

MILITARY SPENDING AND ECONOMIC GROWTH IN ISRAEL  
AND ITS ARAB NEIGHBOURS DURING A PERIOD  
OF RELATIVE PEACE, 1988-2010

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In this research, we use annual time series data on military expenditure (ME), economic growth, net export (NX), and central government expenditure (GE) in Israel and its four Arab neighbours, Egypt, Jordan, Lebanon, and Syria, in the period from 1988 to 2010 to investigate the relationship between ME and the other variables for each country. We found that these four variables have cointegration relationships for all the countries except Syria. The results show that in four of the countries the Granger causal relationship is from economic growth to ME. The causality between ME and NX flows from ME to NX for all of the countries. For all of the countries except Jordan, the results show that if governments increase (or decrease) their spending, then their ME will increase (or decrease) correspondingly. The main conclusion is that a relatively peaceful time does not mean countries will stop or reduce ME.

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## INTRODUCTION

This study examines the impact of military expenditures on economic growth in times of relative peace, from 1988 to 2010, for Israel and the surrounding countries of Jordan, Egypt, Lebanon, and Syria. It analyzes the relationship of Military Expenditure (ME) with three main economic variables: gross domestic product (GDP), net export (NX), and central government expenditure (GE).

When studying economic growth and militarization in developing countries, economists, political scientists, and policy makers explore a few main topics. Is ME a burden on the national economy? How significant is this burden during times of peace and times of war? What are the mechanisms through which ME affects macroeconomic indicators such as saving, investment, external debt, private and public consumption, and, most importantly, the growth in GDP? At first glance, direct comparison between ME and economic growth appears to be nonsensical since each of them requires the other to exist. However, the question about the size of the burden of ME remains critical, because it involves finding answers about methods of financing and direct and indirect effects. All of these queries lead to the most important question: what is the ideal level of ME, or how much is enough to achieve the desired security level without affecting the continuity of the development process?

The importance of this question comes from the fact that in any society, the military sector uses many resources that can have alternative uses in the productive sectors of the economy. Transferring any productive resource(s) from civilian to military sectors leads not only to a decrease in the level of civilian sector production but also a reduction in resources available to the military sector in the future. This idea does not necessarily suggest that a cut in ME will lead to a better standard of living in the society. Depending on the structure of the research, findings of the effects of military expenditure on growth have varied. ME has an impact far beyond the direct resources it consumes, especially when it facilitates conflict. Thus, reaching a consensus on its likely economic effects is important, particularly for developing economies.<sup>1</sup>

Military expenditure is an important issue for the international economy. It has influence beyond any individual country's borders and beyond the resources it consumes. All countries need some level of security to deal with internal and external threats. However, any resource use carries an opportunity cost. Diverting resources to ME prevents money and other resources from being employed for alternative purposes that might directly improve the pace of development. This is particularly important for developing countries with very limited resources.<sup>2</sup>

Until recently, there has not been a scholarly consensus on the effects of ME on economic growth. The availability of twenty more years of data since the end of the Cold War has helped researchers make progress in identifying

the relationship between ME and economic factors. One consensus, after a vast amount of research, is that military expenditure does in general come at an economic cost. The lesson might be that if a state wants to have any hope of becoming (militarily) strong, it should invest in its economy. Once states are economically strong, too much is at stake to risk in war. States may also gain security by becoming important to the world economy, with the major powers protecting them from attack because of the impact any attack would have on the world economy, and thus on them. The best way to security may be through economic growth.<sup>3</sup>

This research is simply an analysis of ME and economic indicators. It aims to measure the economic effects of this expenditure on the performance of the national economy and shed light on the real costs of the ME. It does not analyze the relationship between ME and development because of the difficulties of definitions and measures. Distinguishing economic growth from development is very difficult because development indicators include more than the quantitative increase in GDP. Unfortunately, there are no development indicators that economists agree on in general to be used in these studies. It is also beyond the scope of this study to reach a conclusion about the moral value of ME.

The rest of this paper is organized as follows: the first section discusses the relationship between ME and economic growth. The next three sections include the motivation for our work, our methodology, and a literature review. Then follows a description of the data sources. The largest section discusses the empirical results. Finally, we draw some conclusions.

## RELATIONSHIP BETWEEN MILITARY EXPENDITURE AND ECONOMIC GROWTH

There are several schools of thought about the relationship between ME and economic growth. The first is the Benoit School, which counters classical economic thought. Emile Benoit came to the conclusion that there is a trade-off between growth and ME in developed countries, but there is no evidence of such a relationship in developing countries.<sup>4</sup> Benoit and his followers argue that there is a positive causality of ME on economic growth through multiple channels. The military is able to use idle capital and human resources not used effectively in other economic sectors. Working in the military establishment helps labourers develop skills and management experiences that are useful in other sectors for growth. The

military also helps to reduce production costs and enhance the production function through spending on research and development. In addition, the effect of ME can be seen in what is called the “modernization” factor. In this, the military establishment attempts to make a structural change to the traditional economic and social relations in society. In some cases, this is of a violent nature.<sup>5</sup> Finally, ME has some investment effects: infrastructure spending, such as building roads, airports, seaports, and factories, benefits not only the military but also civilians. All of these economic impacts fall in the category of accumulative capital formation. Therefore, the increase in ME may lead to an increase in total investment in the economy.

A second school of thought argues that ME diverts resources away from more productive government uses like health and education.<sup>6</sup> This school agrees with the classical economic view, which sees the military as a non-productive sector. These theorists contend that the security services provided by the military sector to society cannot be measured accurately to determine the efficiency level of resource usage. This point is particularly important during periods of peace between the state and its neighbours. Whether the ME is financed through taxation or borrowing, it will have economic and social costs. There are five main negative effects of ME on the economies of less developed countries (LDC). First, government production suffers from heavy bureaucracy and low production rates. Second, if exports are the catalysts for growth, then ME will lead to a severe misallocation of resources from the most productive sectors in the economy. Third, if ME is financed through borrowing, then it leads to larger external debt. Fourth, the use of research and development in the defense industry may harm the technological advances in the civilian sector. Finally, ME has a crowding-out effect; more investment in ME creates inflationary pressure that pushes private investment out of the market.<sup>7</sup>

A third school of thought argues that causality is bi-directional. Proponents of this school point out that higher defense spending causes economic growth, and economic growth leads to higher ME.<sup>8</sup> A fourth school of thought contends that there is no relationship between ME and economic growth.<sup>9</sup>

Even though much research has been devoted to investigating the relationship between ME and economic growth, both empirically and theoretically, there is little consensus about that relationship. The growth literature and the defense economics literature come to contradictory conclusions.

While mainstream growth research does not find ME significant in determining growth,<sup>10</sup> research in the defense economics field finds military expenditure to be a significant determinant of growth.<sup>11</sup> The fundamental conclusion is that the military spending-growth relationship is complex and cannot be explained by existing models,<sup>12</sup> or even more advanced models.<sup>13</sup> We need to look more deeply into the nature of the growth process, the demand and supply effects, and the nonlinearities of the effects of ME on growth to understand the process appropriately.<sup>14</sup>

## MOTIVATION FOR THE WORK

Why study the ME-growth relationship for Egypt, Israel, Jordan, Lebanon, and Syria? One reason is because, despite the large volume of literature on the relationship between ME and economic growth, the Middle East has received minimal attention. It is difficult to explain why this is so, since the Middle East has the highest rate of military spending as a percentage of GDP.<sup>15</sup> That said, the Middle East has faced political instability and has experienced large fluctuations in the GDP over the last forty years. This may help explain why the relationship between ME and economic growth in the Middle East is understudied.<sup>16</sup>

A second reason for this study is that the countries in this study are engaged in the enduring, seventy-year-long Arab-Israeli conflict. That conflict has gone through several periods of escalation and reduction in intensity, from actual wars to peace treaties. Previous studies have addressed primarily the periods of time when the Arab countries and Israel were involved in various types of military confrontations. It is important to investigate the relationship between ME and economic growth at a time of relative peace to see if the level of conflict impacts the results.

A third reason is that the lack of consensus on the direction of the relationship between ME and economic growth indicates a need to investigate it on a case-by-case basis. This approach might reveal whether there is a trend for different countries in terms of the effect and direction of the relationship. A fourth motivation is that, to the best of our knowledge, the relationship between ME and economic growth for Lebanon has not been studied at all. As Lebanon has been involved in the conflicts of the region since the beginning, this omission may have impacted the results of previous studies.

The final objective of this research is to examine whether the source

of funding for ME has an impact on the ME-growth relationship. The Middle East region is known for its close relationship between oil revenue and economic growth. The countries in the study are not oil producers, but the increasing revenues of Arab oil-rich countries allows them to pay for an increase in the ME of the countries surrounding Israel. Theoretically, this assistance helps the economies of the recipient countries. However, these aids are connected to oil revenue, which fluctuates significantly over time. The uncertainty of these revenues puts more pressure on the recipient countries to adjust their ME accordingly. The issue of oil funds and foreign aid, especially the US aid to Israel, is of special importance in this type of study. The source of funding might “affect the interaction of military expenditure and economic growth.”<sup>17</sup> Other research on this topic has had mixed results.

## METHODOLOGY

Different methods have been used to investigate the ME-growth relationship. Benoit used cross-sectional data on forty-four countries and found that ME and economic growth have a positive relationship in less developed countries.<sup>18</sup> Other researchers followed this path and found conflicting results. The use of cross-sectional data leads to difficulty when interpreting the estimates, since it assumes identical parameters for different countries.<sup>19</sup> Also, the model is based on the assumption of homogeneity of countries in the sample.<sup>20</sup> As this is clearly not the case in our sample, the choice of cross-sectional data is inappropriate here.

The use of panel data allows the researcher to investigate different kinds of cross-country variations and allows for higher degrees of freedom. However, these data also have limitations. First, panel data have the potential for a significant cyclical or random component. Further, the use of panel data reduces the amount of information about individual countries and might make time series data preferable.<sup>21</sup> Based on these factors, we decided to use annual time series data to analyze the ME-growth relationship for each country individually. We consider time series the best choice for this study because we have a reasonable time span of data and are testing and correcting for non-stationarity. In doing so, we are dealing with the two major criticisms of using time-series data in the literature.

## LITERATURE REVIEW

As mentioned before, the analysis of the ME-growth relationship started with Benoit,<sup>22</sup> who found a positive relationship. Following his seminal work, others found mixed results, depending on the type of data, the models, the period of time, and the countries they chose for their studies.<sup>23</sup> The literature contains few studies that try to investigate the ME growth in the Middle East. Even fewer studies deal with countries involved in the longest conflict in the region, the Arab-Israeli conflict. Given the minimal research in this area, the results are inconclusive.

In 1974, Hossein Askari and Vittorio Corbo calculated and interpreted the economic burden of the increasing ME in ten Middle Eastern countries in the years 1949-69. They found that the combined loss of Gross National Product (GNP) for the countries in the study was about 47 percent; Jordan had the highest loss (117 percent), and Kuwait and Lebanon had the lowest (10 percent). They concluded that increasing ME has a negative effect on the economy in terms of the lost potential GNP in those countries.<sup>24</sup>

Focusing on Iran's social and economic crisis and its relation to increasing ME, Theodore Moran pointed out that the Iranian government devoted about 25 percent of its budget to ME during the years 1973-78. He argued that because of the pressure on the available financial resources in the budget, the balance sheet of the government showed a slower real growth, increasing the constraint on public revenue. Nevertheless, military spending continued between 25 and 33 percent of all government spending. In addition to the known expenditures, there was spending on new military equipment for which the government lacked a mechanism to calculate the cost. Moran concluded that Iran showed little short-run shift of resources from the military to civilian sectors; therefore, the negative impact of high ME would continue to worsen the economic and social crisis in Iran.<sup>25</sup>

James Lebovic and Ashfaq Ishaq studied the military burden and security effect on economic growth in the Middle East and North Africa (MENA) region. They used panel data and categorized the countries into oil- and non-oil-producing countries. They found that in the years 1973-82, military spending reduced economic growth for the whole sample of countries. To account for the effect of oil revenue in some of the countries, the authors investigated the ME-economic growth relationship for seven non-oil-exporting countries and found the same negative effect of ME on economic growth.<sup>26</sup>

In 1991, Abdur Chowdhury conducted a causal analysis of ME on the economic growth of ten MENA countries for the years 1961-87. He found mixed results in the direction of causality. For Egypt and Iran, the causality was bidirectional between military spending and economic growth. For Israel and Jordan, he found that defense spending caused economic growth; however, for Libya, Saudi Arabia, and Tunisia, the causality direction was from economic growth to defense spending.<sup>27</sup>

Mikael Linden's results showed a negative effect of ME on growth for thirteen MENA countries, using a Generalized Linear Model (GLM) for the years 1973-85.<sup>28</sup> Robert Looney found the defense socio-economic trade-offs in thirteen Middle East countries to be complex; they varied considerably depending on the level of military spending in the country. He found that in high defense expenditure countries, ME did not stimulate the economy positively but reduced the economic growth. In countries with little defense spending, the increase in ME did not reduce the economic growth.<sup>29</sup> Jordin Cohen and colleagues<sup>30</sup> found mixed results when examining the impact of defense expenditures on economic growth in Israel for the years 1960-92. They found that the impact of ME on GDP is insignificant through the production of the labour component, but they found a significant effect of ME on growth through the investment path.

Jordin Cohen and Michael Ward used a single equation model and divided countries into two sub-regions within the Mediterranean region. The sub-regions included countries involved in the Arab-Israeli conflict and the Arabian Gulf countries, which are characterized by high oil revenue and are involved in an arms spiral relative to their security situation. For the years 1973-82, they found a positive effect of military spending on economic growth according to the Keynesian aggregate model.<sup>31</sup>

In 2002, Yousif Khalifa Al-Yousif studied five countries in the Gulf region for the years 1975-98. He investigated the ME growth relationship using time-series data and a Granger causality model. After correcting for non-stationarity and cointegration in the data, Al-Yousif found mixed results. He found that for Saudi Arabia, Kuwait, UAE, Oman, and Iran, neither ME nor economic growth Granger-causes the other. For Bahrain, however, ME does not Granger-cause economic growth, but growth Granger-causes ME. Al-Yousif failed to account for the oil revenue factor in determining both the ME and economic growth since all of the countries covered in the study are oil-exporting countries. Also, he used imports as a measure for openness to



trade.<sup>32</sup> This study uses net export for that measure.

Suleiman Abu-Bader and Aamer Abu-Qarn used a causality test to find the direction of effect between ME and economic growth for Egypt, Israel, and Syria over three decades. Specifically, they looked at the 1973-98 budget for Egypt, the 1967-98 budget for Israel, and the 1973-98 budget for Syria. They found that ME had a negative effect on economic growth for all countries, and the non-military government spending had a positive effect on growth in Israel and Egypt.<sup>33</sup>

Julide Yildirim and colleagues used panel data for the years 1989-99 to study the relationship between ME and economic growth in Middle Eastern countries. They worked with a Fixed Effect Model (FEM) and Generalized Methods of Moments (GMM) model and divided the countries into low, middle, and high income countries. The authors found that ME has a positive effect on growth for the countries in the region.<sup>34</sup>

Finally, in a recent discussion paper, Aamer Abu-Qarn used an augmented vector autoregression (VAR) technique to avoid the need for unit-root and cointegration tests that are required for time-series data when a Granger causality test is used. Testing the ME-growth relationship for the period from 1960 to 2004 for Israel, Egypt, Jordan, and Syria, the author found a weak or nonexistent causal relationship between ME and economic growth.<sup>35</sup> These results conflicted with the established assumption of a negative effect of ME on growth.

## DATA SOURCES

The data used in this research are annual time-series data for the years 1988-2010. This represents a period of relative peace in the region for a few reasons. First, the end of the civil war in Lebanon in 1989 brought their military affairs under the control of the central government; as a result, Lebanon's ME was recorded. Second, the Madrid Conference was held in 1991 to restart the peace process in the region. Third, the Oslo negotiations began between Israel and the Palestine Liberation Organization, and the two rivals signed a peace declaration in 1993. Fourth, Jordan and Israel signed a peace treaty in 1994. During this period, Syria and Israel had face-to-face negotiations for the first time. Even though the negotiations did not end with a peace treaty, they greatly reduced the tension between the two countries. Finally, Israel's withdrawal from Southern Lebanon in 2000 went far to reduce the tension between Israel and Lebanon. Studying the ME

growth relationship in this period, we believe, is crucial to determine if the established hypotheses still hold in a time of relative peace. All other studies that covered the countries involved in the Arab-Israel conflict included both times of high conflict and war and periods of declining tension, which make the interpretation of the findings difficult.

Data on GDP, net export, and central government expenditure were obtained from the UN statistical database, and data on ME come from the Stockholm International Peace Research Institute (SIPRI) database on military expenditure. The SIPRI database is considered the best source for such data since it is the only source that provides ME for all of the countries in the study for the entire period examined.

There is no generally accepted definition of ME worldwide. This research follows the definition used by SIPRI, which seeks to include all costs incurred as a result of military activities. The guideline used by SIPRI includes, where possible, expenditure on the following actors and activities: (1) the armed forces, including peacekeeping forces; (2) defense ministries and other government agencies engaged in defense projects; (3) paramilitary forces, when judged to be trained and equipped for military operations; and (4) military space activities. It includes all expenditure on (1) military and civil personnel, including retirement pensions of military personnel and social services for personnel; (2) operations and maintenance; (3) procurement; (4) military research and development; and (5) military aid (in the military expenditure of the donor country). It does not include civil defense and current expenditure for past military activities, such as for veterans' benefits, demobilization, conversion, and weapons destruction.<sup>36</sup> According to the SIPRI website,

The sources for military expenditure data are primary sources, that is, official data provided by national governments, either in their official publications or in response to questionnaires, secondary sources that quote primary data, and other secondary sources. The first category consists of national budget documents, and public finance statistics as well as responses to a SIPRI questionnaire that is sent out annually to the finance and defense ministries, central banks, and national statistical offices of the countries in the SIPRI Military Expenditure Database. It also includes government responses to questionnaires about military expenditure sent out by the UN. The second category includes

international statistics, such as those of the North Atlantic Treaty Organization (NATO) and the International Monetary Fund (IMF). The data for some developing countries is taken from the IMF's Government Finance Statistics Yearbook, which provides a defense heading for most IMF member countries and from country reports by IMF staff. The third category of sources consists of specialist journals and newspapers.

Most countries today make at least basic military budget information available. There are a few countries in the SIPRI database that make no data available at all. However, even where military expenditure data is published by national governments, these data may be subject to a number of problems that limit international comparability and a proper understanding of the economic role of the military on the country. One problem is that different countries define ME differently. SIPRI always seeks data as close as possible to its definition, but this is not always available. Another potential data problem is the issue of currency conversion.<sup>37</sup>

In addition to the international comparison issue, there are potential hurdles relating to the reliability, transparency, and comprehensiveness of the ME data. SIPRI data cannot be more reliable than the sources on which they are based. Data sources may or may not be accurately reporting ME, and there is a question of what the source countries are actually measuring. In some countries, especially lower-income countries with limited state capacity, the systems for financial monitoring and control in the military sector and elsewhere may be weak. Actual levels of expenditure may be incompletely recorded or actively falsified due to corruption. Some governments may purposely seek to disguise the true level of expenditure for the benefit of donor countries and institutions. Transparency is frequently disregarded; many countries provide only limited information on ME. Some only provide a single line item defense budget figure. This lack of detail makes it difficult to know exactly what is or is not included in ME figures. Some countries do not disclose if their ME definitions have changed over time, whether their figures are actual or budgeted expenditures, and other pertinent information.

Finally, in many countries, published ME figures systematically exclude significant items of military expenditure. Sometimes this is due to a difference of definition, as in the case of the exclusion of military pensions or the exclusion of expenditure on arms imports.<sup>38</sup> In other cases, expenditure data

by the Ministry of Defense may omit other significant items of military spending, besides pensions and paramilitaries. Such expenditures may be extra-budgetary, coming from other parts of the state budget, or off-budget, coming from outside the state budget completely. Off-budget items may include natural resource funds dedicated to the armed forces that are often used for arms purchases or funds from the commercial activities of the military. In some countries, these off-budget funds may constitute a large proportion of total military spending.

In 1994, Rémy Herrera compiled a list of five sources that report ME around the world. They are the International Monetary Fund (IMF), the United Nations (UN), the Stockholm International Peace Research Institute (SIPRI), the United States Arms Control and Disarmament Agency (USACD), and the International Institute for Strategic Studies (IISS). The IMF published data on ME in its Government Finance Statistics Yearbook. These data have the advantage of being integrated in a consistent macroeconomic framework, but they are based on government accounts. This sheds doubts on the reliability of the data because the data depend on the willingness of countries to make information available to the IMF.<sup>39</sup> Since 1975, the UN, through the UN Department of Disarmament Affairs, has gathered information on ME through questionnaires sent to member countries to obtain their voluntary data on national defense expenditure. This effort is concerned with identifying ME that may be considered excessive. This data set provides little information for the purpose of this research because of the countries that we examine, only Israel, Lebanon, and Jordan participate.<sup>40</sup> SIPRI is an independent international organization that has presented an annual series of ME data since 1968. The figures are expressed for each country and for the fiscal year in both local currency and in dollars at a constant price. The data are homogenous in the sense that they depend on public information, making it possible to verify the information and lending credibility to the data.<sup>41</sup>

USACD published the World Military Expenditures and Arms Transfers report annually from 1965 to 1997. The figures are expressed in dollars in current and constant prices for a calendar year. The primary source of the data was the official accounting and budget documents published by the Ministry of Defense in the states included.<sup>42</sup> Due to the discontinuation of this report, the data are becoming irrelevant to current events. The IISS is an independent research center that was established in 1958 and is based

in London. It publishes an annual Military Balance report. It is focused on information about armed forces or arms stocks held by specific countries or regions. The figures reported are the latest available defense budgets of the countries concerned, which creates a heterogeneity issue in the data. The report does not use the same detailed and precise definition of ME as do SIPRI and USACD.<sup>43</sup> Based on Herrera's review, we used the data set from SIPRI because it is the most comprehensive data set on ME and does not depend on government information.

All the issues discussed here highlight the problems with the data used in our analysis and show that these data are not the authors' ideal measure of ME. However, these are the best data accessible to us for the purpose of this analysis. The issues of reliability, transparency, and comprehensiveness cause researchers the same problems that many publicly available data sets do. We must acknowledge that our results are only as good as our data. Data reliability and comparability are and will continue to be problems for economic research.

## THE MODEL AND RESULTS

Table 1 shows the correlation coefficients among the four variables for each country. ME varies in its correlation with the other three variables from highly positive with GDP in the case of Syria to highly negative with NX in the case of Jordan. Except for Egypt, ME and GDP have a high correlation coefficient, indicating that there might be more to their relationship. As mentioned above, if both the ME and GDP have a high correlation in the period of study, then it is reasonable to expect that at least one of them has some effect on the other.

Table 1  
Correlation Coefficients

Country	Correlation Coefficient of ME with:		
	GDP	NX	GE
Egypt	0.336	0.288	0.327
Israel	0.691	0.411	0.753
Jordan	0.832	-0.812	0.929
Lebanon	0.721	0.490	-0.322
Syria	0.853	0.491	0.831

The reason we include NX is that the countries covered by the study are non-oil-producers. Therefore, they try to diversify their revenues through export-oriented policies and encourage foreign investments. At the same time, the countries become more and more dependent on imported goods and services as their population increases and the demand for new products increases. Thus, to measure openness to trade for these countries, it is not enough to look at either imports or exports, but one needs to examine NX.

The use of Granger causality in this study comes from our interest in the direction of causality between ME and GDP. We are not looking to see if they have a significant relationship but to see the direction of the impact, if it exists, from one to the other. Despite some potential hurdles, this approach is still popular and can bring the intended results if the data are tested and corrected for unit roots and cointegration.<sup>44</sup>

Tables 2-a and 2-b show the results of the variables' stationarity tests. We used the augmented Dickey-Fuller test (ADF) and the Phillips-Perron (PP) tests. The four variables in all of the countries are non-stationary at their levels, but most of them are stationary at the first difference. The GDP for Egypt is stationary at the second difference.

Table 2-a  
Stationarity Test Results for Variable at Level (5% Critical Value)

Country	Variable	ADF	(L)	PP	(L)	
Egypt						
Level:	GDP	0.007	**2	1.065	1	Trend
	NX	-0.026	1	0.010	1	No Trend
	GE	-0.218	3	-2.373	1	Trend
	ME	-1.584	2	-2.512	1	No Trend
Israel						
Level:	GDP	-2.251	1	-2.280	1	Trend
	NX	-0.087	1	-0.232	1	No Trend
	GE	-3.449	1	-3.600	1	Trend
	ME	-1.487	2	-2.074	1	No Trend

Jordan						
Level:	GDP	-0.098	2	-1.834	1	Trend
	NX	-0.669	1	0.771	1	No Trend
	GE	0.805	4	0.628	1	No Trend
	ME	0.024	1	-0.159	1	No Trend
Syria						
Level:	GDP	-1.275	1	-3.086	1	Trend
	NX	-1.898	1	-2.003	1	No Trend
	GE	0.942	2	-0.056	1	No Trend
	ME	-1.162	1	-1.235	1	No Trend
Lebanon						
Level:	GDP	-0.421	1	1.461	1	No Trend
	NX	-2.034	1	-2.003	1	No Trend
	GE	-1.047	4	0.056	1	No Trend
	ME	-1.480	1	-1.235	1	No Trend

Note. - \*(L) stands for optimal lag. It is determined using Akaike information criterion (AIC).

\*\*2nd Difference.

Table 2-b

Stationarity Test Results for Variable at Difference (5% Critical Value)

Country	Variable	ADF	(L)	PP	(L)	
Egypt						
Difference:	DGDP	-2.787	2	-4.932	2	No Trend
	DNX	-3.355	0	-3.361	1	No Trend
	DGE	-2.827	2	-3.287	1	No Trend
	DME	-2.625	1	-5.434	1	No Trend
Israel						
Difference:	DGDP	-4.186	0	-4.103	1	No Trend
	DNX	-5.245	0	-5.238	1	No Trend
	DGE	-3.466	**2	-6.192	1	No Trend
	DME	-6.923	0	-7.276	1	No Trend

Jordan						
Difference:	DGDP	-3.347	**2	-3.576	1	No Trend
	DNX	-4.969	0	-4.964	1	No Trend
	DGE	-2.887	**2	-4.064	2	No Trend
	DME	-4.559	0	-4.585	1	No Trend
Syria						
Difference:	DGDP	-5.823	0	-5.926	1	No Trend
	DNX	-5.528	0	-6.262	1	No Trend
	DGE	-4.356	**1	-6.262	1	No Trend
	DME	-5.833	0	-5.899	1	No Trend
Lebanon						
Difference:	DGDP	-3.968	1	-7.028	1	No Trend
	DNX	-7.096	0	-7.753	1	No Trend
	DGE	-5.778	0	-5.664	1	No Trend
	DME	-7.038	0	-7.398	1	No Trend

Note. - \*(L) stands for optimal lag. It is determined using Akaike information criterion (AIC)

\*\*2nd Difference.

After taking the required difference in the time-series to establish stationarity, we checked for cointegration to see if the variables have a long-run relationship with each other. We used the Johansen test, and the results appear in Table 3. The null hypothesis of no cointegration was rejected for all the countries except Syria. This indicates that, except for Syria, there is a long-run relationship between the four variables in the sample. Thus, we do not expect to see a causal relationship between the variables in the case of Syria.

Table 3  
Johanson Cointegration Test Results

Country	Null Hypothesis	Test Statistic
Egypt	$r = 0$	91.808***
	$r \leq 1$	39.392***



	$r \leq 2$	14.394
	$r \leq 3$	4.662**
Israel	$r = 0$	81.156***
	$r \leq 1$	30.213**
	$r \leq 2$	11.333
	$r \leq 3$	3.918**
Jordan	$r = 0$	88.366***
	$r \leq 1$	41.325***
	$r \leq 2$	13.292
	$r \leq 3$	4.018**
Syria	$r = 0$	40.821
	$r \leq 1$	21.493
	$r \leq 2$	9.182
	$r \leq 3$	2.215
Lebanon	$r = 0$	73.572***
	$r \leq 1$	30.780**
	$r \leq 2$	11.590
	$r \leq 3$	1.193

Note. \*\*\* Significant at 1%. \*\* Significant at 5%.

Based on the Johansen test, the need for an error correction term is crucial to capture the long-run relationship. To see if there is a Granger causality between ME and economic growth, we used the following error-correction model for each country where all the variables are expressed in the appropriate differences to guarantee stationarity.

$$G_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} G_{t-1} + \sum_{i=1}^{n2} \alpha_{2i} M_{t-i} + \sum_{i=1}^{n3} \alpha_{3i} GE_{t-i} + \sum_{i=1}^{n4} \alpha_{4i} X_{t-i}$$

where: G is economic growth; M is military expenditure (ME); GE is government expenditure; X is net export (NX); and EC is the error-correction term obtained from the multivariate cointegration relationship; and n is the lag orders in the polynomials of  $\alpha$ 's.

To test the other possible direction of the causality, that economic growth Granger-causes ME, we use a similar equation with ME as the dependent variable:

$$M_t = \beta_0 + \sum_{i=1}^{m1} \beta_{1i} M_{t-i} + \sum_{i=1}^{m2} \beta_{2i} G_{t-i} + \sum_{i=1}^{m3} \beta_{3i} GE_{t-i} + \sum_{i=1}^{m4} \beta X_{t-i} +$$

Our focus is to see if the coefficients,  $\alpha_{2i}$  and  $\beta_{2i}$  that represent the short-run Granger causality, and  $\lambda$  and  $\varphi$  that represent the long-run causality, are statistically significant. The preliminary empirical results of the above two equations are reported in Tables 4-a, 4-b, 4-c, 4-d, and 4-e. The results are mixed. For Egypt and Israel, ME does not Granger-cause economic growth; the opposite holds true: economic growth causes higher ME. In Jordan and Lebanon, there is a bi-directional impact, meaning that ME and growth Granger-cause each other. In Syria, as expected from the integration test, ME and growth do not Granger-cause each other; they have no relation.

Table 4-a  
Granger Causality Test Results (Jordan)

Null Hypothesis:	Obs	F-Statistic	Probability
NX does not Granger-cause GDP	22	5.601	0.029
GDP does not Granger-cause NX		8.458	0.009
GE does not Granger-cause GDP	22	22.220	0.000
GDP does not Granger-cause GE		19.667	0.000
ME does not Granger-cause GDP	22	5.952	0.025
GDP does not Granger-cause ME		16.404	0.001
GE does not Granger-cause NX	22	5.304	0.033
NX does not Granger-cause GE		0.613	0.443
ME does not Granger-cause NX	22	10.296	0.005
NX does not Granger-cause ME		3.833	0.065
ME does not Granger-cause GE	22	0.001	0.980
GE does not Granger-cause ME		9.417	0.006

Table 4-b  
Granger Causality Test Results (Egypt)

Null Hypothesis:	Obs	F-Statistic	Probability
GE does not Granger-cause GDP	22	0.539	0.472
GDP does not Granger-cause GE		6.670	0.018
ME does not Granger-cause GDP	22	0.100	0.755
GDP does not Granger-cause ME		4.431	0.049
NX does not Granger-cause GDP	22	2.598	0.124
GDP does not Granger-cause NX		2.391	0.139
ME does not Granger-cause GE	22	0.808	0.380
GE does not Granger-cause ME		6.828	0.017
NX does not Granger-cause GE	22	5.974	0.024
GE does not Granger-cause NX		2.691	0.117
NX does not Granger-cause ME	22	0.298	0.591
ME does not Granger-cause NX		4.952	0.038

Table 4-c  
Granger Causality Test Results (Lebanon)

Null Hypothesis:	Obs	F-Statistic	Probability
NX does not Granger-cause GDP	22	5.213	0.034
GDP does not Granger-cause NX		0.069	0.796
GE does not Granger-cause GDP	22	0.795	0.384
GDP does not Granger-cause GE		1.541	0.230
ME does not Granger-cause GDP	22	15.747	0.001
GDP does not Granger-cause ME		13.562	0.002
GE does not Granger-cause NX	22	0.235	0.634
NX does not Granger-cause GE		11.117	0.003
ME does not Granger-cause NX	22	1.578	0.224
NX does not Granger-cause ME		3.584	0.074
ME does not Granger-cause GE	22	6.465	0.020
GE does not Granger-cause ME		1.986	0.175

Table 4-d  
Granger Causality Test Results (Syria)

Null Hypothesis:	Obs	F-Statistic	Probability
NX does not Granger-cause GDP	22	0.013	0.912
GDP does not Granger-cause NX		0.004	0.947
GE does not Granger-cause GDP	22	1.991	0.174
GDP does not Granger-cause GE		2.674	0.118
ME does not Granger-cause GDP	22	2.881	0.106
GDP does not Granger-cause ME		3.415	0.080
GE does not Granger-cause NX	22	0.403	0.533
NX does not Granger-cause GE		2.015	0.172
ME does not Granger-cause NX	22	0.149	0.704
NX does not Granger-cause ME		4.176	0.055
ME does not Granger-cause GE	22	0.528	0.476
GE does not Granger-cause ME		1.276	0.273

Table 4-e  
Granger Causality Test Results (Israel)

Null Hypothesis:	Obs	F-Statistic	Probability
GE does not Granger-cause GDP	22	0.350	0.561
GDP does not Granger-cause GE		20.474	0.000
ME does not Granger-cause GDP	22	0.241	0.629
GDP does not Granger-cause ME		7.514	0.013
NX does not Granger-cause GDP	22	0.177	0.679
GDP does not Granger-cause NX		4.365	0.050
ME does not Granger-cause GE	22	3.213	0.089
GE does not Granger-cause ME		7.577	0.013
NX does not Granger-cause GE	22	0.557	0.465
GE does not Granger-cause NX		6.816	0.017
NX does not Granger-cause ME	22	1.506	0.235
ME does not Granger-cause NX		9.418	0.006

For the effect of the other variables on ME and growth, we found the following results. For Egypt, GE does not Granger-cause growth; growth Granger-causes GE. NX and GDP do not Granger-cause each other. GE Granger-causes ME, and the opposite is not true. ME Granger-causes NX, and the opposite is not true.

For Israel, GE does not Granger-cause GDP; the opposite is true. NX and GDP do not Granger-cause each other. GE Granger-causes ME, but the opposite is not true. ME does Granger-cause NX while the opposite is not true.

For Jordan, the only non-Granger causality goes from NX to GE and ME to GE. All the other variables Granger-cause each other both ways.

For Lebanon, GE and GDP do not Granger-cause each other. Also, GE does not Granger-cause NX while the opposite is true. ME and NX do not Granger-cause each other. And GE does not Granger-cause ME while the opposite is true.

As mentioned earlier, the cointegration test result indicated no relationship among the variables in the case of Syria and that is confirmed by the Granger causality test. No variable is Granger-causing any other variable in the case of Syria.

## CONCLUSION

This research examined the impact of military expenditures on economic growth in times of relative peace for Egypt, Israel, Jordan, Lebanon, and Syria. The relationships of ME with main economic indicators were tested for the annual time period (1988-2010).

Analysis of the relationship of military expenditure (ME) with three main economic variables, gross domestic product (GDP), net export (NX), and central government expenditure (GE), found that these four variables have cointegration relationships for all of the countries except Syria. For Syria we found no cointegration relationships or causality directions. For the other countries the results for causality appear to be mixed even though there were cointegration relationships among the variables of interest.

Except for Syria, all countries show a causality direction from economic growth to ME. However, the opposite direction, that is, from ME to economic growth, was found only for Jordan and Lebanon. Therefore, for these two countries, ME promotes economic growth.

Regarding the causality between ME and NX, the results indicate a

solid direction from ME to NX for Egypt, Israel, and Jordan. In Lebanon, NX was found to Granger-cause ME. This result may contradict the first causality finding of complete causality from economic growth to ME, because NX is a main part of GDP and economic growth. Therefore, NX should have a similar effect and direction of causality to economic growth. However, this apparent contradiction may be explained somewhat by the importance of economic growth as a whole, not just the NX part of it.

Regarding the causality between ME and GE, for all countries except Jordan, it was clear that an increase or decrease in government spending will likewise affect ME. This makes sense because ME is a main part of government expenditure. As noted above, none of the above causality relationships were found for Syria.

From these results, we conclude that times of relative peace do not lead to a halt in or reduction of ME. ME might not grow as fast as in times of war, but it is definitely affected positively by the local income and the economic situation of the country. Further, we see that increased military spending does not necessarily lead to lower economic growth and a high probability of regional instability. This suggests that to understand the prospect of the economic well-being of the nations in that region and what may cause a prolonged peace, we must investigate factors other than military spending.

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