PAPER

Military Spending and External Debt in the Middle East and North Africa

Shujaat Abbas[*] • **Irfan Lal**[**] • **Muhammad Zubair**[***]

Abstract This study investigates the nexus between military expenditure and exploding external debt in 13 countries of the Middle East and North Africa (MENA) from 2000 to 2019 by employing the second generation of panel econometrics such as cross-sectional independence (CD), CIPS unit root, Pedroni cointegration, Westerlund cointegration, and panel PMG model. The sensitivity of long-run estimates is explored by using fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS) regression analysis. Pedroni and Westerlund's cointegration findings reveal that the selected variables are cointegrated in the long run. The long-run results of the PMG model revealed that current account balance, fiscal balance, and foreign exchange reserve reveal the significant negative effect of various intensities, whereas increasing military spending shows a significant positive effect of higher intensity. The short-run results of the PMG model reveal an insignificant effect of selected variables. Estimated results of FMOLS and DOLS show the robustness of established long-run relationships.

This study urges governments of selected MENA countries to address current account and fiscal imbalances along with the considerable reduction of military expenditures to free capital required for productive economic activities.

Keywords: Military expenditure, External debt, Panel data, CIPS, Westerlund cointegration, PMG, FMOLS, DOLS, MENA.

Jel Classification: C23, F21, F34, O10.

1. Introduction

The Middle East and North African countries face prolonged political violence, sectarian

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conflicts, and regional conflicts, resulting in massive military spending to ensure safety and increase regional influence. The Middle East is one of the largest importers of military equipment and faces sluggish economic growth and the highest external debt distress. The main driving force of significant military spending is the Cold War type sectarian conflict between Iran and Saudi Arabia and other regional conflicts. These sectarian and regional conflicts have made the Middle East the epicenter of armed conflicts.

The Middle East is a highly militarized region where military spending is diverting considerably significant capital away from productive economic activities to finance the import of military equipment, see Figure 1. The increasing military spending and highly sluggish economic growth performance and the large fiscal and trade imbalances have increased the external debt of many MENA countries to an unsustainable level (Smith and Narayan 2009; and Waheed 2017). The exploding external debt distress and corresponding debt service payments have become a major concern for these countries. The role of military expenditure in the external debt of MENA countries is vital for governments and policymakers because of its potential adverse economic effects. Excessive accumulation of external debt can deteriorate terms of trade, appreciates domestic currency, and slower pace of economic prosperity.

The empirical literature on the external debt of Middle East and North African countries is relatively thin, with only two notable studies. Smith and Nararayan (2009) investigated the effect of increased military spending and external debt of only six Middle Eastern countries and found that significant positive effect of higher intensity; whereas Waheed (2017) explored determinants of exploding external debt in the MENAP region by constructing a model that incorporates various macroeconomic variables, excluding military spending. This study expands the scope of existing literature by augmenting the two-gap models of Chenery and Strout (1966) and Bacha (1990) with military spending and other explanatory variables. This study uses advanced panel econometrics to explore the long-run and dynamic short-run effects of military spending and other explanatory variables.

2. Conflict, Arms race, and External debt

This section will discuss regional conflicts, arms race, and external debt distress in selected Middle East and North African countries.

2.1 Regional Conflicts

The unique strategic position, vast natural resources, unique geographic position, and birthplace of all monotheist religions have made the Middle East an epicenter of armed conflicts. There are various dimensions of chronic insecurity and persistent susceptibility of the Middle Eastern countries to armed conflicts and military spending. First, the Arab-Israel conflict that has emerged with the inception of the state of Israel after the Second World War in 1948 onward. The Arab-Israel conflict later transformed into Lebanon/

Palestine-Israel conflict over the occupied territories and preludes all the other conflicts in the region. Second, sectarian conflicts, mostly between Saudi Arabia and Iran emerged after the Islamic revolution of Iran in 1979. In recent years the cold war type inter-regional conflict between Iran and Saudi Arabia has resulted in brutal armed conflicts that cost billions of US$ and killed more than half a million innocent lives in Syria, Iraq, and Yemen. Iran and Saudi Arabia are not directly fighting with each other; instead, they are fighting a proxy war in the Middle East and other Muslim countries in Asia and Africa. The sectarian division and conflicts in other developing Muslim countries have cost thousands of innocent lives and billions of US$ across the globe.

2.2 Military Expenditure

The selected Middle East and North African countries have outstripped other world regions in terms of military spending. The recent years have witnessed a considerably significant increase in military spending in selected MENA countries and have the highest military indicators in the world in terms of percent of exports, government spending, and GNP. Figure 1 reveals that the military spending of selected Northern African countries has considerably increased from 2006 onward. Among these countries, Algeria has the most significant military spending that has considerably increased from 3.09 billion US$ in 2006 to 10.3 billion US$ in 2019, whereas Tunisia reported the lowest military spending that has modestly increased from 0.33 billion US$ in 2000 to approximately 1 billion US$ in 2019. Despite being a small developing country with economic problems, Morocco has spent 3.73 billion US$; whereas Egypt spent 3.74 billion US$ in 2019. The primary cause of high military spending in the North African region is the spill over effect of sectarian and regional conflicts of the Middle Eastern countries.
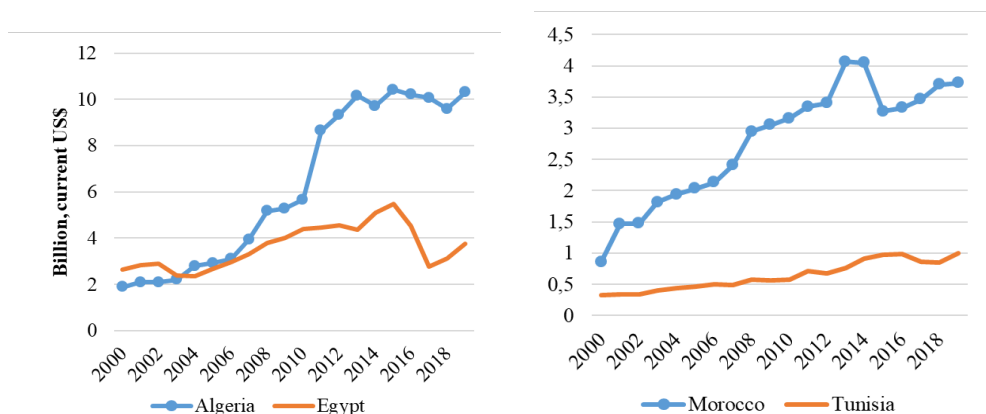

Figure 1. Military Spending of North African Countries
Source: Authors' construction. Data has been collected from Stockholm International Peace Research Institute (SIPRI) database
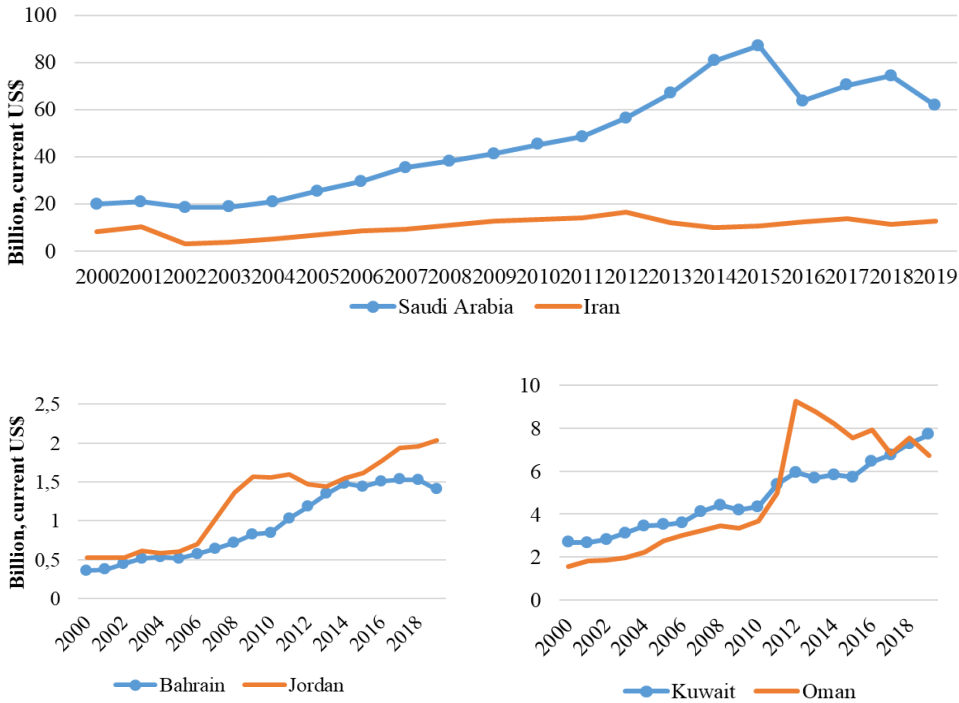
Figure 2. Military Expenditure of Middle Eastern Countries

Source: Authors' construction. Data was collected from the Stockholm International Peace Research Institute (SIPRI) database (2020).

The Middle East is the epicentre of sectarian and regional conflicts. It is massively spending, more than 100 billion US$, on its defence. The armed regional and sectarian conflicts have resulted in more than 500 thousand lives in Syria and Iraq, which are not included in this study due to the unavailability of data. The primary stakeholders of sectarian conflicts are Saudi Arabia and Iran. Saudi Arabia ranked as the topmost spender in the world and region. The trend analysis revealed exponential growth in military spending of Saudi Arabia from 18.7 billion US$ in 2003 to 61.8 billion in 2019. The recent distortion in the military spending of Saudi Arabia after 2015 can be attributed to an effect of a drastic reduction in oil prices. Iran follows it with defence spending of more than 12.6 billion US$ in 2019. Trend analysis of Iran revealed a modest increase in defence spending, which may be due to United Nation and other international restrictions and advancements in military technology. Among other Middle Eastern countries, Kuwait spent 7.71 billion US$, Oman spent 6.73 billion US$, Jordon spent 2.03 billion US$, and Bahrain spent 1.41 billion US$ in 2019. The trend analysis of these countries revealed exponential growth with some distortion after 2015 in oil-exporting countries due to the crash of oil prices. The combined military

spending of selected Middle Eastern countries, despite the oil price crash, accounts for more than 98.63 billion US$ in 2019.

2.3 External Debt Distress

External debt distress is a condition in which indebted nations face difficulties in managing external debt obligations such as repayment of debt and interest payments. There are various approaches to measuring distress on external debt, such as claiming external debt on GDP and exports revenue. The distress level on external borrowing more than 50 percent of GDP can be considered as high for selected MENA countries.

Table 1. External Debt Distress of MENA Countries

	2000	2003	2006	2009	2012	2015	2018	2019
Algeria	46.16	32.29	4.38	4.08	1.75	1.94	1.75	1.72
Bahrain	50.58	57.30	67.72	178.70	145.48	174.40	187.82	205.46
Egypt	26.71	40.11	26.23	16.10	12.44	15.00	37.40	34.11
Iran	2.17	11.46	8.60	5.22	2.59	2.03	2.05	2.23
Jordan	164.27	124.98	75.87	59.09	56.78	65.06	69.03	68.51
Kuwait	23.98	31.55	30.28	42.23	17.40	35.99	43.82	48.23
Morocco	46.31	29.40	22.96	23.33	28.46	33.87	32.69	33.02
Oman	36.94	21.88	33.03	33.08	24.78	43.41	80.60	91.74
Qatar	83.46	44.12	43.22	87.30	62.90	88.35	101.63	122.32
Saudi Arabia	13.81	9.55	11.29	15.48	8.16	10.63	19.20	23.17
Tunisia	53.58	60.77	52.53	48.31	54.41	65.36	97.31	90.27

Source: Author's tabulation. Data has been taken from the Middle East and Central Asia economic outlook. The unavailability of data from 2000 onward has restricted the sample size.

Table 1 shows that the external debt distress of many MENA countries has approached an unsustainable level. Among selected MENA countries, the Kingdom of Bahrain has accumulated the highest external debt of 205.5 % of GDP, which Qatar follows with an external debt of 122.32 % of GDP. The trend analysis revealed exponential growth in these countries. Algeria reported the lowest external debt of 1.72 % of GDP among selected MENA countries, followed by Iran with external debt distress of 2.23 % of GDP. Egypt, Kuwait, Morocco, and Saudi Arabia have external debt lower than 50 % of GDP among other MENA countries. Jordan has drastically reduced external debt from 164.3 % of GDP in 2000 to 68.5 % in 2019. The exploding external debt distress of selected MENA countries is a major concern for their governments and policymakers. Excess

external debt accumulation distorts economic growth through capital outflow as interest payments and exchange rate appreciation. An important question that this study will attempt to explore is whether MENA countries' defense expenditure impacts regional external debt burden. Randa Alami (2002) urged that overall military debt accounted for more than 40 percent of total Arab debt stock from 1989 to 1990. In an attempt to explain exploding indebtedness of MENA countries, excessive military expenditure can be considered an important determinant. The following section will review theoretical and empirical literature to examine the relationship between military spending and external debt and explore macroeconomic determinants of external debt distress.

3. Survey of Literature

The pioneering work of Benoit (1973) established a relationship between military spending and economic growth, whereas Brzoska (1983) explored military-related external debt of third world countries. Since then, many studies have established a relationship between military spending and external debt. The exploding external debt of MENA countries is the major concern of this study. There are several ways to explain these countries need external borrowing. Among which the most popular propositions are the two-gap model and three-gap model, proposed by Chenery and Strout (1966) and Bacha (1990). These models consider that three major sources create conditions for external borrowing such as (1) saving-investment gap, (2) foreign exchange gap, and (3) fiscal-constraint gap. Besides these gaps, there are a plethora of other explanatory variables of external debt distress, including military spending. The rest of this section will review some empirical literature to explore the nexus between external debt and military spending and explore other explanatory variables.

In recent decades, empirical research on the effect of military spending on external debt has attracted researchers and policymakers from both developing and developed countries. Looney and Frederiksen (1986) investigated the effect of military spending on external debt and found a significant positive effect of higher intensity on both resource-constrained and unconstrained developing countries. Similarly, Looney (1989) revealed that rising military spending to import military equipment deteriorates economic growth and enhances external borrowing in a sample of 61 military equipment importing developing countries.

These early studies have established a significant positive effect of military spending on external debt. The increasing sectarian and regional conflicts of the Middle East have considerably increased in recent years. The empirical literature on military spending and external debt nexus of MENA countries is relatively scarce except for one bivariate study of Smyth and Narayan (2009) that have concluded significant positive effect in the six Middle Eastern countries, i.e., Bahrain, Iran, Jordon, Oman, Syria, and Yemen, over the period 1988 to 2002 in the long run. The plethora of empirical literature on determinants of external debt and external debt sustainability

analysis across the globe has incorporated many macroeconomic variables, including military spending, to explain the behavior/need of external borrowing. Azam and Feng (2017) explored the nexus between military spending and external debt in selected ten Asian countries from 1990 to 2011 by incorporating real GDP, taxes, inflation, foreign exchange reserve, and real per capita GDP growth along with military spending. The estimated results revealed a significant positive effect of military spending on external debt. Determinants of exploding external debt of MENAP countries is investigated by Waheed (2017) by constructing a model that incorporates current account balance as % of GDP, general government expenditures as % of GDP, general government revenue as % of GDP, foreign exchange reserve, gross capital formation as % of GDP, and inflation. Similarly, Abbas and Wizarat (2018) explored the effect of military spending on the external debt of selected South Asian countries by augmenting the popular two-gap model with the inclusion of military spending % of GDP, gross capital formation % of GDP, and per capita GDP as additional explanatory variables along with the fiscal balance as % of GDP and trade balance as % of GDP. Findings have revealed that increasing military spending increases the external debt of selected South Asian countries. In more recent studies, Abbas et al. (2020) have concluded a significant effect of socio-economic variables, such as economic growth, current account balance, democracy, life expectancy, and access to electricity on external debt distress of selected South Asian countries.

The review of the above-discussed empirical studies has revealed that many economic and social variables can explain the external debt of MENA countries. The recent increase in military spending due to the explosion of regional and sectarian conflicts and the corresponding increase in military debt has increased the importance of peaceful resolution of regional and sectarian conflicts to contain arm races in the region and external debt distress. This study expands the literature by constructing an eclectic model incorporating military spending and other explanatory variables. It explores long-run and short-run effects on external debt distress of selected MENA countries by using the second generation of panel econometrics.

4. Methodological Framework

This section discusses model specification, estimation strategy, and data used to explore the effect of military spending and other explanatory variables on external debt distress in the Middle East and North African countries. The original objective of this study was to include a broader sample of MENA countries, but the unavailability of necessary to establish the relationship between military spending and external debt over a sufficient time frame restricted sample to 11 countries such as Algeria, Egypt, Morocco, Tunisia, Bahrain, Iran, Jordon, Kuwait, Lebanon, Oman, and Saudi Arabia from 2000 to 2019.

4.1 Model Specification

The existing literature has not provided any firm guideline regarding other explanatory variables to include in addition to military spending. To explore additional explanatory variables, one should inquire why and when a nation needs external borrowing. According to the three gaps model of Bacha (1990), the significant reasons for public borrowing are the gaps between domestic saving and investment, fiscal revenue and fiscal expenditures, and foreign exchange receipts and payments. Abbas and Wizarat (2018) consider fiscal gap and foreign exchange gap along with the military spending are the most important determinants to explain external debt of South Asia, whereas Waheed (2017) found domestic investment, fiscal gap, current account balance, inflation rate, and foreign exchange reserve as essential determinants of external borrowing in MENAP countries. This study constructed an eclectic model that incorporates military spending and the other explanatory variables suggested by the reviewed empirical literature to explain the behavior of external debt distress in selected MENA countries.

$$ED_{it} = \beta_0 + \beta_1 CAB_{it} + \beta_2 FB_{it} + \beta_3 ME_{it} + \beta_4 INF_{it} + \beta_5 RES_{it} + \mu_{it} \qquad (1)$$

Equation 1 is a panel regression model used to address the external debt of selected MENA countries. The explanation of variables, descriptive statistics, and the data source is reported in Table 2, while shows white noise error term. Including correlating economic variables as explanatory variables in a regression model without transformation can lead to various econometric issues such as multicollinearity and endogeneity. To reduce these problems and normalize data, this study transformed variables into % of GDP.

The popular literature of the three-gap model suggested that the need for public borrowing will increase with the increasing current account deficit and fiscal deficit. The empirical literature has also reported a significant positive effect of these gaps on external borrowing (Waheed 2017; Abbas and Wizarat 2018). Following gap theory and related empirical studies, the coefficients and are expected to have a significant positive effect. The increase in military spending can influence external debt through two important channels.

First, military spending is fiscal budget items that need to be financed. If taxable income is not sufficient to finance military spending, then a budget deficit may create the need for foreign borrowing. Second, the import of military equipment requires the foreign exchange, and the lack of foreign exchange will increase the need for external borrowing, (see Perlo-Freeman, *et al*., 2004; Dunne, *et al*., 2004; and Abbas and Wizarat, 2018). The coefficient is expected to have a significant positive effect on external debt distress of selected MENA countries.

Table 2. Variable Description and Descriptive Statistics

Variables	Definition	Mean	Med.	Max.	Min.	Std. Dev.	Source
ED	External debt as % of GDP	43.20	30.01	205.46	1.27	43.33	IMF (2020)
CAB	Current account balance as % of GDP	9.90	0.79	164.76	-56.72	29.17	IMF (2020)
FB	Fiscal balance as % of GDP	0.15	-2.52	43.17	-21.31	11.15	IMF (2020)
ME	Military spending as % of GDP	4.63	3.68	13.33	1.18	2.68	SIPRI (2020)
FER	External debt as % of GDP	30.18	21.53	108.65	4.53	23.14	IMF (2020)
INF	Inflation rate, change in CPI	4.94	3.25	41.06	-1.22	6.38	IMF (2020)

The inflation rate can contribute to the external debt of MENA countries as most of these countries have fixed exchange rate systems. Increasing the inflation rate would pressure the exchange rate to depreciate. To maintain a fixed exchange rate, these countries need foreign exchange, which can be met through external borrowing. The coefficient is therefore expected to have a significant positive effect on external borrowing. Foreign exchange reserves are another source of external finance just like external debt. Therefore, increase in foreign exchange reserve can reduce the need for external borrowing. On the other hand, an increase in reserve may indicate an enhanced ability to manage the debt, which may increase external borrowing (Waheed 2017).

4.2 Estimation Strategy

This study aims to explore the short-run and long-run effects of increasing military spending along with other explanatory variables on exploding external debt in selected MENA countries by using contemporary panel econometrics, as discussed in this section.

4.2.1 Cross-sectional Dependence and Panel CIPS Unit Root Test

The panel data combines cross-sectional observations over an extended period and exhibit cross-sectional dependency and unit problem. The traditional panel econometric analysis on cross-sectional dependent variables with unit root issues can lead to spurious results. To avoid this problem, this study proceeds with the investigation of the cross-sectional independence of selected explanatory variables by using the cross-sectional independence (CD) test proposed by Pesaran (2020).

This issue should be solved before applying panel unit root analysis as the traditional unit root test proposed by Im et al. (2003) (IPS) can be less effective for panel series with cross-sectional dependence. Pesaran (2007) modified the IPS unit root test to address cross-sectional dependence, known as the CIPS unit root test. This study has employed both IPS and CIPS unit root tests to explore the existence of unit root and order of integration.

4.2.2 Panel Co-integration

Traditional panel cointegration does not effectively address the cross-sectional dimension of series. Recent empirical research is urging for panel cointegration techniques that can explore long-run relationships among integrating variables with both a time series and cross-sectional dimensions. Therefore, this study employs both traditional panel cointegration proposed by Pedroni (2004) and second-generation panel cointegration analysis introduced by Westerlund (2007) to explore the existence of a long-run relationship among variables on the sample of 11 MENA countries.

The major issue with the traditional panel cointegration analysis is that it favors the null hypothesis of no cointegration even if economic theory suggests strong cointegration. Westerlund's cointegration test is based on structure rather than residual dynamics and does not impose common factor restrictions.

Moreover, this test is not limited by the assumption of normal distribution and provides more effective and accurate in the case of a small sample size compared to the Pedroni cointegration test. Westerlund panel cointegration test assesses the cointegration hypothesis by using two tests, i.e., panel test and group mean test. Westerlund has proposed four types of test statistics, such as Gt, Ga, Pt, and Pa, based on the error correction model that is normally distributed. Among these test statistics, Pt and Gt are based on standard error parameters of the error correction model; whereas Pa and Ga test statistics are based on the standard error of Newey and West that help to settle autocorrelation heteroscedasticity.

4.2.3 Long-run and Short-run Impact

After establishing a stable cointegrating relationship, this study proceeds with determining long-run and short-run relationships and adjusting short-term disturbances into equilibrium by using the panel pooled mean group (PMG) technique, introduced by Pesaran et al. (1999). The panel PMG model is an extension of the autoregressive distributed lag model of Pesaran et al (2001) that provides more superior explanatory power over alternatives and provides efficient long-run estimates compared to panel regression models and panel ARDL model. This technique provides homogenous long-run estimates and captures dynamic short-term cross-sectional heterogeneities and short-term disturbances' adjustment mechanisms. This model is sensitive to lag-length selection. The optimum lag length is selected based on minimum values of Schwarz

Bayesian criteria. Unconstraint PMG version of model 1 is presented in equation 2:

$$\Delta ED_{ijt} = \alpha_{0i} + \delta_1 ED_{ijt-1} + \delta_2 CAB_{it-1} + \delta_3 FB_{it-1} + \delta_4 ME_{jt-1} + \delta_5 INF_{ijt-1} +$$
$$\delta_6 RES_{it-1} + \sum_{k=1}^{n} \beta_1 \Delta ED_{ijt-k} + \sum_{k=0}^{n} \beta_2 CAB_{it-k} + \sum_{k=0}^{n} \beta_3 \Delta FB_{it-k} + \qquad (2)$$
$$\sum_{k=0}^{n} \beta_4 \Delta ME_{jt-k} + \sum_{k=0}^{n} \beta_5 \Delta INF_{it-k} + \sum_{k=0}^{n} \beta_6 \Delta RES_{it-k} + \mu_{it}$$

Where k shows optimally lag length selected based on minimum SBC. The significant negative value of the cointegration term reveals the existence of cointegration along with the speed of convergence of short-term disturbances into equilibrium in a year.

4.2.4 Sensitivity analysis

The stability of the estimated PMG model is explored by using recursive CUSUM and CUSUM of residual square plots; whereas the sensitivity of long-run estimates of the PMG model is explored by estimating long-run coefficients using fully modified ordinary least square (FMOLS) of Pedroni (2000), and dynamic ordinary least square (DOLS) regression techniques.

These models address potential serial correlation and provide long-run estimates. If long-run estimates' sign and significance level remains the same, results will be considered robust; otherwise fragile.

5. Estimated Results

This section discusses estimated results and establishes a short-run and long-run relationship between the external debt (ED) and military spending along with other explanatory variables.

Table 2 shows the result of cross-sectional dependence and unit root analysis performed to explore cross-sectional dependence and to examine the level of integration. The estimated CD test results reject the null hypothesis of cross-sectional independence of all selected variables at a 1 percent significance level, indicating cross-sectional dependence. The cross-sectional dependence urges the use of second-generation unit root analysis to explore the order of integration. The estimated result of the traditional Im et al. (2003) (IPS) unit test reveals the existence of unit root at the level of all variables, which become stationary at first difference. The result of the second-generation CIPS unit root test of Pesaran (2007) validates the order of integration at first difference.

Table 2. Result of panel CD and unit root test

Variables	Pesaran CD test		IPS at first difference		CISP Unit root Test
	CD test	Prob.	C	C & T	
ED	5.045	0.000	-2.801*	-1.527*	-2.939*
CAB	9.846	0.000	-6.330*	-4.580*	-3.529*
FB	13.252	0.000	-6.576*	-4.331*	-4.189*
ME	2.401	0.025	-4.912*	-3.471*	-3.187*
INF	9.701	0.000	-8.02*	-7.11*	2.409**
RES	20.065	0.000	-8.02*	-7.11*	-3.789*

*Source: Authors' estimation. Note * and ** indicate significance at 1 percent and 5 percent levels. Critical values of CIPS unit root test statistics are -2.18, -2.33, and 2.64 for significance at 10 percent, 5 percent, and 1 percent level, respectively.*

5.1 Result of Co-integration Analysis

The findings of the CD test and the unit root analysis urge the use of second-generation cointegration analysis and the traditional Engle-Granger-based panel cointegration analysis proposed by Pedroni (2004) to validate the existence of a long-run relationship between external debt and selected explanatory variables.

Table 3. Result of Pedroni cointegration analysis

Estimates	Statistic	Prob.
Alternative hypothesis: common AR coefficients (within dimension)		
Panel v-Statistic	0.434	0.332
Panel rho-Statistic	2.290	0.999
Panel PP-Statistic	-5.2183	0.000
Panel ADF-Statistic	-6.933	0.000
Alternative hypothesis: individual AR coefficient (between dimension)		
Group rho-Statistic	3.985	1.000
Group PP-Statistic	-4.182	0.000
Group ADF-Statistic	-5.272	0.000

Source: Authors' estimation. The null hypothesis is no cointegration.

The estimated result of Pedroni's (Engle-Granger-based) cointegration analysis in Table 3 reveals the existence of the long-run relationship. Both within the dimension and between dimension and ADF and PP test statistics rejects the null hypothesis of no cointegration. The estimated result of bootstrap panel cointegration analysis proposed

by Westland (2007) reported in Table 4 validates findings of Pedroni cointegration analysis. Hence, second-generation cointegration analysis validates the cointegration of selected variables in the long-run model of external debt of selected MENA countries.

The estimated short-run result in Table 5 revealed an insignificant effect of selected macroeconomic variables on the external debt of selected MENA countries. The significant negative coefficient of the cointegration equation validates the existence of cointegration with a lower adjustment mechanism as 15.5 percent of short-term disturbances converge to equilibrium in a year. The estimated result of PMG model estimates revealed that the current account balance and fiscal balance have a significant negative effect on the external debt of selected MENA countries. The findings of this study are consistent with the two-gap and three-gap proposition of Chenery and Strout (1966) and Bacha (1990). Moreover, the current account balance has higher explanatory power as one percent of GDP increase in current account balance would reduce external debt by 3.956 percent of GDP in the long run. It urges selected MENA countries to reduce their current account and fiscal imbalances to enhance external debt sustainability.

Table 4. Result of Westerlund (2007) panel cointegration

Statistic	Constant				Constant and trend		
	Value	Z value	P-value		Value	Z value	P-value
Gt	-2.941	-3.128	0.000		-2.417	-2.638	0.000
Ga	-3.125	-1.921	0.063		-2.917	-4.184	0.000
Pt	-5.146	-4.534	0.000		-3.216	-1.960	0.000
Pa	-4.215	-5.375	0.000		-3.612	-2.631	0.000

Source: Authors' estimation. The null hypothesis is no cointegration.

5.2 Findings of PMG model

The estimated result in Table 5 reports cointegration along with the long-run and short-run effects of selected explanatory variables on the external debt of selected MENA countries, investigated using panel pooled mean group estimator.

Table 5. Result of Panel PMG model. Dependent variable: external debt, % of GDP

Variable	Coefficient	Std. Error	Prob.
Long Run Equation			
Current account balance, % of GDP	-3.956	1.030	0.000
Fiscal balance, % of GDP	-0.725	0.608	0.004

Variable	Coefficient	Std. Error	Prob.
Long Run Equation			
Military expenditure, % of GDP	4.307	1.002	0.000
Inflation rate, change in CPI	0.575	0.839	0.494
Foreign exchange reserve, % of GDP	-0.442	0.246	0.075
Short Run Equation			
COINTEQ	-0.155	0.032	0.085
Δ (Current account balance, % of GDP)	0.044	0.646	0.946
Δ (Fiscal balance, % of GDP)	-0.029	0.146	0.842
Δ (Military expenditure, % of GDP)	-1.345	1.151	0.245
Δ (Inflation rate)	0.536	0.484	0.270
Δ (Foreign exchange reserve, % of GDP)	0.222	0.279	0.429
Diagnostics			
Mean dependent variable	0.705	Log likelihood	-515.010
S.E. of regression	8.156	Akaike info criterion	5.800
S.D. dependent variable	80.952	Schwarz criterion	6.872

Source: Authors' estimation

The long-run coefficient of military expenditure revealed a significant positive effect of the high intensity on the external debt of selected MENA countries. One percent of GDP increase in military expenditure increases external borrowing by 4.307 percent of GDP. This result is consistent with the argument established by Smith and Nararayan (2009). It implies that a reduction in regional military spending will positively affect external debt sustainability. It urges selected MENA countries to peacefully resolve regional and bilateral disputes to free capital for productive economic activities. The long-run inflation coefficient reveals an insignificant effect, whereas, foreign exchange reserve shows a significant negative effect on external debt. One percent of GDP increase in foreign exchange reserve can reduce external borrowing by 0.442 percent of GDP. It implies that an increase in foreign exchange reserve provides required foreign exchange and reduces the need for external borrowing.

5.3 Sensitivity Analysis

This section performs sensitivity analysis for estimated long-run coefficients of panel PMG model by estimating the long-run coefficients of selected explanatory variables by using fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS). The estimated results reported in Table 7 revealed that the sign and significance of long-run coefficients estimated using FMOLS, DOLS, and CCR are consistent with the PMG model estimates. The findings thus validate the robustness of the PMG model.

Table 6. Result of Robustness Analysis
Dependent variable*:* external debt, % of GDP

Variables	FMOLS		DOLS	
	Coefficient	t-Statistic	Coefficient	t-Statistic
C	4.157	2.703**	6.852	1.713***
CAB	-1.141	-2.721**	-0.852	-1.703***
FB	-0.782	4.527*	-0.559	2.582**
ME	0.245	4.885*	0.376	4.673*
INF	1.245	0.245	0.951	1.125
FER	-0.245	-4.885*	-0.376	-4.673*
R-squared	0.748		0.887	
S.E. of reg.	2.231		1.892	

*Source: Author's estimation. Note *, **, and *** reveal significant levels at 1 percent, 5 percent, and 10 percent, respectively.*

6. Conclusion

The Middle East and North Africa (MENA) is the epicentre of conflicts due to vast natural resources, unique geographical position, and the birthplace of all monotheist religions. This region is massively spending on its military equipment and is highly indebted. The exploding external debt distress and corresponding debt service payments have become a major concern for these countries. This study investigates the nexus between military expenditure and exploding external debt in 11 countries of the Middle East and North Africa (MENA) from 2000 to 2019 by constructing an eclectic model of external debt that incorporates military expenditure along with other explanatory variables suggested by gap models and empirical literature such as current account balance, fiscal balance, inflation rate, and foreign exchange reserve.

The existence and nature of the long-run relationship are investigated using the second generation of panel econometrics such as cross-sectional independence (CD), CIPS unit root, Pedroni and Westerlund cointegration analysis, and panel PMG model. Sensitivity analysis of long-run estimates of PMG model is investigated by using fully modified ordinary least square (FMOLS) and dynamic ordinary least square regression analysis. The estimated result of second-generation unit root and cointegration analysis and Pedroni cointegration reveal a long-run relationship between external debt and selected explanatory variables. The estimated result of long-run estimates of the PMG model reveals that current account balance, fiscal balance, and foreign exchange reserve have a significant negative effect on the external debt of selected MENA countries, whereas, positively explained by the increasing military spending. However, the findings of short-run estimates reveal insignificant effects, whereas the dynamic cointegration equation reveals significant negative effects. Sensitivity analysis of long-run estimates of the PMG model confirms the robustness of established relationships.

 The finding of this study, constrained by the small sample size, argues selected MENA to encourage a culture of dialogue for outstanding disputes and efficiently utilize their available productive resources into more efficient production processes. Besides containing unproductive spending, they should adopt stable economic and trade policies that would increase their current account balance, fiscal balance, and foreign exchange reserve to address exploding external debt problems. Future research could expand the scope of this study by increasing the sample size and inclusion of other political, economic, and social variables.

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