The Impact of Military Expenditure on Economic Growth in Developing Countries: MENA Case

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Abstract

This paper examines one of the puzzling results of economic growth literature, i.e. the impact of military expenditures is frequently found to be non-significant or negative and sometimes positive, yet most countries spend a large fraction of their gross domestic product on military. The objective of this paper is to investigate the impact of military expenditure on the economic growth in 11 developing countries from the Middle East and North African Region (MENA) using time series data for 45 years (1960-2005). Multivariate cointegration and variance decomposition techniques were used to investigate this relationship. Conflicting results were found showing a negative relationship between these two variables in some countries, and a positive one in others. These results are associated with conflicting views in existing theoretical literature. This ambiguity, emerging from the empirical and theoretical sides, does not help to draw a general conclusion on how military expenditure affects economic growth.

أثر الإنفاق العسكري على النمو الاقتصادي في الدول النامية : دول الشرق الأوسط وشمالي افريقيا

وداد سعد
شوقي الموسوي

ملخص

يعالج هذا البحث أحد النتائج المحيرة لأدبيات النمو الاقتصادي المتعلقة بأثر الانفاق العسكري على النمو الاقتصادي، حيث تظهر الدراسات نتائج متناقضة بشأنه. فمنها ما يعتبر أن لا علاقة ذو أثر ذو دلالة بين هذين المتغيرين، والبعض الآخر يشير إلى علاقة سلبية أحياناً وإيجابية أحياناً أخرى. ومع ذلك، فإن معظم الدول لازالت تنفق جزءاً كبيراً من ناتجها المحلي الإجمالي على القطاع العسكري. تهدف هذه الدراسة إلى فحص أثر الإنفاق العسكري على النمو الاقتصادي لإحدى عشرة دولة في الشرق الأوسط وشمالي أفريقيا، وذلك من خلال إستخدام سلاسل زمنية تعود لمدة 45 سنة (1960-2005). لقد أجري اختباري التكامل ،العلاقة السببية بمفهوم " جرانجر " (Granger Causality) وذلك في محاولة لفحص هذه العلاقة. وبناءً عليه، فقد تم الحصول على نتائج متضاربة تظهر وجود علاقة سلبية في بعض الدول وإيجابية في دول أخرى . تترافق هذه النتائج مع التضارب الموجود في الأدبيات النظرية. هذا الالتباس الذي ينبثق من الناحيتين النظرية والتطبيقية لا يساعد على استخلاص نتيجة عامة حول كيفية تأثير الانفاق العسكري على النمو الاقتصادي.

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Introduction

The notion whether military spending, or more generally, government spending, has an impact on the economic growth and vice-versa, has been a controversial issue. A thrust of empirical studies has attempted to disentangle this dilemma, but conflicting results have been obtained. While some fluctuate between the presence of a positive or negative relationship, others conclude that no consistent evidence exists for a significant relationship. Most of these studies used cross-sectional data to link economic performance to government expenditure. The disadvantage of cross-sectional analysis is that it may identify correlation but not causation between variables or specific effects for each country. They often incorporate a mixture of developed and developing countries in their data. Others are concerned with advanced rich countries. Few studies focus on developing countries.

The relationship between the government expenditure and growth is especially important for developing countries. These countries have experienced increasing levels in government consumption expenditure over time associated with rising fiscal deficits that may be translated to an adverse effect on growth. This is the reason for the authors' interest in this study of military expenditures in developing countries.

Countries of the Middle East and North African Region (MENA) are characterized by large fiscal imbalances due to high expenditures and the vulnerability of government to external shocks. Due to political instability in this region, the military burden is very high compared to international standards. Almost all of these countries have undertaken some fiscal adjustments (reducing expenditures). Thus, with the increase in population rate and the vulnerability of revenues to external shocks, persistent per capita economic growth is still a major question. This situation awakens in policymakers the need to put forward a macroeconomic environment that would enhance private investment and economic growth and the predominant role that public sectors plays in MENA economies, especially in controlling the resources, their contribution to output and their effect on economic incentives; in reallocating expenditures to productive areas and in establishing public finance reforms. All these factors play critical roles in dealing with this issue.

This paper is concerned with the decomposition of government expenditure into military spending and non-military spending (civilian government expenditure) to examine the impact of each component on growth and vice-versa. For this purpose, the MENA region was selected as field of this study. To constitute the sample of analysis over the period 1960-2005, eleven countries were selected: Algeria, Egypt, Iran, Israel, Jordan, Kuwait, Morocco, Saudi Arabia, Syria, Tunisia, and Turkey. The timeline period of 1960-2005 was selected to ensure the inclusion of as many countries for which data are available.

The purpose of this study is to provide insights on the interaction between government consumption expenditure (used as a proxy of government spending) and military government spending and economic growth by modeling short-run and long-run dynamic relationships between these variables. Multivariate Johansen's (1988, 1991) cointegration test and Granger causality tests (1969, 1988) were used and a vector error correction model (VEC) was constructed for this purpose.

Theoretical Literature and Empirical Evidence

Economists are divided as to whether government expansion boosts or dampens economic growth. Advocates of higher government spending argue that the intervention of the government can foster the economic growth by injecting money in the private sector (Henrekson and Lybeck, 1988; Landau, 1983, 1986). On the other hand, proponents of the opposite view (Barro, 1991; Ghali, 1998) assume that an increase in government spending undermines economic growth by transferring additional resources from the productive sector of the economy to the public sector, which uses them less efficiently. They also explain that government spending requires costly financing choices and all of the options used for financing the government expenditure have adverse consequences. For instance, taxes discourage the productive behavior and borrowing consumes capital that otherwise would be available for private investment.

These two mainstreams may be categorized as Keynesian and classical (and neoclassical) controversies (Ram, 1995; Chowdhury, 1991; Mintz and Stevenson, 1995, Knight, Loayza and Villanueva, 1996). The Keynesian theory asserts that by borrowing money from the private sector and then spending it through various programs, the government pumps purchasing power in the economy that could provide short-term stimulus to help end a recession. The

opponents of this theory (e.g. Razzolini and Shughart, 1997) argue that borrowing, which is materialized by budget deficits, may lead to higher interest rates that hamper investment which is necessary for long-run economic growth. Classical and neoclassical economists allege that an increase in public spending crowds out private investment and believe in the self-regulating mechanisms that lead the economy back to equilibrium.

Economic theory has illustrated how public expenditures may either be beneficial or detrimental to economic growth. In macroeconomics, especially the Keynesian school of thought, it has been assumed that various kinds of public spending can contribute positively to economic growth through multiplier effects on aggregate demand. Keynesians argue that government programs provide valuable "public goods" such as education and infrastructure, health care, airports, and postal operations (Ram, 1986). However, the Keynesians stipulate that a reduction of government spending should be taken into consideration once the economy has recovered in order to prevent inflation, which could result from too much economic growth. Or, from the classical and neoclassical point of view, these services could be provided by the private sector with higher quality and lower cost and the government by its intervention in the competitive markets, hampers the process of determining the prices that ensures the most efficient allocation of resources. Moreover, the fiscal deficits and the associated effect on interest rates are supposed to be behind the crowding out of private investment (Diamond, 1989). Thus, a higher tax burden and more government debt will hinder the economic performance.

Military spending is one of the expenditures that may exert an adverse effect on economic growth by distorting resource allocation and by diverting resources from productive activities to the accumulation of armaments and the maintenance of sizeable military forces. However, according to Benoit (1978), in less developed countries, (LDCs) the decrease in military spending results in a small percentage, if any, that goes to productive activities. Thus, the decrease in military spending will not necessarily enhance economic growth. On the other hand he assumes that in LDCs, military spending may contribute efficiently to the economic growth through different ways especially by providing education and technical training that can improve human capital. It is important to note that there exists not only a significant difference in the composition of public expenditure between developed and developing countries, but the difference is also profound in the way in which public expenditures form the outcome in these two set of countries.(1)

A host of empirical studies have attempted to examine the effect of government spending on economic growth in order to determine which theory is most accurate. These studies have shown conflicting results. Some of them reveal a negative government spending-growth relationship (Feder, 1983; Grier and Tullock, 1989; Alexander, 1990; Romer, 1990; Barro, 1990, 1991; Easterly and Rebelo, 1993; Tanninen, 1999; Fölster and Henrekson, 1999). Others give evidence of positive impact of the government expenditures and economic performance (Grossman, 1988;Chan and Gustafson, 1991; Devarajan, et al., 1996; Bose, Haque, and Osborn, 2003). Ram (1986) finds a positively significant effect of the government spending on growth in LDCs; but the whole sample of 115 countries (composed of developed and LDCs) show a negative relationship. Using panel data of 62 countries over a period from 1960 to 1985, Lin (1994) obtains mixed results, where the relationship is insignificant in the advanced and rich countries and positively significant in the LDCs. In a study of the Organization for Economic Cooperation and Development (OECD), Agell, Lindh, and Ohlsson (1999) demonstrate that the relationship is not significant.

Many studies focus on the impact of global government spending on economic performance. Others are interested in the particular effect of the components of the government expenditures on economic growth. After Benoit's seminal contribution (1973, 1978), numerous empirical studies have attempted to assess the impact of military expenditure on economic performance. Benoit is the pioneer in his findings of a positive defense-economic growth relationship in LDCs and has opened doors for further research that contradict or confirm his results (Stewart, 1991; Dunne, 1996; Ram, 1995; Fontanel, 1990; Gleditsch, et al., 1996; Sala-i-Martin, et al., 2004). The diversity of the results that have been swinging between negative or positive effects and even insignificant relationship could be attributed to the use of different types of study (cross section or panel time series), the heterogeneous groupings of countries (different regime, geographic region), or the nature of variables (levels or growth).

Two kinds of models have been adopted in most studies concerning the economic impact of military spending: (a) Single-equation models which assume that military expenditure is exogenously determined and that the effect goes from military spending to economic growth. This approach captures the direct effects of military spending on economic growth. (b) The second kind of models relies on simultaneous equation systems emphasizing the direct and indirect effects of military expenditure.

For instance, in a study that encompasses 26 African countries over the 1967-1976 period, Smith and Smith (1980) used the Three Stage Least Squares (3SLS) to estimate a three-equation simultaneous model and alleged the presence of a bidirectional influence between the economic growth and military burden. Moreover, Joerding (1986) used Granger-causality test and found that military spending is not a strong exogenous variable. Chowdhury (1991) analyzed the causal relationship between defense and economic growth in 55 developing countries and concluded that any relationship cannot be generalized and may vary from one country to another according to each case specification.

In fact, the unidirectional relationship from the public spending to economic growth is referred to as the Keynesian view. On the other hand, the opposite direction causality from economic growth to public spending was formulated by Adolph Wagner in 1890. It is referred to as Wagner's law. His theory emphasizes economic growth as the fundamental determinant of public sector growth.

Recently, empirical studies have undertaken the focus on testing whether there is a unidirectional or bidirectional causality between economic performance and public spending. For instance, Loizides and Vamvoukas (2005) used a bivariate and trivariate tests to examine if the government size Granger causes the economic growth or vice versa. Although, the causality analysis has thrown interesting light on the phenomenon, results stemming from various studies cannot be generalized since they may differ from one country to another.

Data Description and Definition of Variables

To investigate the impact of military expenditure on economic growth, eleven countries from the Middle East and North African Region (MENA) were chosen to constitute the field of study: Algeria, Egypt, Iran, Israel, Jordan, Kuwait, Morocco, Saudi Arabia, Syria, Tunisia, and Turkey to make a group of countries for analysis. The choice of these particular countries is due to the availability of an extended and reasonably representative series data. The econometric estimation period spans from 1960 to 2005 since the longest and complete data sets obtained cover this period time. However, data pertaining to Algeria and Kuwait start in 1962 and those related to Tunisia, Syria, Jordan, and Saudi Arabia start in 1961, 1963, 1967, and 1968, respectively. As to Turkey, the series used in this study cover the period from 1969 to 2004.

Using time series data that were collected for each country, data consist of annual measures of nominal Gross Domestic Product (GDP), nominal government consumption expenditure (GE) and military expenditures (ME) plus the GDP deflators for all countries. These variables were drawn from the International Financial Statistics Yearbook of the International Monetary Fund (various years) except the military expenditures which were taken from the Stockholm International Peace Research Institute (SIPRI), the United States Arms Control and Disarmament Agency (ACDA) and the World Development Indicators 2006 CD-ROM.

The variables used in this study are based on these measures. The data transformation has led to define the following variables:

The first variable of interest is the real gross domestic product of each country, expressed in its current local currency. These measures were calculated based on GDP deflators for some countries and consumer price indices for other countries. The second variable is the ratio of total nominal government consumption expenditure to nominal GDP (GE). It is used as a measure of government size. The third variable is the ratio of military expenditure to GDP (ME), to proxy the military burden of these countries.

All the variables used in the econometric models are evaluated in logarithmic form defined as follows:

LGDP is the natural logarithm of the real GDP in billions of current local prices.

LME is the natural logarithm of the military burden.

LGE is the natural logarithm of the share of non-defense government consumption expenditure in GDP.

Empirical Results

Most of the models used to examine the defense-growth relationship are based on Neoclassical or Keynesian theoretical frameworks. The latter puts the accent on the demand side, while the former concentrates on the supply-side. An alternative approach that has attempted to examine the series without developing a structural model has emerged. This refers to Vector Autoregressive (VAR) models which allow for testing the causal linkages using the Granger causality test (1988).

Since the principal aim of this paper is to evaluate empirically the causal link between the size of the public sector and military expenditure and economic growth within a trivariate framework, the authors used the Johansen's cointegrating VAR approach (1988), on the eleven countries chosen from MENA for country comparison. The Johansen procedure sets up a VAR model with Gaussian errors, which can be defined by the following Error-Correction model:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \cdots\cdots + \Gamma_{k-1}\Delta X_{t-k+1} + \Pi_k X_{t-k} + \mu_t + u_t$$

where Δ is the difference operator. X_t is a $p \times 1$ vector of non stationary variable (in levels). μ_t is the deterministic element of the VAR model and u_t is the vector of random error. The Johansen technique determines whether the coefficient of matrix Π contains information about the long-run properties of the VAR model.

Properties of the Variables

To test for the presence of a unit root for each variable in the model, Augmented Dickey Fuller (ADF, 1979), Philips-Perron (PP, 1988), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) tests were conducted. Table 1, Appendix presents the ADF, PP, and KPSS tests for the unit roots where an intercept and trend are included as well as when the data are in first difference for the eleven countries for the logarithm of GDP, CGE, and ME. Akaike's Information Criterion (AIC, 1973, 1974) and Schwarz Bayesian Criterion (SBC, 1978) were used to determine the lag order of each variable under study.

According to these results, all series are non-stationary in levels for all countries expect for the CGE series belonging to Syria and Israel. However, all series are stationary in difference in all countries. Hence, tests for stationarity indicate that the null hypothesis of a unit root cannot be rejected for the levels of the variables. Using differenced data, the tests suggested that the null hypothesis is rejected for the individual series, at the five percent significance level, except for the CGE of Egypt where the null hypothesis is rejected at 5% level of significance for the ADF and PP, the KPSS indicates the presence of a unit root in this series. The differenced series are proved to be stationary and thus, the variables LGDP, LGE, and LME are integrated of order one, I(1). The results of these tests are reported in Table 1, Appendix .

Having determined that the variables are stationary in first differences, the Johansen cointegration test (1991) was performed to examine whether the variables in question have common trends.

Test of Number of Cointegrating Relationship

With the integration properties of the series having been established, the authors examined whether there is a long-run relationship between the variables in question for each country. The Johansen cointegration method was used for testing cointegration. The optimal lag length for each variable is determined empirically by using the Akaike information criterion.

Tables 2 and 3, Appendix show the order of VAR. The Likelihood Ratio test based on the maximum Eigenvalues of the stochastic matrix and the one based on the trace of the stochastic matrix were used for the cointegration test. Due to space consideration, only the results for the latter test are reported in Table 2, Appendix for the countries that have significant cointegration tests (i.e. Jordan, Saudi Arabia, Syria, and Turkey). For each country, the null hypothesis of no cointegration (H_0: r = 0 is rejected by both tests in favor of the alternative (r = 1), indicating that there is one cointegrating vector in all the series.

The existence of one cointegrating vector between the series in question LGD, government consumption expenditure LGE, and LME should be taken into consideration when the short-run causality between the variables is examined. To find the direction of the causality, the standard Granger tests were used augmented by the error correction term (ECT) which derived from the long-run cointegrating relationships. The ECT is the lagged value of the estimated residuals from each of the cointegrating regressions displayed in Table 2, Appendix.

The cointegrating series can then be modeled in a VAR specification. The choice of the lag length of the VAR model was based on the Schwarz's final prediction error. Different lags are reported for the four countries – Jordan, Saudi Arabia, Syria, and Turkey. As to the remaining countries, the residuals of the long-run relationships appear to contain unit root in their levels and stationary in their differences, indicating that they are integrated of order one.

Using VAR models in differences for these countries, the VAR structure is based on AIC and SBC values, which sets different values of lag length to these countries, but the models are not reported due to space consideration.

The second step was to test for cointegration relationship between relevant variables. The results of Johansen's maximum eigenvalue test (λ_{max}) are reported in Table 2, Appendix. This test shows that one cointegration relationship among the variables exists for Jordan, Saudi Arabia, Syria, and Turkey. The results indicate that military burden affects long-run economic growth negatively in the four countries, whereas government consumption expenditures affect economic positively the economic growth in Jordan, but negatively in Saudi Arabia, Syria, and Turkey.

Two Specifications of the VAR Models

Two specifications of the VAR models on the eleven Arab countries were applied:

- The standard Granger causality test (SGC) – i.e. there is no cointegrating relationship – which is applied to seven countries (Algeria, Egypt, Iran, Israel, Kuwait, Morocco, and Tunisia) in the first differences.
- The Granger causality test augmented by the error correction term derived from the cointegrating regressions (i.e. the existence of cointegration is taken into account). Thus, the error correction model (ECM) was applied to the four countries of Jordan, Saudi Arabia, Syria, and Turkey to detect the direction of causality between the variables.

The SGC results between variables in each of the seven countries are presented in Table 3, Appendix. Bidirectional causality between GDP and ME was detected in Egypt and Israel indicating a feedback. However, a unidirectional causality appeared in Iran, Morocco, and Tunisia. The absence of causality between GDP and CGE in both directions in Algeria and Kuwait is noted.

As to government consumption expenditure and GDP, there is absence of any causality relationship between these in Egypt and Morocco. Bidirectional causality relationship between these variables is present in Tunisia. The remaining countries demonstrate unidirectional causality between these variables.

With respect to GE and ME, three bidirectional relationships are noted in Kuwait and Tunisia. The absence of causality between these variables is observed in Algeria, Iran, and Israel. The rest of countries show unidirectional relationships between these variables.

To sum up, findings support the usual results of negative relationships between economic growth and military burden in all countries except in Morocco and Israel where this relationship is found to be positive. These relationships are statistically significant in Jordan, Saudi Arabia, Turkey, Egypt, and Israel but not in the other countries. The negative effect may be explained by the fact that these expenditures do not have any positive effects on the productivity and probably generate an increase in the taxes. Their impact is therefore negative on the economic growth.

The positive link may be explained by the fact that military spending is at the origin of security context which is favorable for the investment and therefore for the economic growth. Thus, military expenditure could constitute positive externality sources that may reflect a positive impact on the economic growth. There are two ways by which military expenditure exercise its positive impact on growth. The first one is manifested in the reinforcement of the national security (as well as law) which will improve the protection of the property rights. The latter implies a decrease in the marginal rate of taxation. Therefore, an increase in the military expenditure allows an increase in the saving rate of the producers who feel well protected. Moreover, the increase in the saving rate induces an increase in the investment and therefore, the economic growth.

The effect of military expenditure on growth, via marginal productivity, is indirect but real. Military expenditure may induce a decrease in the permanent income which leads to a decrease in the demand and increase in the work force. The second explanation appears when the military expenditure has a multiplier effect on the employment, investment, income, and therefore on the fiscal returns of the government. In the opposite, a high level of civilian government expenditure is, in general, accompanied by a high budget deficit. This situation leads to an acceleration of the inflation and an eviction effect on the financial market.

As to government consumption expenditure, it has a negative relationship with the economic growth in all countries except in Jordan, Algeria, Egypt, Israel, and Kuwait where a positive relationship is detected. These relationships are statistically significant in Algeria, Jordan, Syria, Iran, Kuwait, and Israel but not in the other countries. Government consumption expenditures are not necessarily bad for some countries, but they negatively affect the economic growth in other countries. The latter case may be partly explained by the unproductive use of the resources. The reallocation of these expenditures from unproductive to productive spending is required to achieve higher growth rates.

Results of Variance Decomposition and Impulse-Response Functions

The objective of this section is to determine the relative importance of each variable in explaining output growth rate beyond the sample period for each of the eleven countries. The variance decomposition functions provide information about the percentage importance of each random innovation in affecting the variables in VAR and impulse response functions trace the effect of one-time shock to one of the innovations on current and future values of the endogenous variables. The results for two, five, ten and twenty years are presented in Tables 4 and 5 Appendix. Since the innovations are not necessarily uncorrelated, the residuals are orthogonalized using the Choleski decomposition to obtain a diagonal covariance matrix of the resulting innovations and to isolate the effects of each variable on economic growth.

The main results in Tables 4 and 5 may be summarized as follows:

- Government consumption expenditures in Morocco, Egypt, Algeria, Saudi Arabia, Jordan, Turkey, and Israel explain less than or close to 1% of the forecast-error variance economic growth in the first period and goes from less than 1% to 50% in the 20th year (Table 5). However, this percentage goes from about 7% to 12% in the first year in Iran, Kuwait, Syria, and Tunisia. It spans form about 8% to 36% in the 20th year.

- The impulse response functions in Table 5 show that the economic growth responses to government consumption expenditure shocks have a decreasing magnitude, except for Jordan, Syria, and Turkey where the effect of innovations persist with increasing magnitude.

- The obtained results in Table 4 show that military burden explains less than 1% to about 3% of the forecast-error variance of economic growth in the first year. This proportion moves from 2% to about 46% in the 20th year. The impulse responses to military burden start from less than 1% in Jordan to -141.27% in Saudi Arabia in the first year and decline very quickly in most countries except for Saudi Arabia and Jordan and Syria (Table 5).

- The forecast-error variances of military burdens are mostly explained by their own previous shocks in all countries but less than 30% of that variance is explained by its own previous shocks in the case of Tunisia

and about 50% is explained by shocks to government consumption expenditures.(2)

These results show that while military expenditures seem to be exogenous and independent of economic growth and civilian expenditures in all countries, in Tunisia, these two variables constrain the military burden. One possible explanation is that some these countries are still under the Israeli-Arab conflict and others have the threat of other countries. Therefore each country sees the increase of military expenditures in the other country as a threat to its own security and reacts by increasing military expenditures. This is not the case for Tunisia, which does not consider itself as an active partner in the conflict.

Conclusion

In the recent past, empirical studies have focused on the impact of government spending, and more specifically, military spending, on economic growth to give evidence on a significant relationship or to determine the direction of causality between these variables. The preponderance of research strongly supports the hypothesis that either government spending or military spending has generally adverse effects. While a number of studies give evidence of the presence of a negative relationship, others suggest a positive relationship. A third category ascertains that there is no evidence of the presence of a consistent and significant defense-growth relationship.

These contradicting results mainly stem from two facts. The first refers to the use of cross-sectional or panel data that encompass a mixture of developed and developing countries. The second fact is attributed to the use of statistical tools that do not take into consideration the specific effect of each country or the choice of the econometric model to be estimated. Studies of single countries are very rare.

This research attempts to address an important gap that currently exists in the literature by considering eleven countries from MENA and analyzing them individually over the period 1960-2005. This period has been selected to ensure the inclusion of many countries for which data are available. Using a vector error correction model and Johansen analysis, it aims to examine if there is a relationship between military expenditure and economic performance.

Multivariate contegration and variance decomposition techniques were employed to investigate the relationship between military expenditure and economic growth. These techniques combine the long-run relationship with the short-run one that takes into account the deviation of the long run-equilibrium and adjusts them to their equilibrium path. The objective is to see if there is a causal relationship between government expenditures, both civilian and military components, and economic growth in eleven countries wherein governments play major roles in the economies and large proportions of spending go to the military.

Conflicting results are obtained, indicating an ambiguity in the effect of military expenditure on economic growth. Negative relationships between economic growth and military burden are detected in all countries except in Morocco and Israel where this relationship is found to be positive. These relationships are statistically significant in Jordan, Saudi Arabia, Turkey, Egypt, and Israel but not in the other countries. The positive sign may be attributed to the fact that some literature indications which stipulate that military spending provides security and stability and the foundations of modernizations that are preconditions of social and economic development. The negative sign may be ascribed to the argument of some scholars that military spending tends to inhibit democratic and human resource development. In the Middle East, this is mostly due to political threats.

Similarly, the analysis of the impact of civilian government expenditure shows contradicting results. The negative unidirectional causality from government expenditure to economic growth may be due to military burdens. Military spending is found to be exogenous to both government civilian expenditures and economic growth, except for Tunisia.

To further support these findings, beyond the sample period, the researchers decomposed the forecast-error variance of each of the three variables and obtained their impulse response functions to exogenous shocks on the other two variables. The results confirm the Granger causality findings within the sample period.

As a result, shifting resources from military to civilian spending seems to enhance long-run economic growth of Jordan and the short-run of the all countries except Egypt, Iran, and Tunisia where resources must be reallocated from unproductive civilian activities to productive ones in order to foster economic growth.

Most of these countries suffer from differences in their security environment, for instance: the Arab-Israeli conflict, the precaution between Iranian and Arab countries, the Algerian problem with Morocco, and so on. These countries share common characteristics in being all developing countries. Their economic similarities and security differences make them interesting subjects of analysis as they represent relatively homogeneous groups of countries.

Overall, there is no general empirical conclusion that may be drawn as to the economic effects of military spending on these countries. The results show the difficulty of making judgments on the economic effects of military spending even across a group of relatively homogeneous countries.

There is a need to conduct further research focusing especially on determining the causal relationships between military expenditure and a number of development indicators (as opposed to measurements of economic well-being).

Footnotes

(1) For more details, please refer to the World Bank Report (1988).

(2) The results are not reported here due to space limitation.

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Appendices

Table (1) ADF Unit Roots Test Results

Country	Variable	ADF with Trend and Intercept							
		Levels				First Differences			
		ADF	K	PP	KPSS	ADF	K	PP	KPSS
Algeria 1962-2005	LGDP	-2.443	0	-2.445	0.293	-7.423	0	-14.198	0.106
	LCGE	-2.385	0	-2.382	0.140	-6.887	0	-6.887	0.131
	LME	-1.421	0	-1.496	0.239	-4.205	0	-6.183	0.062
Egypt 1960-2005	LGDP	-1.379	0	-1.762	0.189	-5.119	0	0.069	0.071
	LCGE	-1.850	1	-2.074	0.153	-4.905	0	-4.960	0.188
	LME	-2.282	0	-2.336	0.156	-5.834	0	-5.839	0.081
Iran 1960-2005	LGDP	-1.924	4	-1.823	0.177	-4.009	3	-4.811	0.081
	LCGE	-1.883	0	-1.691	0.268	-6.351	0	-6.345	0.041
	LME	-1.592	0	-1.869	0.138	-6.093	0	-6.146	0.110
Israel 1960-2005	LGDP	-2.539	1	-2.534	0.219	-5.199	0	-5.199	0.129
	LCGE	-6.494	0	-6.494	0.083	-8.501	1	-23.493	0.046
	LME	-1.866	0	-1.824	0.257	-8.069	0	-8.053	0.122
Jordan 1967-2005	LGDP	-1.875	0	-2.052	0.171	-4.588	0	-4.494	0.066
	LCGE	-2.866	3	-4.667	0.174	-3.767	3	-14.107	0.048
	LME	-5.070	0	-5.083	0.115	-10.018	0	-12.814	0.079
Kuwait 1962-2005	LGDP	-2.062	0	-2.062	0.185	-6.160	1	-6.826	0.098
	LCGE	-2.504	0	-2.377	0.130	-8.472	0	-8.844	0.098
	LME	-2.469	0	-2.596	0.161	-6.030	0	-6.128	0.066
Morocco 1960-2005	LGDP	-1.339	1	-1.224	0.284	-8.476		-8.444	0.024
	LCGE	-2.444	0	-2.444	0.109	-7.077	0	-7.147	0.048
	LME	-2.312	0	-2.210	0.177	-8.225	0	-8.629	0.067
Saudi Arabia 1968-2005	LGDP	-3.497	1	-2.540	0.113	-4.034	1	-3.974	0.125
	LCGE	-1.357	0	-1.623	0.193	-4.405	1	-4.147	0.081
	LME	-2.118	0	-2.036	0.208	-7.171	0	-7.508	0.062
Syria 1963-2005	LGDP	-1.759	0	-1.738	0.210	-7.490	0	-7.458	0.070
	LCGE	-3.368	0	-3.411	0.067	-6.877	0	-7.150	0.059
	LME	-1.909	0	-1.658	0.247	-7.549	0	-8.137	0.067
Tunisia 1961-2005	LGDP	-6.526	9	-1.433	0.254	-2.118	9	-8.325	0.089
	LCGE	-2.777	0	-2.860	0.161	-7.693	0	-7.697	0.039
	LME	-2.896	0	0.147	0.154	-7.258	0	-7.399	0.054
Turkey 1969-2004	LGDP	-1.712	0	-1.615	0.153	-6.944	0	-7.072	0.061
	LCGE	-2.591	1	-1.804	0.124	-4.168	0	-4.052	0.052
	LME	-3.183	1	-1.979	0.083	-4.084	0	-3.938	0.073

LGDP, LCGE, and LME are the natural logarithms of real GDP, the natural logarithm of the government consumption expenditures to nominal GDP, and the natural logarithm of the military burden, respectively.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table (2) Johansen Cointegration Test Results

Variable	λ_{max}		P*	r *	Cointegration Equation
Jordan LGDP, LCGE, LME	20.041**	9.476	4	1	LGDP = -0.516 + 2.344LCGE – 0.806LME (5.738) (-3.541)
Saudi Arabia LGDP, LCGE, LME	24.187**	10.203	3	1	LGDP = 9.106 -0.226LCGE – 2.242LME (-0.204) (-3.189)
Syria LGDP, LCGE, LME	22.299**	11.349	1	1	LGDP = 20.151 - 4.917LCGE -0.413LME (-2.782) (-0.482)
Turkey LGDP, LCGE, LME	25.539**	0.515	1	1	LGDP =10.805 -0.309LCGE - 4.672LME (-0.758) (-4.439)

LGDP, LCGE, and LME are the natural logarithms of real GDP, the natural logarithm of the government consumption expenditures to nominal GDP, and the natural logarithm of the military burden, respectively.

Numbers in parentheses are t-ratios.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

λ_{max} is the maximum eigenvalue statistic.

P* represents the optimal lag length based on AIC and SC from the unrestricted VAR model.

r * is the number of cointegration vectors based on Johansen's method.

Lag lengths of the three variables were determined using Akaike's AIC method, with maximum lags of 5 allowed for each variable.

Table (3) Results of Granger Causality Tests (Trivariate Analysis)

LGDP, LCGE, AND LME								
					Independent Variables			LM(4)
Country	Method	Dependent Variable	K	ECM_1	ΔLGDP	ΔLCGE	ΔLME	
Algeria	SGC	ΔLGDP	3			2.240	0.976	11.375
		ΔLCGE	3		17.602***		1.674	
		ΔLME	3		0.607	4.188		
Egypt	SGC	ΔLGDP	2			0.241	0.022**	7.715
		ΔLCGE	2		0.431		0.740	
		ΔLME	2		8.113**	14.0823***		
Iran	SGC	ΔLGDP	1			2.591*	1.063	16.309
		ΔLCGE	1		0.174		0.150	
		ΔLME	1		5.088**	0.945		
Israel	SGC	ΔLGDP	2			0.033	5.902**	13.972
		ΔLCGE	2		7.297**		3.020	
		ΔLME	2		5.746**	0.963		
Jordan	ECM	ΔLGDP	4	-0.155**		10.323**	2.591	13.533
		ΔLCGE	4	0.554***	2.278		3.449	
		ΔLME	4	-0.139	8.615*	0.875		
Kuwait	SGC	ΔLGDP	1			5.463**	1.235	2.892
		ΔLCGE	1		0.009		4.934**	
		ΔLME	1		1.0719	4.417**		
Morocco	SGC	ΔLGDP	1			0.101	1.391	10.780
		ΔLCGE	1		0.609		1.668	
		ΔLME	1		5.428**	10.695***		
Saudi	ECM	ΔLGDP	2	-0.241***		9.98**	5.414	7.804
Arabia		ΔLCGE	2	0.111***	7.909**		7.55**	
		ΔLME	2	-0.073*	2.94	6.688*		
Syria	ECM	ΔLGDP	1	-0.025***		0.115	3.982**	9.128
		ΔLCGE	1	-0.042**	4.93**		2.97*	
		ΔLME	1	-0.038	6.80***	0.315		
Tunisia	SGC	ΔLGDP	5			9.232*	4.929	12.947
		ΔLCGE	5		19.698***		16.091***	
		ΔLME	5		14.209**	12.666**		
Turkey	ECM	ΔLGDP	2	-0.050***		0.722	10.784***	5.881
		ΔLCGE	2	-0.039	0.032		11.793***	
		ΔLME	2	-0.068**	0.024	1.121		

LGDP, LCGE, LME are the natural logarithms of real GDP, the natural logarithm of the government consumption expenditures to nominal GDP, and the natural logarithm of the military burden, respectively.

Δ is the difference operator.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

The values in the ECM column are the coefficients of the error correction terms in the relevant equation. The values in the columns of ΔLGDP, ΔLCGE, and ΔLME are the Wald test statistic values for testing the null hypotheses that all coefficients of the lags of these variables in the equation of dependent variable are zeros.

Lag lengths of the three variables were determined using Akaike's AIC method, with maximum lags of 5 allowed for

each variable. LM(4) is the Lagrange Multiplier test up to the fourth-order serial correlation in the residuals, which is asymptotically distributed $X^2_{(9)}$.

Table (4) Variance Decomposition of ΔLGDP (%)

Percentage of Forecast Error Variance Explained by ΔLCGE											
Years	Algeria	Egypt	Iran	Israel	Jordan	Kuwait	Morocco	Saudi Arabia	Syria	Tunisia	Turkey
2	1.37	0.06	7.10	0.38	0.70	12.59	.08	0.012	6.87	9.55	2.15
5	2.85	2.83	7.87	30.05	20.03	15.50	.70	1.88	16.85	9.23	3.67
10	3.57	2.86	7.87	44.19	16.45	15.34	.71	4.48	27.75	12.06	4.43
15	3.59	2.86	7.87	47.76	15.78	15.34	.71	8.26	33.06	12.82	4.65
20	3.59	2.86	7.87	49.33	15.17	15.34	.71	10.89	36.01	12.93	4.75
Percentage of Forecast Error Variance Explained by ΔLME											
Years	Algeria	Egypt	Iran	Israel	Jordan	Kuwait	Morocco	Saudi Arabia	Syria	Tunisia	Turkey
2	1.22	0.77	1.85	0.22	0.55	1.74	2.40	9.68	4.02	2.81	0.17
5	2.05	12.42	2.37	1.39	7.62	6.33	2.58	34.25	5.85	8.68	18.33
10	2.20	12.50	2.37	1.81	14.05	7.33	5.59	42.10	6.57	10.19	28.75
15	2.20	12.50	2.37	1.91	15.05	7.34	2.59	45.15	6.85	11.01	30.24
20	2.20	12.50	2.37	1.96	15.78	7.34	2.59	45.99	6.93	11.14	31.00

The results are based on the appropriate VAR and VECM systems of LGDP, LCGE, and LME indicated in Table 3.

Δ is the difference operator.

Table (5) Impulse-Response Function of ΔLGDP (1×10^{-3} Standard Deviation)

ΔLGDP Response to a Shock on ΔLCGE											
Years	Algeria	Egypt	Iran	Israel	Jordan	Kuwait	Morocco	Saudi Arabia	Syria	Tunisia	Turkey
2	8.52	1.08	-31.25	-0.04	9.65	65.15	1.47	5.05	-27.77	-10.86	-9.86
5	1.71	3.27	-1.99	-.34	49.26	2.69	0.81	-54.83	-58.78	.98	-14.67
10	.74	.03	-.04	-.02	35.44	-1.24	-.01	-118.16	-98.42	1.46	-15.71
15	.28	-.004	-.0008	-.0008	42.62	-.12	2.8E-04	-142.54	-120.96	1.16	-15.68
20	.08	.0001	-.00001	-.00004	40.79	0.09	-5.7E-06	-137.48	-133.96	-.0004	-15.67
ΔLGDP Response to a Shock on ΔLME											
Years	Algeria	Egypt	Iran	Israel	Jordan	Kuwait	Morocco	Saudi Arabia	Syria	Tunisia	Turkey
2	-8.06	3.72	15.98	11.98	0.27	-24.25	7.64	-141.27	21.25	5.89	2.81
5	-.78	-.0007	1.57	1.32	45.86	7.08	-.45	-209.18	31.07	9.09	-41.80
10	-.06	-.0001	.03	.06	49.86	-1.77	.01	-249.94	43.92	-3.95	-39.41
15	.03	.005	.006	.02	48.57	-.14	-2.3E-04	-229.63	51.17	1.59	-40.24
20	.02	.00001	.0001	.0001	47.77	.14	4.7E-06	212.61	55.35	-.72	-40.21

The results are based on the appropriate VAR and VECM systems of LGDP, LCGE, and LME indicated in Table 3.

Δ is the difference operator.