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The Economics of Conflict: An Econometric Investigation of War's Impact on Growth in the Middle East and Africa (2010–2023)

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Abstract

Wars have deeply determined the economic spheres of the Middle East and Africa, leading to long-term instability and developmental complications. While the human cost of conflict is well documented, its economic results remain overlooked. This study applies an econometric approach to analyse the impact of war on economic growth across conflict-affected countries from 2010 to 2023. The findings reveal that both war and corruption significantly restrict economic performance, with corruption negatively impacting growth (-0.3747) and conflict-driven instability, as measured by the Global Peace Index, further intensifying economic decline (-1.7803). Yet, the direct economic cost of war was found to be statistically insignificant, suggesting that broader systemic setbacks such as institutional deterioration, capital flight, and governance failures are the primary obstacles to growth. The results highlight the urgent need for strong governance, anti-corruption standards, and peace-building strategies to support post-conflict economic recovery. This study provides practical insights for policymakers, offering strategic recommendations to promote sustainable development in war-affected regions.

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Introduction

Wars are among the most obstructive forces affecting global economies, altering economic trajectories and diminishing prospects for development. While the human cost of war is widely documented, its economic consequences, particularly in the Middle East and Africa, remain a crucial yet relatively underexplored subject. The relationship between war and economic growth is complex: conflicts may generate short-term economic activity through military spending, yet they almost invariably impose long-term economic decline via infrastructure destruction, capital flight, and institutional instability.

The Middle East and Africa have been at the centre of numerous armed conflicts over the past decade. Countries such as Syria, Iraq, Yemen, Sudan, Libya, Mali, and Somalia have experienced extended episodes of violence, with severe economic outcomes including negative GDP growth, declining investment, rising unemployment, and weakened governance structures. Wars obstruct trade, displace populations, and place enormous pressure on public finances, ultimately constraining pathways to sustainable development.

For the purposes of this study, a sample of 11 countries was selected according to two guiding criteria: the persistence and intensity of armed conflicts during the 2010–2023 period, and the availability of reliable macroeconomic and institutional data across both conflict and post-conflict years. This targeted selection allows the analysis to focus on cases that are most representative of the war–growth nexus in the region, while also ensuring the statistical consistency required for panel econometric techniques.

Given the ongoing nature of conflicts in these regions, assessing their economic impact is essential for policymakers, economists, and international organizations. This study employs an econometric approach to investigate the war–growth framework in Middle Eastern and African countries between 2010 and 2023. By examining key macroeconomic indicators, the research provides empirical evidence on how armed conflicts shape economic performance, offering valuable insights for post-conflict recovery strategies and long-term economic planning.

This research seeks to achieve the following objectives:

- ✓ Analyse the long-term impact of war on economic growth by investigating how armed conflicts in Middle Eastern and African countries influence GDP growth over time.
- ✓ Evaluate key economic indicators through examining the effect of war on critical economic variables such as economic cost.

- ✓ Review the role of institutional and political stability by exploring how corruption index and word peace index mediate the relationship between war and economic performance in these regions.
- ✓ Provide policy recommendations to offer evidence-based policy suggestions for post-conflict economic recovery and sustainable growth in war-affected Middle Eastern and African countries.

Literature overview

The relationship between war and economic growth has been a subject of extensive academic debate. Various studies have provided the diverse impacts of war on national economies, considering factors such as capital destruction, government intervention, and post-war recovery.

Initially, Thies and Baum (2020) highlight the ambiguity surrounding the effect of war on GDP per capita. While war leads to the destruction of human and physical capital, national income accounting considers military production as a positive economic contribution. This complexity makes it difficult to assess whether war eventually stimulates or restricts economic growth. Similarly, Higgs (2006) suggests that wartime economies often benefit from reduced unemployment as labour shifts toward military production; however, this does not necessarily convert into long-term prosperity.

Correspondingly, Lindgren (2006) emphasizes the difficulty in quantifying war's impact, given that different studies on the same conflict often produce widely varying estimates. Koubi (2005) takes a historical approach by dividing the period 1960–1989 into two phases, revealing that the economic effects of war differ based on political and global conditions. Aisen and Veiga (2011) further demonstrate that political instability, a common consequence of war, reduces productivity growth and capital accumulation, exacerbating economic declines.

Polachek and Sevastianova (2010) differentiate between civil and interstate wars, finding that civil wars basically affect poorer countries, whereas wealthier countries suffer more from interstate conflicts. Their findings indicate that short-term effects of war are severe, but some economies manage to recover over time. Meanwhile, Barro (1991) and Sachs and Warner (1997) argue that geographic factors such as climate and resource abundance also influence economic outcomes post-war.

The relation between war, political instability, and economic development is further explored by Alesina et al. (1996), who show that civil wars, coups, and political violence break economic activity and slow growth. Similarly, Besley and Persson (2011) argue that fragile states experience both war and economic stagnation due to weak governance, low public investment, and instability.

Building upon these discussions, O'Reilly and Powell (2015) highlight how war leads to expanded government regulation, restricting economic freedom and slowing liberalization. Their findings align with the "conflict trap" theory, which suggests that low-income countries are more likely to experience recurrent conflict, thereby extending economic stagnation. Dirks and Schmidt (2023) further illustrate that war-induced political instability significantly reduces GDP growth in developed economies.

Recent conflicts have demonstrated the far-reaching results of war on global and regional economies. Kasych (2023) claims that the war in Ukraine has significantly disrupted European economies, causing rising inflation, market instability, and supply chain disruptions. Likewise, the European Council 2024 highlights how restrictions and geopolitical instability have slowed economic recovery (Papunen, 2024). Tsutsunashvili et al. (2024) examine the economic fallout of Russia-Ukraine war, emphasizing how conflict-induced uncertainties slow regional development. Similarly, the Gaza war has had severe consequences, with UNDP (2024) reporting an 8.7% contraction in the Palestinian economy in 2023, with projections of up to a 29% decline in 2024.

Furthermore, several studies examine the economic consequences of war beyond direct conflict zones. Kešeljevi and Spruk (2023) use a synthetic control method to assess the impact of the Syrian civil war, concluding that its economic effects were severe but temporary, whereas its institutional damage was long-lasting. Garicano et al. (2022) argue that wars like the one in Ukraine create global supply chain interruptions, causing inflationary pressures in distant economies. Meanwhile, Ozili (2025) examines how the Israel-Palestine war has increased financial market volatility and energy prices, exacerbating economic instability.

In addition, empirical studies by Fraj et al. (2020) and Papaioannou (2020) expose how economic instability driven by political crises mirrors the economic damages caused by war. Their findings suggest that political unrest can hinder economic development as much as direct conflict. In the same way, Le et al. (2022) analyse cross-country data to show how war affects labour markets, productivity, and long-term social development. Moreover, Kaplan and Akçoraoğlu (2017) investigate the link between corruption and political instability, concluding that war intensifies governance challenges. Esteban and Ray (2016) explore whether economic growth naturally reduces conflict or if deeper inequalities sustain cycles of violence.

Naleef and Masih (2018) provide evidence from Malaysia, showing that war-induced political instability disrupts exchange rates and labour markets. Moreover, Arsahanova et al. (2020) analyse how wars impact long-term economic trajectories, revealing patterns of inflation, industrial decline, and state intervention. Finally, the World Bank (2024) and UNDP (2024a; 2024b) assess the devastating economic impact of ongoing conflicts in the Middle East, while Garicano et al. (2022) provide an overview of global economic consequences stemming from war.

Cumulatively, the literature consistently demonstrates that war and political instability break economic growth through capital destruction, reduced investment, and weakened institutional structures. Although some wartime economies experience short-term boosts in production, the long-term consequences often include economic contraction, increased poverty, and diminished financial stability.

Research methodology

This study employs an econometric approach, combining quantitative panel data analysis with qualitative case study insights to examine the impact of war on economic growth in Middle Eastern and African countries. The panel ARDL (Autoregressive Distributed Lag) model, chosen for its ability to capture both long- and short-term effects while accounting for cross-sectional heterogeneity (Pesaran et al., 1999), ensures robust estimation. Although the Generalized Method of Moments (GMM) was initially considered, the relatively short time dimension of the panel and the presence of cross-sectional dependence rendered the Pooled Mean Group (PMG) estimator more appropriate for this setting.

The study relies on secondary data from reputable sources, including the World Bank (IBRD) for GDP growth, the International Monetary Fund (IMF) for macroeconomic indicators, and the Global Peace Index for conflict intensity. Corruption indices provide governance quality assessments. The dataset, covering 2010–2023, spans 11 war-affected countries (Afghanistan, Palestine, Iraq, Yemen, Lebanon, Syria, Libya, Somalia, Nigeria, Mali, and Sudan), enabling a comprehensive longitudinal evaluation of war's economic implications.

The econometric analysis

This section presents the standard model utilized in the study, drawing upon insights from prior research. It includes the definition of study variables and the specification of data sources employed.

Accordingly, this study constructs an economic growth function model incorporating war-related indicators, namely the Corruption Index, the Global Peace Index, and the economic cost of war, represented by the following equation: Lpip = F(Lcpi, Lgpi, Lew).

Regarding data sources, the variables in this study are derived from multiple official institutions, including the World Bank, the International Monetary Fund (IMF), the Global Peace Index database, and corruption reports. The study covers the period from 2010 to 2023 and encompasses data from 11 countries.

Study variables

This study defines the key variables employed to analyse the impact of war on economic performance in selected Middle Eastern and African countries.

- ✓ Dependent variable – GDP Growth (%): The outcome variable is the annual growth rate of real GDP per capita, measured as the percentage change in output. According to Nafziger (2006: 15), economic growth refers to the quantitative increase in a country's gross or per capita income. The World Bank defines GDP growth as the annual percentage change in the total value added generated by resident producers, inclusive of product taxes and net of subsidies not included in product values (International Labour Office, 2012).
- ✓ Corruption (CPI): The corruption variable is derived from Transparency International's Corruption Perceptions Index (CPI). In this index, higher scores correspond to lower

levels of perceived corruption. Accordingly, a positive coefficient indicates that reduced corruption is associated with improved economic outcomes.

- ✓ Conflict (GPI): Conflict intensity is proxyed by the Global Peace Index (GPI). In this index, higher values reflect lower levels of peace, which implies more conflict. Therefore, a negative relationship between GPI and growth would suggest that greater conflict reduces economic performance.
- ✓ Economic Cost of War (EW): This measure, sourced from the Institute for Economics and Peace, is expressed as the economic cost of violence as a percentage of GDP. Because the variable contains zeros, a transformation was applied by adding a small positive constant before taking the natural logarithm, ensuring that the log specification is well defined. The variable is denoted as *lew*.

Empirical findings from the econometric analysis

To examine the homogeneity property, the Hsiao (1986) test is applied, using Fisher's statistic to assess the homogeneity of parameters and a constant intercept for all observations. This process consists of three phases, in which individual models are estimated using the specified methodology (Bourbonnais, 2009: 349).

Table 1. Hsiao Test Results (1986)

Test	F-Statistic	Probability Value	Decision
Total Homogeneity	83.421	0.0000	Rejected
Smoothing Parameters	4.234	0.0000	Rejected
Homogeneity of Constants	207.129	0.0000	Rejected

Source: Computed by the authors using Stata16 software

The results in Table 1 indicate the rejection of the null hypothesis at a 5% significance level, implying significant heterogeneity among the studied countries. This suggests that static panel models are inappropriate, necessitating the adoption of dynamic panel models.

Testing the homogeneity of regression parameters (slope heterogeneity)

The Pesaran-Yamagata (2008) test is employed to assess slope heterogeneity across individuals (Seghiri et al., 2021: 394). Heterogeneity in regression parameters may lead to inconsistent estimations in panel models. The hypotheses tested include:

- Null Hypothesis: Parameters across all individuals are homogeneous.
- Alternative Hypothesis: Parameters exhibit heterogeneity across individuals.

Where the strategy is to estimate the regression coefficients using the time series for each individual, and then compare those estimates with the values of β, as these estimates should be close to the values of β, the big difference of these estimates indicates that the null hypothesis should be rejected, and we mean by β values that they are weighted versions of the estimator of fixed effects (Campello et al., 2018: 12), and the test is defined as follows:

$$\sim S = \sum_{i=1}^{N} (\hat{\beta}_i - \sim\beta_{WFE}) \left(\frac{X_i M_i X_i}{\sim\sigma_i^2} \right)^{-1} (\hat{\beta}_i - \sim\beta_{WFE}) \sim S \rightarrow \chi^2_{(N-1)K} \cdots \cdots \cdots \cdots \cdots .. (1)$$

Where:

$$\sim\sigma_i^2 = \frac{(y_i - X_i \hat{\beta}_{FE}) M_i (y_i - X_i \hat{\beta}_{FE})}{T-K-1};$$

$\hat{\beta}_{FE}$: The ability of static effects (Pesaran, 2004: 54);

$\sim\beta_{WFE} = \left(\frac{\sum_{i=1}^{N} X_i M_i X_i}{\sim\sigma_i^2} \right)^{-1} \frac{\sum_{i=1}^{N} X_i M_i Y_i}{\sim\sigma_i^2}$: The weighted value of the constant effects estimator.

Table 2. Pesaran and Yamagata (2008) Test Results

Test	Statistic	Probability Value
Delta	5.626	0.000
Delta Adj	7.016	0.000

Source: Computed by the authors using Stata16 software

The significantly low p-values indicate a strong rejection of the null hypothesis, confirming heterogeneity in regression parameters (Table 2). This implies that a uniform approach to modelling economic growth across all countries would be inappropriate. Instead, a heterogeneous panel approach is required to accommodate country-specific differences in economic responses to war indicators.

Detecting cross-sectional dependence

To examine cross-sectional dependence, the CD-test is applied, following a normal distribution and applicable to various panel model specifications:

- Heterogeneous dynamic panel models.
- Balanced and unbalanced panel datasets.
- Small T (≥10) and large N settings.

Table 3. CD-Test Results for Cross-Sectional Dependence (Pesaran, 2004)

Variable	CD-Test Value	P-Value	Correlation	Absolute Correlation
Lpip	1.87	0.062	0.067	0.471
Lcpi	0.92	0.356	0.033	0.474
Lgpi	4.47	0.000	0.161	0.462
Lew	18.47	0.000	0.666	0.666

Source: Computed by the authors using Stata16 software

Based on the results of the CD test for cross-sectional dependence, following Pesaran (2004, 2015), the correlation (*corr*) and absolute correlation (*abs*(*corr*)) values were analysed (Table 3). The findings support the rejection of the null hypothesis at the 1% significance level, indicating the presence of cross-sectional dependence between the variables *lgpi* and Leo.

For the variable *lpip*, we fail to reject the null hypothesis at the 10% significance level, suggesting no significant correlation. However, for the variable *Lcpi*, the null hypothesis is rejected, confirming the existence of cross-sectional dependence.

Unit root and cointegration tests

Second-generation unit root tests are utilized to assess stationarity while accounting for cross-sectional dependence. The CADF (cross-section augmented Dickey-Fuller) and CIPS (Cross-sectionally augmented IPS) tests are applied:

A/ CADF test (cross-section augmented Dickey-Fuller)

The CADF test is based on the standard least squares method using a constant trend. It extends the traditional ADF regression by incorporating the lagged cross-sectional mean and its first difference. The model is specified as follows:

$$\Delta q_{it} = \alpha_{it} + \beta_{it} q_{it} + c_{it} + \sum_{j=1}^{p} d_{ij} \Delta q_{i,t-1} + g_i' {-z_t} + e_{it} \dots \dots \dots \dots \dots \dots (2)$$

Where:

$$-z = \left(-q_{t-1}, \Delta - q_t, \Delta - q_{t-1}, \dots, \Delta - q_{t-p}\right)'$$

The hypotheses for the CADF test are as follows (Kouassi et al., 2018: 21):

$$\begin{pmatrix} H_0: \beta_i = 0,\ i = 1, \dots, N \\ H_1: \beta_i < 0,\ i = 1, \dots, N\ \ \beta_i = 0, i = N + 1, \dots, N \end{pmatrix}$$

B/ CIPS test (cross-sectionally augmented IPS)

The CIPS test is an extension of the Im, Pesaran, and Shin (IPS) test, designed to account for cross-sectional dependence. It involves calculating the simple average of the individual t-statistics for βi obtained from the CADF regressions using Ordinary Least Squares (OLS). The test statistic is given by:

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} {\sim} t_i$$

Where:

${\sim}t_i$ represents the t–statistic for the estimated coefficient β_i;

Both the CADF and CIPS tests are particularly suitable for handling small sample sizes while accounting for cross-sectional dependence.

Table 4. Results of Second-Generation Stationarity Tests

Variables	CIPS Test		CADF Test		Results
	First Difference	Levels	First Difference	Levels	
Lpip	-2.770***	-1.779	-3.023***	-1.582	I(1)
Lcpi	-3.871***	-1.293	-3.275***	-1.834	I(1)
Lgpi	-3.871***	-1.958	-2.604***	-1.927	I(1)
Lew	/	-2.668***	-3.207***	-2.512**	I(0)

Note: *(*) (**) (***) Indicates the level of morale (10%) (5%) (1%) respectively.*

Source: Compiled by the authors using Stata16 software

The results presented in Table 4, based on the CIPS and CADF tests for panel unit roots, confirm that the variables economic growth (*lgpi*), the corruption index (*lcpi*), and the World Peace Index (*lpip*) are stationary at their first differences. Thus, they are integrated of order I(1). However, the economic cost of war (*lew*) is found to be stationary at levels, meaning it is integrated of order I(0) according to both the CIPS and CADF tests.

Pedroni residual cointegration test

Similar to unit root tests, cointegration tests for panel data provide more reliable results compared to individual tests. Building on the Engle-Granger (EG) cointegration test, Pedroni developed a broader panel cointegration framework. Pedroni's method derives seven test statistics, categorized into two groups (Mitić et al., 2017: 7):

- Within-Dimension Tests: These impose common autoregressive parameters across sections.
- Between-Dimension Tests: These allow for individual autoregressive parameters across sections.

The starting point of Pedroni's panel cointegration analysis is the following equation:

$$y_{i,t} = \beta_i x_{i,t} + \gamma_{1i} + \varepsilon_{i,t} \dots\dots\dots\dots\dots (3)$$

where Yit is the dependent variable, and Xit represents a set of independent variables (Lyhagen et al., 2007: 8).

Following the Engle-Granger (EG) procedure, the cointegration test is conducted using auxiliary regressions of the residuals obtained from Equation (1). Depending on the type of test, Pedroni's method includes:

- <u>Quasi-parametric tests</u>: Represented by Equation (2)
- <u>Parametric tests</u>: Represented by Equation (3)

The Pedroni cointegration test statistics include: Panel v-Statistic; Panel rho-Statistic; Panel PP-Statistic (semi-parametric); Panel ADF-Statistic (parametric); Group rho-Statistic; Group PP-Statistic (semi-parametric); Group ADF-Statistic (parametric).

All Pedroni test statistics follow a normal distribution, and the cointegration test is evaluated based on the following hypotheses (Mitić et al., 2017: 8):

- Null Hypothesis (H_0): No cointegration relationship exists.
- Alternative Hypothesis (H_1): A cointegration relationship exists.

Table 5. Results of Pedroni Residual Cointegration Test

Test	Statistic	Probability
Modified Phillips-Perron (t)	3.7068	0.0001
Phillips-Perron (t)	-1.9422	0.0261
Augmented Dickey-Fuller (t)	-2.3578	0.0092

Source: Compiled by the authors using Stata16 software

The results in Table 5 indicate the presence of cointegration relationships between the studied variables, which are integrated at the same order. The probability values for all tests are below the 5% significance level, leading to the rejection of the null hypothesis (which states that no cointegration exists). This supports the alternative hypothesis, confirming the existence of a long-term cointegration relationship between economic growth and war-related indicators in the countries under study.

Model Estimation Results

To address the bias arising from heterogeneous trends in dynamic panel models, Pesaran, Shin, and Smith introduced two estimation methods (Pesaran and Smith, 1995: 79-113):

A/ Mean Group (MG) Estimator: Allows for heterogeneity across cross-sectional units.

B/ Pooled Mean Group (PMG) Estimator: Imposes long-run homogeneity while allowing short-run heterogeneity.

To estimate the dynamic panel model using the MG and PMG estimators, the model is formulated within the Panel Autoregressive Distributed Lag (Panel-ARDL) framework as follows (Pesaran et al., 1999: 623):

$$Y_{it} = \sum_{j=1}^{p} \lambda_{ij} Y_{it-j} + \sum_{j=1}^{q} \delta'_{it} X_{it-j} + \mu_i + \gamma_t + \varepsilon_{it} \dots \dots \dots (4)$$

Where:

Y_{it}: Represents the dependent variable at time (t);

Y_{it-j}: Represents the dependent variable in the interval (t-j);

X_{it}: Matrix of explanatory variables;

λ_{ij}: Coefficients of the lagged dependent variable;

δ'_{it}: Matrix of parameters for the explanatory variables.

μi: Individual-specific effects.

γt: Time effects.

ϵit: Error term.

The lag structure may vary across countries. Based on these considerations, Equation (1) can be reformulated as follows:

$$\Delta Y_{it} = \emptyset_i Y_{i,t-1} + \beta_i' X_{it} + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{it}^{*\prime} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \ldots \ldots \ldots (5)$$

Where (θ_i) represents the error correction parameter, or the speed of adjustment of the economic growth variable toward its equilibrium relationship, while (β_i) denotes the long-term parameters. (δ'_i) captures the short-term dynamic relationships. The Mean Group (MG) and Pooled Mean Group (PMG) estimators are widely recognized and commonly used methods in dynamic panel data models, particularly when dealing with large cross-sectional and time-series datasets. These methods are advantageous as they account for long-term relationships while also accommodating heterogeneous dynamic adjustment processes across different entities (Fayad, 2010: 10).

To obtain the Mean Group (MG) estimates, Equation (6) is estimated separately for each country. The final MG estimates are then derived by taking the average of the estimated parameters across all countries. These parameters include both long-term and short-term estimates, as well as the error correction term, and are calculated as follows:

$$\hat{\theta}_{MG} = \frac{\sum_{i-1}^{N} \hat{\theta}_i}{N}, \hat{\beta}_{MG} = \frac{\sum_{i=1}^{N} \hat{\beta}_i}{N}, \lambda_{jMG}^{*} = \frac{\sum_{i=1}^{N} \lambda_{ij}^{*}}{N} \quad j = 1 \ldots .., p-1, \delta_{jMG}^{*} = \frac{\sum_{i=1}^{N} \hat{\delta}_{ij}^{*}}{N} \quad j = 1 \ldots .. q-1 \ldots \ldots \ldots (6)$$

Where:

(N) indicates the number of states.

Pesaran et al. (1999) proposed the Pooled Mean Group (PMG) estimator as an alternative to the MG estimator to address its limitations. The PMG method strikes a balance between the MG estimator, which allows all parameters to vary across countries, and the pooled estimation methods, such as the Fixed Effects (FE) or Random Effects (RE) models, which impose complete homogeneity on model parameters.

The PMG estimator imposes a homogeneity constraint on the long-term parameters, meaning they are assumed to be the same across all countries. However, it allows for short-term heterogeneity, meaning short-term parameters, error correction speeds, and residual variances can still differ by country.

With this restriction, Equation (7) is reformulated as follows:

$$\Delta Y_{it} = \theta_i(Y_{it-1} - \beta_i' X_{it-1}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta Y_{it-j} + \sum_{j=1}^{q-1} \delta_{ij}^* \Delta X_{it-j} + \mu_i + \gamma_t + \varepsilon_{it} \ldots\ldots\ldots(7)$$

The long-term parameters βi converge to equality across all states. Consequently, the Pooled Mean Group (PMG) estimator achieves both efficiency and compact estimation. Additionally, the issue of inconsistency arising from the integration of heterogeneous dynamic relationships is mitigated (Tahtan and Bechrair, 2017: 254).

To derive the estimates for the central tendency of the Pooled Mean Group (PMG), the preceding equation (8) is estimated, and the corresponding estimates are computed as follows:

$$\hat{\theta}_{PMG} = \frac{\sum_{i-1}^{N} \hat{\theta}_i}{N}, \lambda_{jPMG}^* = \frac{\sum_{i=1}^{N} \lambda_{ij}^*}{N} \quad j = 1 \ldots, \ p-1, \quad \delta_{jPMG}^* = \frac{\sum_{i=1}^{N} \hat{\delta}_{ij}^*}{N} \quad j = 1 \ldots q-1,$$
$$\hat{\beta}_{PMG} = \hat{\beta} \ldots\ldots\ldots(8)$$

To distinguish between the mid-range estimator (MG) and the compact mid-range estimator (PMG), the Hausman test is employed to assess the hypothesis of homogeneity of long-term parameters. Under this assumption, the PMG estimator remains consistent and exhibits greater efficiency (i.e., lower variance) compared to the MG estimator, which does not impose restrictions on long-term parameters. The test statistic is formulated as follows:

$$H = \hat{q}'\left(\mathrm{var}(\hat{q})\right)^{-1}\hat{q} \to \chi_k^2$$

Where H represents the matrix of differences between the MG and PMG estimators and their corresponding covariance matrices. It is computed as the difference between the covariance matrices of the MG and PMG parameters. The test statistic follows a chi-square (χ2) distribution with K degrees of freedom, where K denotes the number of constraints imposed (Pesaran et al., 1999: 79–113).

After conducting a series of tests that confirmed the invalidity of static panel models and performing unit root tests, no second-order stationary time series were identified. Furthermore, the Pedroni test confirmed the presence of a common integration. Consequently, at this stage, the ARDL panel model for dynamic panel data is estimated for the initial equation using the specified estimation methods. The obtained results are presented in the Table 6 below.

Table 6. Estimation of the Panel-ARDL Model for Middle Eastern and African Countries

Variants		MG	PMG	Hausman
The long term (LR)	Lcpi	-2.6119	-0.3747***	PMG/MG PValue=0.6615
	Lgpi	-5.4335	-1.7803 ***	
	Lwe	0.1804	-0.0047	
The short term (SR)	ECT	-0.5302***	-0.4057***	
	dl. cpi	0.1854	0.2866	
	dl. gpi	0.6082	0.428	
	dl. we	-0.0179	-0.0031	
	Cons	5.1873	4.447***	

Notes: (*) (**) (***) indicate significance levels of 10%, 5%, and 1%, respectively.

Source: Compiled by the authors using Stata16 software.

The results of the Hausman test comparing the PMG and MG estimators indicate that the Pooled Mean Group (PMG) model is the appropriate choice for this study. Since the p-value of the test is greater than 0.05 at the 5% significance level, the null hypothesis of parameter homogeneity cannot be rejected. This suggests that the PMG estimator, which assumes long-term parameter homogeneity across groups, is statistically valid and preferable to the MG estimator.

Results

Results of the estimation of the appropriate model (PMG)

The estimation results indicate that the error correction term (ECT) is estimated at -0.4057, a statistically significant value. This confirms the existence of a long-term relationship between economic growth and the explanatory variables under study, namely the economic cost of war, the Global Peace Index (GPI), and the Global Corruption Index (GCI). The estimated value implies that 40.57% of any disequilibrium is corrected in each period, meaning that deviations from the long-term equilibrium adjust automatically within the model.

Regarding the independent variables, the Corruption Index and the Global Peace Index exhibit a statistically significant negative effect at the 1% significance level in the long run. Specifically:

- The Corruption Index negatively affects economic growth, where a 1% increase in corruption leads to a 0.3747% decline in economic growth. This result aligns with theoretical expectations, as corruption adversely impacts both microeconomic and macroeconomic levels. The negative influence of corruption on growth is logical, given that it acts as a major impediment to development. The prevalence of corruption in these countries is explained by the lack of accountability and transparency, the absence of institutional oversight, and the prioritization of personal over collective interests in governance.

- The Global Peace Index also has a negative impact on economic growth, suggesting that an increase of 1% in the index leads to a 1.7803% decline in economic growth. This result reflects the destabilizing effect of war and conflict, as higher GPI values indicate lower levels of peace. In times of war, economic activity is severely disrupted, leading to economic contraction.
- The economic cost of war was found to be statistically insignificant, implying that its effect on economic growth could not be conclusively determined within this model.

The broader impact of war on economic growth

War and armed conflict represent major barriers to economic growth, particularly in low-income countries, where their effects are more severe compared to countries that are indirectly involved in conflicts. War results in:

- ✓ A decline in per capita income, reducing both consumption and production.
- ✓ Destruction of infrastructure and institutions, making economic recovery challenging.
- ✓ A prolonged period of economic stagnation, particularly in civil conflicts, as rebuilding the economy and restoring fundamental structures takes many years.

The negative consequences of war are further exacerbated by corruption and weak decision making, which restrict the ability of governments to implement effective policies for post-conflict recovery. Moreover, ineffective economic and legal institutions further delay progress, making it difficult for affected countries to regain economic stability.

Conclusion

The findings of this study confirm that war and corruption significantly block economic growth in the Middle East and Africa, highlighting the severe economic results of extended conflicts in these regions. The negative impact of corruption on growth (-0.3747) aligns with expectations, as corruption disrupts both microeconomic and macroeconomic stability, weakening institutional structures and discouraging investment. Moreover, the Global Peace Index (GPI) shows a strong negative relationship with economic growth (-1.7803), particularly during periods of increased conflict, indicating that instability and insecurity significantly impair economic performance. However, the economic cost of war was found to be statistically insignificant, suggesting that while direct war expenditures may not have a clear measurable impact, the broader consequences of conflict, such as institutional deterioration, capital flight, and loss of human capital, are the primary drivers of economic decline.

The results reinforce the notion that war and armed conflicts pose severe barriers to economic growth, particularly in low-income Middle Eastern and African countries, where economic resilience is weaker. Internal conflicts, in particular, have a dramatic long-term impact, as post-war economic recovery is often slow, costly, and hindered by weak governance and institutional instability. These findings emphasize the urgent need for effective governance, anti-corruption standards, and peace-building initiatives to reduce the adverse effects of conflict and encourage sustainable economic development in war-affected regions.

Ultimately, this study underscores the critical role of political stability, institutional quality, and post-conflict economic policies in shaping the economic flows of war-torn Middle Eastern and African countries. The findings provide empirical evidence for policymakers and international organizations, highlighting the necessity of strategic economic planning, investment in governance reforms, and conflict resolution efforts to promote long-term growth and stability in these regions.

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