions. The values in parentheses are the t-statistics. (*) significant at the 1% level, (**) significant at the 5% level, (***) significant at the 10% level.

4.3. Growth-Cyclical Volatility and the Moderating Role of the Trade Openness: Model (3)

Finally, in model (3), we add the *interaction variable* (*TOP*Ins*) to evaluate the moderating role of trade openness policy on the relationship between cyclical instability and economic growth. It consists to estimate the following specification:

$$y_{i,t} = \alpha_0 + \alpha_1 TOP_{i,t-1} + \alpha_2 Ins_{i,t-1} + \alpha_3 TOP_{i,t-1} * Ins_{i,t-1} + \rho X_{it-1} + \beta_i + \beta_t + \mu_{it} \quad (3)$$

This specification is augmented with the entire set of the control variables X_{it} cited earlier, reflecting the main explanatory determinants of both cyclical instability and economic growth.

We examine the significance as well as the magnitude of the interact coefficient to determine whether the moderating effect is substantial or weak:

If α_3 is significantly different from zero, this indicates that the openness policy plays a moderating role in the relationship between economic growth and cyclical instability.

If α_3 is negative, it suggests that the TOP could play a positive role by mitigating the impact of cyclical instability on the economic growth rate. The impact of instability on economic growth decreases as openness increases, and it could play a stabilizing role in presence of economic shocks. A positive coefficient means that the openness policy could strengthens the relationship economic growth-cyclical instability by increasing the impact of macroeconomic volatility. In this case, with greater openness, economic instability exerts a stronger pressure on economic growth.

5. Estimation Method and Empirical Results

5.1. Estimation Method

Concerning the estimation strategy that we choose to pursue, we would like to emphasize that the idea was to begin by employing standard panel regressions of Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). And, to keep the suitable regression, we applied the Hausman and the Lagrange Multiplier Tests. Therefore, estimating that these standard regressions may violate assumptions of autocorrelation and heteroskedasticity, we go further and use the Durbin-Watson test and the Laplace Likelihood Ratio Test to assess these potential issues. Finally, this leads us to use dynamic system-Generalized Methods of Moments to address autocorrelation and heteroskedasticity concerns.

In addition to all of these regressions, we opt also for the *Johnson–Neyman* (JN) technique to analyze whether trade openness influences the relationship cyclical instability-economic growth. This is a powerful statistical technique, especially when the moderating effect is suspected to vary depending on the intensity of the moderating variable (TOP in our case). Unlike classical regressions with interaction terms, where we test if the moderating effect is globally significant, the JN estimation is a threshold selection test for moderating effects. It helps identify the specific values of the moderating variable (TOP) at which the effect of the independent variable (here, cyclical instability) on the dependent variable (economic growth) becomes significant and/or changes in a statistically significant manner.

5.2. Economic Growth, Macroeconomic Instability and Trade Openness Policy: Empirical Results and Discussion

We follow conventional econometric strategy, and apply Hausman and Lagrange Multiplier test to choose the most appropriate estimation method among OLS, FEM, and REM. These tests show that the REM is the most appropriate estimation in our case. Table 4 reports these estimates conducted on the full MENA sample.[8]

For the full MENA sample, we found a positive correlation between economic growth and cyclical volatility (both in model 1 and model 3). For MENA region, an increase in cyclical instability results in an increase in economic growth rates. This result proves the necessity of not dissociating between business cycle and economic growth, and then, the importance of stabilizing cyclical fluctuations in MENA countries.

Besides, trade openness policy positively increases economic growth (both in model 2 and model 3). Openness appears to be a stabilizing factor for economic activity for MENA region, as it is positively and significantly correlated with higher economic growth.

[8] To keep the paper concise, we present only the REM estimates.

Finally, the interaction term (α_3) between TOP and instability is negative involving that openness contributes to reduce the impact of macroeconomic volatility on economic growth.

This implies that MENA countries, with higher trade openness, would be better positioned to mitigate cyclical instabilities and consolidate their long-run economic growth.

For the dummy variable,[9] we observe that it is significantly positive. This suggests that being an Oil-exporting country has a positive effect on GDP per capita growth. In other words, Oil-Exporters countries tend to have a higher GDP per capita growth rate than those that are not, regardless all the other included factors.

Concerning the control variables, Tables 4 yields globally a theoretically expected signs across the different specifications: Both Investment as % of GDP and Human capital are positively related to economic growth rate. The three other variables expressing business cycle fluctuations, public expenditure (% GDP), monetary supply (% GDP) and Terms of Trade are negatively associated to the economic growth rate.

Table 4.
Panel Regression (using random-effects model) GDP per capita growth, economic volatility and trade openness policy (1990–2023) – Full MENA sample.

Independent variable	**Model (1)**	**Model (2)**	**Model (3)**
Instability (Ins)	127.71	-	160.42
	(13.014)		(8.4447)
Trade Open Policy (TOP)	-	0.31*	0.16***
		(4.19)	(42.15)
Interactive variable; Ins*TOP			-0.32***
	-	-	(-39.85)
Control Variables			
-Public expenditure (% GDP) volatility	0.78**	-	1.15**
	(19.11)		(28.33)
-Monetary supply (% GDP) volatility	1.01***	-	0.165
	(102.46)		(26.55)
-Terms of Trade volatility	-0.0087	-	-0.0235
	(-0.141)		(-0.163)
-Average Investment (% GDP)		0.1205	0.449*
	-	(1.1352)	(2.0701)
-Human capital		0.0367	0.0085
	-	(3.102)	(4.135)
$Dummy_i$	0.55**	0.22*	0.67**
	(17.13)	(3.97)	(18.92)
Adj R-squared	0.66	0.64	0.72
R-Squared	0.222	0.2116	0.2601
F-statistics	245.31	255.63	276.48
p-value (F-statistic)	<0.001	<0.001	<0.001
Hausman Test (Prob.)	>0.01	>0.01	>0.01
Lagrange Multiplier Test (Prob.)	<0.05	<0.05	<0.05
Durbin-Watson Stat	2.53	2.66	2.18
Laplace Likelihood Ratio Test	<0.01	<0.01	<0.01
Num of observations	612	612	612

Note: The t-values are in parentheses. (***), (**), and (*) indicate the significant level at 1%, 5%, and 10%, respectively. The dependent variable is the GDP per capita growth rate. For this Full MENA sample estimates, we introduce a dummy variable ($dummy_i$) taking value 1 if the country is an Oil exporter and 0 otherwise.

However, from Table 4, we highlight that when consulting the Durbin-Watson and the Laplace Likelihood Ratio statistics, we found that the REM violates assumptions relative to the model specification, notably the absence of error autocorrelations and heteroskedasticity. In fact, from Table 4, the DW indicates an eventual problem of autocorrelation. The Laplace Likelihood Ratio gives significant statistics (a low p-value), which may indicate that the model remains mis-specified and does not capture the errors variance. To resolve this problem and integrate some adjustments, we were compelled to push even further the econometric estimations. That's why, we implemented a *dynamic system-GMM*. And, while previous estimates were done on the full sample, the dynamic specification will be conducted separately for *MENA Oil-Exporters* and *MENA Oil-Importers*, as shown in Tables 5 and 6, respectively.

[9] Notice that when conducting these estimates on the full MENA sample, we introduced a dummy variable ($dummy_i$) that takes the value 1 if the country is an Oil-Exporter and 0 if not.

Table 5.
GDP per capita growth, economic volatility and trade openness policy (1990–2023): Dynamic system GMM estimations - MENA Oil-Exporters.

Independent variable	**Model (1)**	**Model (2)**	**Model (3)**
Gro(-1)	1.25**	-0.67**	-1.64***
	(18.37)	(-17.54)	(-89.24)
Instability (Ins)	0.1571***	-	0.09***
	(5.11)		(5.45)
Trade Open Policy (TOP)	-	0.31*	0.16***
		(4.19)	(42.15)
Interactive variable; Ins*TOP			-0.334***
	-	-	(-22.34)
Control Variables			
-Public expenditure (% GDP) volatility	-0.243	-	-0.114**
	(-34.75)		(-26.79)
-Monetary supply (% GDP) volatility	-0.112*	-	-0.243*
	(-45.73)		(-46.66)
-Terms of Trade volatility	-0.05	-	-0.02
	(-11.47)		(-15.89)
-Average Investment (% GDP)	-	0.243*	0.334
		(24.48)	(33.55)
-Human capital	-	0.647	0.345
		(56.96)	(87.74)
J-statistic	22.89	20.45	24.45
Prob(J-statistic)	>0.1	>0.1	>0.1
Prob (Arellano–Bond test for AR(1))	0.0026	0.0053	0.0065
Prob (Arellano–Bond test for AR(2)	0.461	0.356	0.724
Instrument rank	14	14	15
Num of observations	340	340	340

Note: System-GMM estimations for dynamic panel-data models. Sample period: 1990–2023. T-statistics are in parentheses. (***), (**), and (*) indicate the significant level at 1%, 5%, and 10%, respectively. The dependent variable is the GDP per capita (log). A negative coefficient for the *initial GDP per capita* is consistent with conditional income convergence across countries.

Table 6.
GDP per capita growth, economic volatility and trade openness policy (1990–2023): Dynamic system GMM estimations - MENA Oil-Importers

Independent variable	**Model (1)**	**Model (2)**	**Model (3)**
Gro(-1)	1.15	-0.78**	-1.01***
	(28.33)	(-19.11)	(-102.46)
Instability (Ins)	-0.1213***	-	-0.04***
	(-5.11)		(-4.51)
Trade Open Policy (TOP)	-	0.22*	0.17***
		(4.07)	(37.34)
Interactive variable; Ins*TOP			-0.193***
	-	-	(-41.53)
Control Variables			
-Public expenditure (% GDP) volatility	-0.229**	-	-0.945*
	(-32.34)		(-14.77)
-Monetary percentage (% GDP) volatility	-0.212	-	-0.318**
	(-66.34)		(-88.56)
-Terms of Trade volatility	-0.11	-	-0.14
	(-18.66)		(-21.41)
-Average Investment (% GDP)	-	0.138*	0.461***
		(12.77)	(98.39)
-Human capital	-	-0.345	0.213**
		(-45.12)	(85.69)
J-statistic	19.34	18.77	20.55
Prob(J-statistic)	>0.1	>0.1	>0.2
Prob (Arellano–Bond test for AR(1))	0.0018	0.0013	0.0023
Prob (Arellano–Bond test for AR(2)	0.306	0.364	0.423
Instrument rank	10	12	10
Num of observations	272	272	272

Note: System-GMM estimations for dynamic panel-data models. Sample period: 1990–2023. T-statistics are in parentheses. (***), (**), and (*) indicate the significant level at 1%, 5%, and 10%, respectively. The dependent variable is the GDP per capita (log). A negative coefficient for the *initial GDP per capita* is consistent with conditional income convergence across countries.

The following key insights emerge from these two tables:

Now, when disaggregating the MENA region, the hypothesis H1 is confirmed only for MENA Oil-Importers where the cyclical volatility becomes significantly and negatively related to economic growth. When instability increases by 1%, economic growth decreases by 0.1213%. However, for the MENA Oil-Exporters, there is still a positive and significant relationship between volatility and economic growth. If instability increases by 1%, economic growth rate increases by 0.1571%.[10] Our results are consistent with Kim, et al. [4]; Ma, et al. [13] and Raju and Acharya [5]. They contradict the traditional dichotomy that prevailed in macroeconomic literature, which dissociates between economic growth and business cycles volatility.

For both MENA sub-groups, the hypothesis H2 is valid: trade openness policy is significantly and positively correlated to economic growth. An increase by 1% in trade openness policy yields to an increase in economic growth rate by 0.31% for MENA Oil-Exporters and 0.22% for MENA Oil-Importers. This finding is consistent with Usman [14]; Banday and Aneja [12] and Cheung and Ljungqvist [9].

Tables 5 and 6 show that the hypothesis H3 is verified for the two MENA sub-groups: TOP positively moderates the relationship between cyclical volatility and economic growth. For both sub-groups, higher openness degree seems enhancing economic growth by contributing to stabilize macroeconomic fluctuations. For MENA countries, openness policy contributes to decrease domestic volatility and smoothing internal economic cycles by diversifying economic growth sources, accessing new markets, and compensating for declines in domestic demand through increased foreign demand. Furthermore, it could strengthen foreign direct investment, enhance competitiveness, and increase their resilience even when they are facing economic instabilities.

Average investment as % of GDP is positive and highly significant for both MENA sub-groups. Investments in physical capital seems promoting productivity and reenforcing steady economic growth. Human capital coefficients indicate a weak, but insignificant, positive association. Across the different specifications, Human capital bear-mixed signs and significance, yielding ambiguous relationship with economic growth.

The volatility of economic policy instruments is negatively correlated with economic growth, and reflect globally the expected signs. Monetary and fiscal instabilities would be perceived as a potential determinant of economic fluctuations in MENA region. The negative coefficient for the monetary instrument indicates that monetary volatility acts as a barrier to growth, as it can create uncertainty in investment, saving, and consumption decisions. The negative coefficient for government expenditure volatility suggests that fiscal instability could reduce economic growth, which may reflect negative uncertainty related to unpredictable fiscal policies. This supports equilibrium cycle theories highlighting the importance of government disengagement which should aim to reduce any uncertainty regarding their interventionist policies rather than attempting to stabilize economy.

External instability, expressed by increased volatility in terms of trade, is negatively associated with economic growth rate. A negative coefficient suggests that instability in terms of trade, by disturbing international trade conditions and affecting trade balances, would have an adverse impact on economic growth. The volatility of terms of trade would be significantly associated with increased volatility in the economic growth rates of MENA countries, which clearly reflects the dependence of these countries on fluctuations arising in the rest of the world.

Finally, we finish this paragraph by examining the robustness of the dynamic GMM estimates presented in Tables 5 and 6. The p-value of the J-statistic is high, above 10%, the model has no endogeneity issues and the H_0, that all instrument variables are valid (i.e., uncorrelated with the error terms), is accepted. Concerning the Arellano-Bond test, used to detect autocorrelation of the residuals in first differences and to ensure that the instrumentation conditions are valid in dynamic models, we observe that, both in table 5 and 6, the model has no quadratic autocorrelation. The AR(1) p-value is low (< 0.05) and the The AR (2) probability is above 30%. All instrument variables are valid, and the models have no endogeneity issues. The instrumental variables are Gro(-1), TOP, Ins, and TOP*Ins.

5.3. Johnson–Neyman Test and Openness Trade Moderating Effect

To go further in explaining the moderation effect, we implement the JN technique. We try to examine how trade openness moderates the relationship between economic growth and macroeconomic volatility:

1) It helps identifying the thresholds of TOP beyond which the effect of instability on growth becomes significant. Instability could have a negative effect on growth only when the openness policy is low, but this effect could disappear or becomes positive beyond a certain level of openness. *This allows, not only, to appreciate if it has a moderating effect, but also to see how this effect changes across countries and periods*.

2) It is well-suited for empirical panel analyses as it allows for robust testing of the moderating effect while controlling for individual effects (countries, periods).

3) It permits a more intuitive visualization of the moderating effect through a graph showing the thresholds where the moderating effect becomes significant, which is useful for clearly communicating our results.

Before moving to the JN test, we check Figure 2 and Figure 3 that represent the simple interaction plot analyses for the effect of cyclical instability on economic growth when there is high TOP (1 standard deviation above the mean), average TOP (mean), and low TOP (1 standard deviation below the mean). For both, Oil-Exporters and Oil-Importers countries, we observe that with higher TOP, the association between macroeconomic instability and economic growth was less substantial than with lower TOP. Now, for the JN significant regions, they are provided in Figure 4 and Figure 5 showing

[10] This result coincides with the stylized fact analysis presented at the beginning of our work.

the following key messages:

For both MENA sub-groups, whether they are Oil-Importers or Oil-Exporters, the moderating role of trade openness policy is significantly verified. The JN test confirms what was previously concluded with the various panel estimates.

The only difference lies in the *range of significance values*. For Oil-Importers group, the interval in which trade openness does not have a significant moderating effect is between [1.87, 2.63]. These countries have a narrower range in which the impact of cyclical instability on economic growth is significantly moderated by TOP. However, for Oil-Exporters group, this interval is between [3.19, 20.81], and these countries have a much wider range where this moderation is significant.

This difference in the moderating effect intervals can be explained by structural dissimilarities between these two categories of countries, their productive structures, and their resilience to economic shocks. Many explanations can be presented:

For the MENA Oil-Importers, openness plays a significant moderating role only when its level is outside the interval [1.87, 2.63]. Their openness strategy must be relatively low to moderate in order to mitigate the negative impact of cyclical instability on economic growth. If these countries are either too open or too closed, the moderating effect disappears, and instability will have a more amplified impact on growth. For the MENA Oil-Exporters, openness moderates the impact of instability over a much wider range [3.19, 20.81], allowing them to maintain a significantly moderated impact of instability on growth, even at a high level of openness.

Openness seems to play a more flexible and broader moderating role for MENA Oil-Exporters countries. This may be due to their ability to generate substantial energetic revenues, making them less vulnerable when facing global or regional instabilities and enabling them to maintain steady economic growth. In contrast, Oil-Importers countries, more dependent on global fluctuations, would be more sensitive to economic shocks, making their economic growth more volatile depending on their degree of openness. In this case, openness needs to be more finely adjusted to avoid exacerbating the negative effects of cyclical instability on growth.

MENA Oil-Exporters countries have a productive structure dominated by energetic sector, but that provides them a great advantage in maintaining stability face to external disturbances. They can continue to grow thanks to their Oil rents, even when instability is important. Openness can be more flexible because the Oil and Gaz sector generates stable revenues, allowing them to minimize the risks emanating from greater international liberalization.

MENA Oil-Importers countries generally have a more diversified productive structure. This makes them more vulnerable to external shocks, including those caused by fluctuations in commodity prices. For this group, a low openness can expose them to trade deficits, while excessive openness can weaken their economic structure. Their diversification may provide some resilience, but it can also make them more dependent on internal sectoral balances.

In terms of economic policies, it may be preferable for Oil-Importers countries to maintain a moderate level of openness to prevent cyclical instability and a growing negative impact on growth. A low or an excessive openness degree could increase their economic vulnerability. In contrast, Oil-Exporters countries have more flexibility to maintain a more open trade policy without compromising their economic stability.

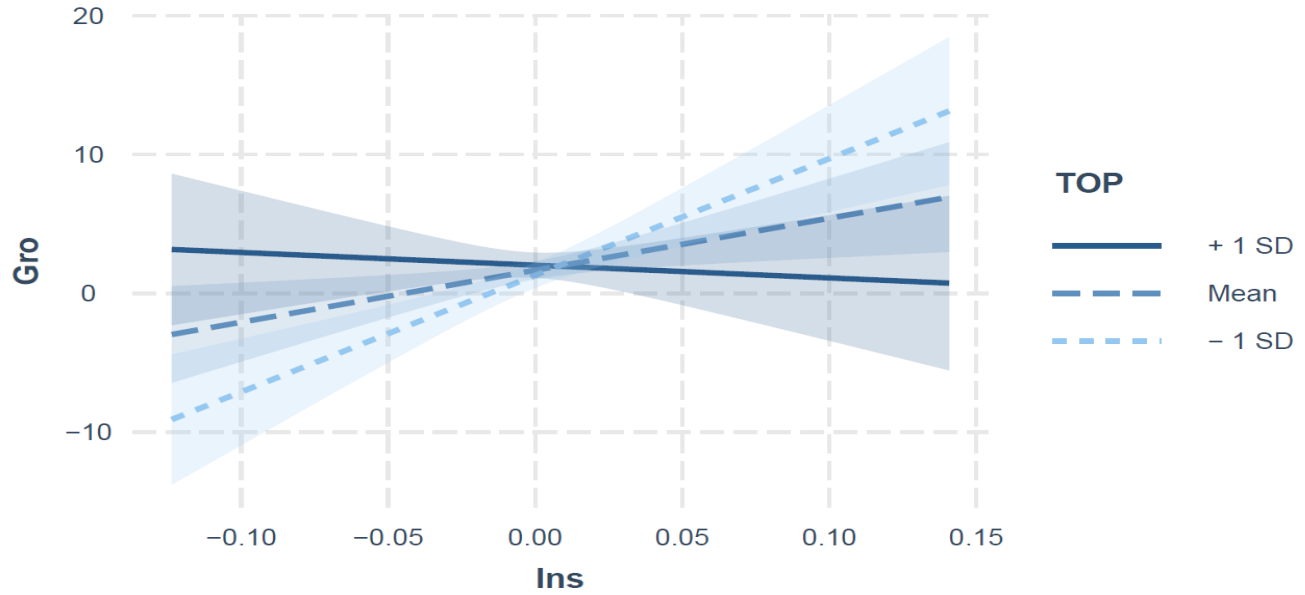

Figure 2.
Interactive effect for the MENA Oil-Importers.

Slope analysis of the interactive effect of macroeconomic instability on Economic growth with high trade openness policy (1 standard deviation above the mean), average trade openness policy (mean), and low trade openness policy (1 standard deviation below the mean).

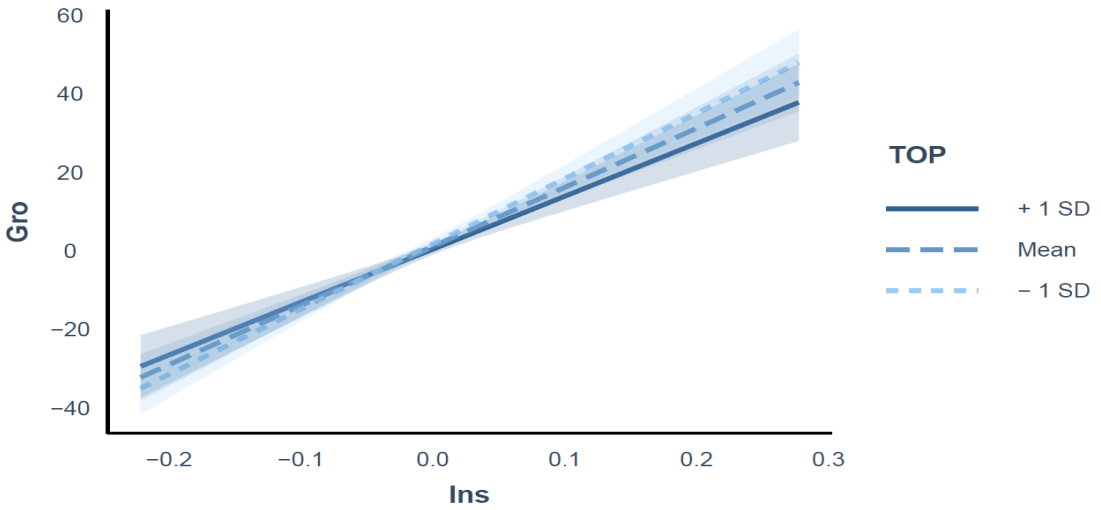

Figure 3.
Interactive effect for the MENA Oil-Exporters.

Slope analysis of the interactive effect of macroeconomic instability on Economic growth with high trade openness policy (1 standard deviation above the mean), average trade openness policy (mean), and low trade openness policy (1 standard deviation below the mean).

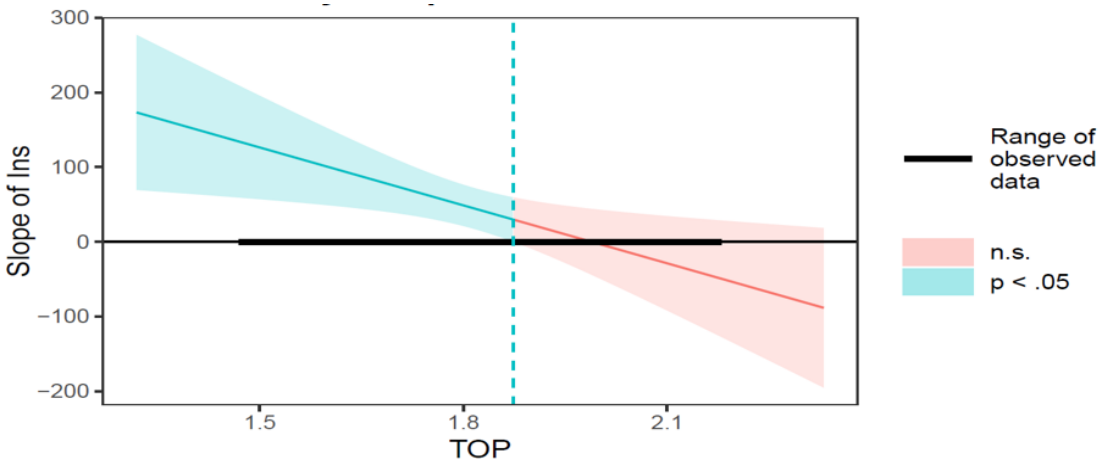

Figure 4.
Johnson–Neyman plot for the MENA Oil-Importers.

The moderating effects of trade openness policy (TOP on the nexus between macroeconomic Instability (Ins) and Economic growth rate. When TOP is OUTSIDE the interval [1.87, 2.63], the slope of Ins is $p < .05$. *Note: The range of observed values of TOP is* [1.48, 2.17].

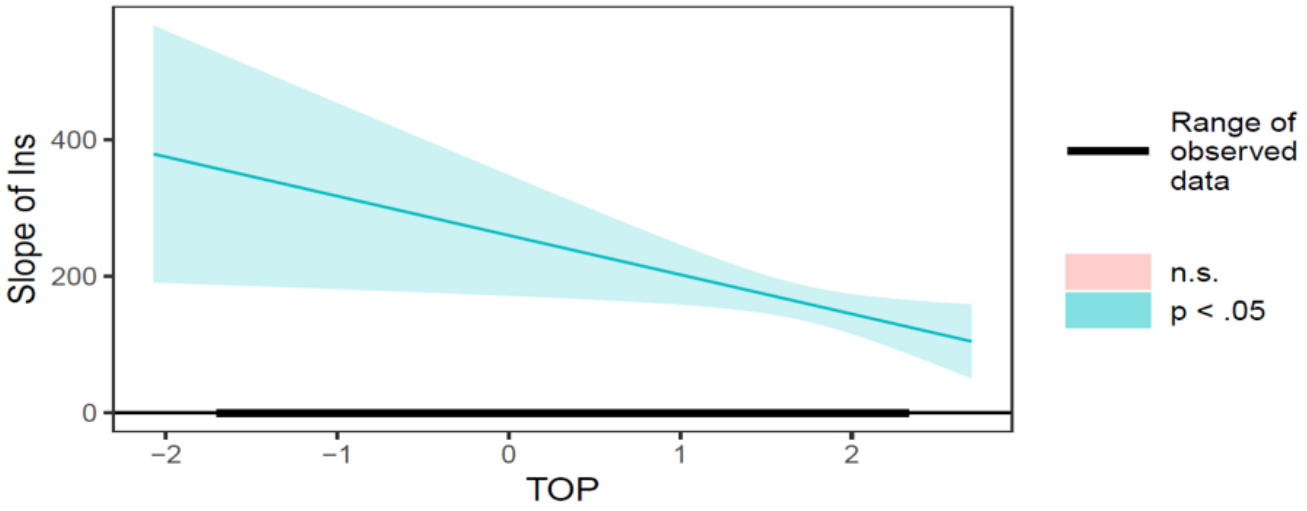

Figure 5.
Johnson–Neyman plot for the MENA Oil-Exporters.

The moderating effects of trade openness policy (TOP on the nexus between macroeconomic Instability (Ins) and Economic growth rate. When TOP is OUTSIDE the interval [3.19, 20.81], the slope of Ins is $p < .05$. *Note: The range of observed values of TOP is* [-1.68, 2.31].

6. Conclusion

This study investigates the dynamic relationship between trade openness, cyclical volatility, and long-run economic growth in MENA countries over the period 1990–2023. It aims to determine how trade openness policies and macroeconomic instability, proxied by output volatility, shape growth trajectories across two sub-groups: MENA Oil-Exporters and MENA Oil-Importers. The analysis begins with conventional panel econometric estimations (OLS, FEM, REM) and proceeds with a Dynamic System-Generalized Method of Moments (System-GMM) to ensure robustness. Furthermore, the Johnson–Neyman technique is applied to identify the levels of trade openness at which cyclical instability significantly affects economic growth.

The findings reveal notable structural heterogeneity. For MENA Oil-Importers, output volatility negatively influences growth, reflecting higher sensitivity to economic shocks. Conversely, for MENA Oil-Exporters, volatility exerts a positive and significant effect, indicating a capacity to absorb fluctuations through resource revenues. This highlights the interdependence between business cycles and growth, as well as the necessity of stabilizing cyclical fluctuations across the region.

Trade openness policy exhibits a consistently positive and significant correlation with economic growth for both country groups, regardless of structural characteristics. It functions as a stabilizing mechanism that mitigates the adverse effects of cyclical volatility. Moreover, the moderating role of openness is statistically validated in both REM and System-GMM estimations. The Johnson–Neyman test further refines this insight: for Oil-Importers, openness moderates the growth–instability link only outside the interval [1.87, 2.63], whereas Oil-Exporters maintain significant moderation within a broader range [3.19, 20.81]. This reflects the exporters' stronger fiscal resilience and diversified revenue bases, which buffer them from external instabilities. In contrast, Oil-Importers require finely tuned openness levels to prevent amplification of volatility effects.

Additional findings reveal that fluctuations in monetary and fiscal policy tools, specifically the money supply and public expenditure, have a negative correlation with economic growth, emphasizing the destabilizing effect of policy uncertainty. likewise, terms-of-trade volatility has been shown to reduce growth, underscoring the MENA region's sensitivity to external shocks.

The paper calls for transparent countercyclical frameworks and institutional reforms to improve macroeconomic shock absorption. While the study adds to current material, it also acknowledges the System-GMM's limitations in distinguishing between short- and long-term impacts. Future research should use panel ARDL models and include financial and trade composition elements to have a better understanding of the openness-volatility-growth nexus in the MENA region.

References

[1] R. C. Kormendi and P. G. Meguire, "Macroeconomic determinants of growth: Cross-country evidence," *Journal of Monetary Economics*, vol. 16, no. 2, pp. 141-163, 1985. https://doi.org/10.1016/0304-3932(85)90027-3

[2] K. B. Grier and G. Tullock, "An empirical analysis of cross-national economic growth, 1951–1980," *Journal of Monetary Economics*, vol. 24, no. 2, pp. 259-276, 1989. https://doi.org/10.1016/0304-3932(89)90006-8

[3] G. Ramey and V. A. Ramey, "Cross-country evidence on the link between volatility and growth," *American Economic Review*, vol. 85, pp. 1138-51, 1994.

[4] D.-H. Kim, S.-C. Lin, and Y.-B. Suen, "Trade, growth and growth volatility: New panel evidence," *International Review of Economics & Finance*, vol. 45, pp. 384-399, 2016. https://doi.org/10.1016/j.iref.2016.07.006

[5] Y. Raju and D. Acharya, "Revisiting the Volatility-Growth relationship: Some cross country evidence, 1978–2017," *Cogent Economics & Finance*, vol. 8, no. 1, p. 1826655, 2020. https://doi.org/10.1080/23322039.2020.1826655

[6] D. T. Coe and E. Helpman, "International r&d spillovers," *European Economic Review*, vol. 39, no. 5, pp. 859-887, 1995. https://doi.org/10.1016/0014-2921(94)00100-E

[7] S. Edwards, "Openness, trade liberalization, and growth in developing countries," *Journal of Economic Literature*, vol. 31, no. 3, pp. 1358-1393, 1993. https://doi.org/10.1016/0304-3878(95)00042-9

[8] M. Balavac and G. Pugh, "The link between trade openness, export diversification, institutions and output volatility in transition countries," *Economic Systems*, vol. 40, no. 2, pp. 273-287, 2016. https://doi.org/10.1016/j.ecosys.2016.02.001

[9] J. Cheung and Z. Ljungqvist, *The impact of trade openness on economic growth: A panel data analysis across advanced OECD countries*. Stockholm: Stockholm University Press, 2021.

[10] A. N. N. Le, H. Pham, D. T. N. Pham, and K. D. Duong, "Political stability and foreign direct investment inflows in 25 Asia-Pacific countries: the moderating role of trade openness," *Humanities and Social Sciences Communications*, vol. 10, no. 1, p. 606, 2023. https://doi.org/10.1057/s41599-023-02075-1

[11] M. N. Monyela and C. S. Saba, "Trade openness, economic growth and economic development nexus in South Africa: A pre- and post-BRICS analysis," *Humanities and Social Sciences Communications*, vol. 11, no. 1, p. 1108, 2024. https://doi.org/10.1057/s41599-024-03604-2

[12] U. J. Banday and R. Aneja, "Macroeconomic stability, openness, and economic growth nexus: An Insight from BRICS countries," *Journal of the Knowledge Economy*, vol. 15, no. 2, pp. 5965-5979, 2024. https://doi.org/10.1007/s13132-023-01241-9

[13] Y. Ma, Y. Jiang, and C. Yao, "Trade openness, financial openness, and macroeconomic volatility," *Economic Systems*, vol. 46, no. 1, p. 100934, 2022. https://doi.org/10.1016/j.ecosys.2021.100934

[14] K. Usman, "The linkages between trade, financial openness, and economic growth in China: An ARDL-bound test approach," *Journal of Applied Economics*, vol. 26, no. 1, p. 2258616, 2023. https://doi.org/10.1080/15140326.2023.2258616

Appendix

Table 1.
Statistics description and data sources.

Variables	Description
Real GDP - Output per capita and the output growth rate	Average of 2015=100. Seasonally adjusted Real GDP, in logarithms. Sources: the IFS –WDI
The money supply (MS)	The series: M2 monetary aggregate Source: IMF's IFS data. We compute a five-year rolling standard deviation of monetary aggregates-to-GDP ratios for each country.
General government final consumption expenditure (% of GDP)	From the *World Development Indicators*. We compute a five-year rolling standard deviation of government expenditure-to-GDP ratios for each country.
Exports of goods and services (% of GDP)	From the *World Development Indicators*.
Total population	From the *World Development Indicators*.
Terms of Trade	Measured by the ratio of the export price index to the import price index (2015 base year). Available from the United Nations Conference on Trade and Development, Handbook of International Trade and Development Statistics, and Global Development Finance and World Development Indicators. For each country, we compute a five-year rolling standard deviation of terms of trade.
Human capital	Proxied by the average years of total schooling of the population aged 25 and above. Taken from UNESCO
Average investment as share of GDP	Gross fixed capital formation (% of GDP) – WDI - Code: NE.GDI.FTOT.ZS Investment as part of national accounts (*World Economic Outlook*)
Dummy variable – Oil-Exporters countries	Global Development Finance & World Development Indicators
Bilateral distances	Provided by "*CEPII: Centre d'Études Prospectives et d'Informations Internationales*."

Note: The main data sources are the IMF's international Financial Statistics database and the World Bank (World Development Indicators). The data have been harmonized in several dimensions, including deseasonalization and the use of 2015 as the base year to express the series in real terms. The sample covers the period from 1990 to 2023.