

## Dynamic Analysis of the Impact of Military Expenditure on Economic Growth in Oil and Non-Oil Countries in the Middle East

Mohammad Mowlaei<sup>1\*</sup>, Abolghasem Golkhandan<sup>2</sup>

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### Abstract

Middle East is a strategic region because of its abundant oil reserves, hostile struggles among the countries, and threat of the radical groups. The countries of this region spend a large amount of their annual budgets on buying weapons and war armaments. The purpose of this paper is to study the impact of military expenditures on economic growth of oil and non-oil Middle East countries by a dynamic panel model during 1988-2012. The paper results show the negative impact of the military expenditures on economic growth of the Middle East countries which is more visible in oil countries than the non-oil ones.

**Keywords:** Augmented Solow Model, Dynamic Panel Data Model, Economic Growth, Military Expenditure, Oil and Non-oil Countries

**Classification JEL:** O53, H5, C23

### 1. Introduction

Considerable amount of the countries' annual budget is allocated to military expenditure (ME hereafter) nowadays to provide internal and external security<sup>3</sup>. Considering ME in annual budget is inevitable, but under applying an excessive method, it has negative impacts on economic growth. However, a number of advanced and developed countries are able to increase their gross domestic product (GDP) by exporting weapons to improve their external balance of payments. But importing countries do not possess this advantage and because of lavishing on buying arms, their economic development would be slow or stopped.

Security is a public good. According to Adam Smith, all governments are trying to provide security for their citizens by ME. Considering security,

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1. Assistant Professor, Department of Economics, Bu-Ali Sina University, Hamedan, Iran (Corresponding Author: mowlaei.mohammad@gmail.com)

2. Ph.D Candidate in Economics, Lorestan University, Khoram-Abad, Iran (golkhandana@gmail.com)

3. According to annual report of Stockholm International Peace Research(SIPRI), the World ME in 2014 was an estimated \$1776 billion, representing a marginal increase of about 31.6 percent in real terms compared 1988 ([www.SIPRI.org](http://www.SIPRI.org)).

defense economy is a subset of public economy. Considering the external effects of security, strengthening the defensive power of a country is important for other countries. This means that armed position of a country may have positive or negative consequences for the other countries. The policies applied by the various countries compel them to increase their defense power competitively and that is a reason for increasing ME (Smith, 1995).

The countries of the Middle East are placed in a strategic place, as they possess great energy reserves of the world, facing with some security threats of some foreign countries. In recent years, wars in Iraq, Syria, and Yemen have required nations to expand their defensive efforts in light of threats from violent extremists groups. Tensions growing from the regional Sunni-Shia rivalry playing out on ground in Iraq and parts of Lebanon require the attention and strength of big power players to maintain relevance by exerting soft as well as hard power. Recent low oil prices have taken a toll on the Middle East economic growth, mostly notably Iran and Iraq. Saudi Arabia, the UAE, and other Persian Gulf nations as major oil producers are also affected by low prices. Although, the military spending in the Middle East amounted to \$196 billion in 2014- an increase of 5.2% since 2013, and 57% since 2005- but the ME budget of states in the region is affected by the fall in the price of oil in the recent years. However, large surplus funds in previous years are likely to cushion Persian Gulf budgets. Thus, the economic effects of ME on economic growth of the Middle East countries are ambiguous.

In this paper, the impact of MEs on economic growth in 14 important Middle East countries during 1988-2014 is studied by Generalized Method of Moments (GMM). The important Middle East countries are: Bahrain, the UAE, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabian, Syria, Yemen, Egypt, and Turkey.

According to annual conference report of the United Nation Conference of Trade and Development (UNCTAD), the oil countries are the countries which their rate of crude oil export is at least 50 percent. Under the above criterion, the oil countries are: Bahrain, the UAE, Iran, Kuwait, Oman, Qatar, Saudi Arabia, Syria, and Yemen. The non-oil countries are Egypt, Jordan, Lebanon, Israel, and Turkey.

The important reason for division of the Middle East countries in oil and non-oil groups is that, according to World Bank report, the ratio of ME to GDP in oil countries in the Middle East is increased from 4.8% in 2010 to 6.3% in 2014, while the ratio of ME to GDP in non-oil countries is decreased from 4% in 2010 to 3.4% in 2014 ([www.worldbank.org](http://www.worldbank.org)). Thus, the important purpose of this paper is to study whether MEs of the mentioned countries affect their economic growth or not.

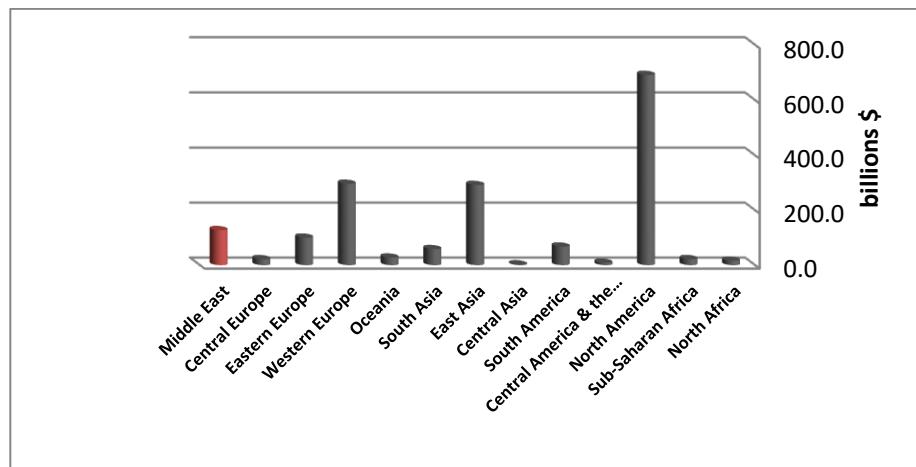
The main hypothesis of this research is as follows:

"The impact of ME on economic growth of countries of the Middle East region is negative and significant. This significant negative impact on the oil-producing countries in the region is more than the non-oil ones".

The paper is arranged as follows: after introduction, ME of the world and the Middle East countries is examined. Literature review is in the third section. Methodology of the research and the model are covered in section four. The empirical results are in section five. Finally, section six contains the conclusions.

## 2. A Review of MEs in the world and the Middle East

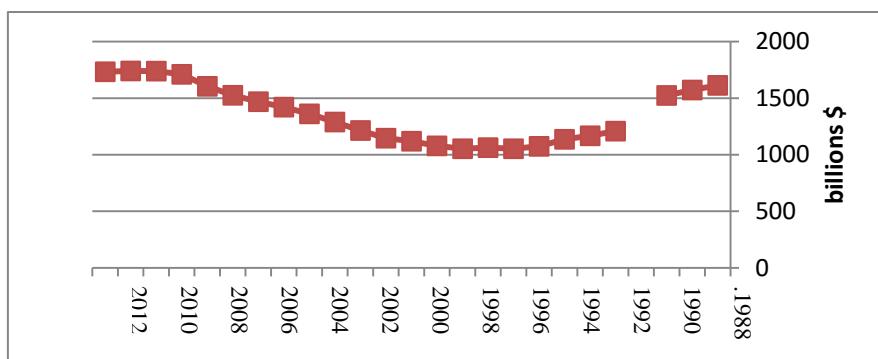
Figure 1 shows the level of world ME in 2012, in different regions. According to this figure, countries in North America have had the most ME, about more than \$705 billion. After that, countries in East Asia (over 17%), Western Europe (over 16%), and the Middle East (8%) had the most MEs, respectively. More than 81% of the MEs of the world have been spent in these 4 regions; while the share of the other regions of the world in ME is low (less than 19%). For example, MEs share of Central America, the Caribbean region, and Central Asia countries is very low, with about 0%.



**Figure 1. ME of different parts of the world in (2012)**

Resource: Research calculations using SIPRI data

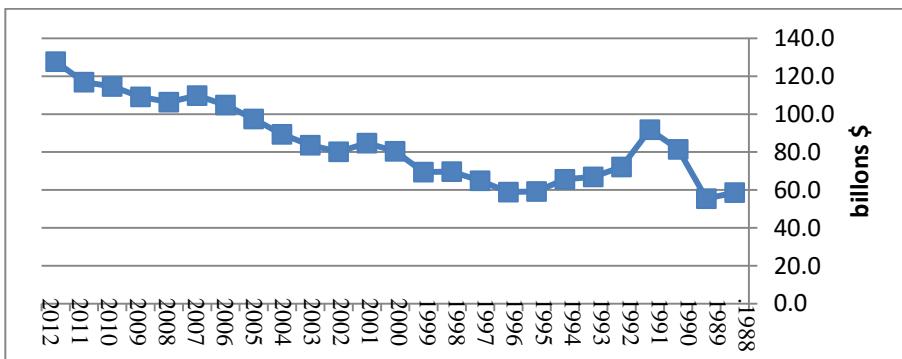
Figure 2 shows the spent ME of the world during 1988-2012. According to this figure, during 1996-2011, MEs of the world saw an ascending trend. It was along with a gentle slope from 1996 to 2001. The ME of the world has increased fast since 2001, maybe due to the events of September 11, 2001. Terrorist attacks and the war in Afghanistan were the main reasons of increasing ME. There are several reasons for the increase in world ME, including foreign policy objectives, the reality of perceived threats, armed conflict and policies to contribute to multilateral peacekeeping operations, combined with access to economic resources.



**Figure 2. ME of the world in 1998-2012**

Resource: Research calculations using SIPRI data

Figure 3 shows ME of the Middle East countries in 1988-2012. According to this figure, ME of this region saw an ascending trend (except for the years between 1991 and 1996, when the trend had been descending due to decrease of oil price).



**Figure 3. ME of the Middle East in 1988-2012**

Resource: Research calculations using SIPRI data

Regarding the ascending trend of ME in the Middle East region, some questions are considered:

Have these costs (due to budget constraints) been able to increase economic growth in the Middle East by creating positive economic effects, such as security, or has the economic growth been reduced in these countries by the negative effects of the economy, such as crowding-out impact of these expenditures with the other ones (including costs of health care, education and so on...) or increase in the trade deficit?

Considering that most of the oil-producing countries of the region are the major importers of arms in the world, is there any significant difference between impacts of ME in these countries in comparison to the other non-oil countries in the region?

### 3. Literature review

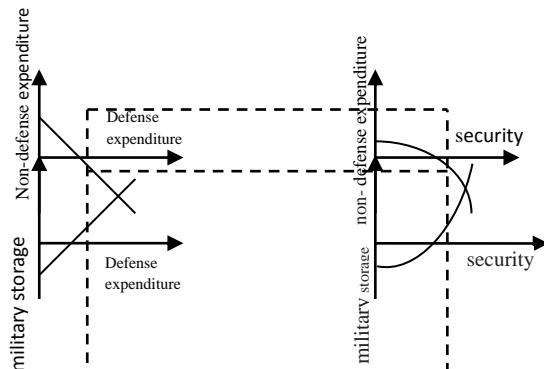
First, the theoretical foundations, and then, the empirical studies are examined.

#### 3.1. Theoretical foundations

Defense Economics is a new branch of public economics that studies the management of ME during war and peace. It analyzes external effects of these expenditures on other sectors of the economy. Generally, defense expenditures are considered as expenditures on public goods of an economy. The internal and external security of the country keeps defense expenditure (DE).

Defense economy analyzes relationship between defensive expenditure and economic growth by different channels (Ando, 2009). Figure 4 shows a brief introduction of defense economics. Upper left part of the diagram shows government budget restrictions in national income allocation between DE and non-DE. If the government decides on more investment in defense section, it should increase its defensive expenditure. It results in increasing the military storage. It is shown in the left part of the following figure.

The increase in the military expenditure, according to right part of the following figure, increases security, but it decreases non-military expenditure. Right section of the figure represents this issue (Anwar, Rafique and Jopia, 2012).



**Figure 4. The Process of Defense Expenditure**

Basically, two major theories are mentioned here as follows:

According to the first hypothesis, increased defense expenditure (DE) decreases economic growth by the effect of replacing the non-defense expenditure, such as investment, education, and sanitary. But, according to the second hypothesis, increasing DE increases economic growth by skilled workforce, good investment, export of defense weapons, building security, and generally increasing the level of demand (Yildirim, Ocal and Keskin, 2011). The relation between defensive expenditure and economic growth is described according to classic model of Guns Versus Butter Trade-off.

Accordingly, buying weapons and arms, due to lack of enough foreign exchange, reduces existing resources to import intermediate goods and basic investment to improve the long-term sustainable economic growth (Narayan and Smith, 2009).

According to some economic theories, security is a public good with unexceptional and non-competitive consumption features (Smith, 1980). According to these specifications, financing DE can be justified by the non-defensive sections. In other words, there are not any similarities between defense section and the other private sections of economy. Therefore, imposing a compulsory tax system on other sections is necessary to provide finance for this section. This can reduce the rate of economic growth. Although, this reduction can be compensated by the positive effects of leakage from the defense sector (Hartly, 2005). Therefore, in some studies, the impact of DE on economic growth has been estimated as positive effect.

Different models were designed to study the effect of ME on economic growth. These models are divided into two groups: Keynesian models of the demand and supply side.

Atesoglu's model (2002) is one of the most important and most widely used Keynesian models in demand side. He offered the following model to assess the effect of DE on economic growth, with regard to DE as a variable of demand side after simplification in the form of a simple model of Keynesian macroeconomics:

$$Y_t = \beta_1 + \beta_2 ME_t + \beta_3 GE_t + \beta_4 R_t + \varepsilon_t \quad (1)$$

In this model,  $Y_t$  is the real output,  $GE_t$  is the real non-defense expenditure of state,  $ME_t$  is the defense expenditure of state as a real form, and  $R_t$  is the real interest rates. Equation (1) is a new macroeconomic model that introduces production related to DE, non-defense expenditure, and interest rates (Halicioglu, 2004).

Biswas and Ram (1986) developed supply-side models in neoclassical framework to express the relationship between defense and growth. They adapted Feder's model (1983) of the impact of export on economic growth on impact of DE on economic growth.

Two-section Feder-Ram's model includes the private consumption (C) and military (M). (Y) is as a result of adding these 2 sections.

$$Y = C + M \quad (2)$$

Capital and labor are divided in two parts, as follows:

$$K = K_C + K_M , \quad L = L_C + L_M \quad (3)$$

Considering indirect impacts of military section on consumption section, and given the productivity difference between inputs and consumer sections

and some simplification, finally, the Feder-Ram model is presented as follows (Huang and Mintz, 1991):

$$\dot{Y} = \alpha_0 + \alpha_1 \dot{L} + \alpha_2 \frac{I}{Y} + \alpha_3 \frac{M}{Y} \dot{M} + \alpha_4 M \dot{\left(\frac{C}{Y}\right)} + \varepsilon_t \quad (4)$$

In this model,  $\dot{Y}$  is GDP growth,  $\dot{L}$  is labor force growth,  $\frac{I}{Y}$  is rate of investment to production,  $\frac{M}{Y} \dot{M}$  is direct effect of defense sector on economic growth, and  $M \dot{\left(\frac{C}{Y}\right)}$  is indirect effect of defense sector on private consumption section.

Since the indirect and direct impacts of MEs are examined in Feder-Ram model, it is very popular among researchers of defense economics. Of course, rewriting this model as a 4-section model is possible by adding non-defense public sector and export.

The two mentioned models were applied widely in previous studies by using time-series data (Dunne, Smith, and Willenbockel, 2005). In addition to these two models, the supply side augmented Solow model is presented to evaluate the effect of ME on economic growth. Usually, this important model is used for combined data (panel data), and it is used in this research.

### 3.2. Empirical studies

Benoit's research (1973) was one of the first studies about the impact of ME on economic growth. He discovered positive relation between ME and economic growth for 44 less developed countries during 1950-1965. Benoit achieved a strong and positive relationship between ME and economic growth of many countries. Since his method of study was preliminary and lacked a strong theoretical framework, the other studies were done by more developed methods and models.

Hasani Sadrabadi (2008) investigated the impact of ME on economic growth and its indirect effect on private consumption in Iran (using Supply-side economics model). Feder's 4-section model used in this research includes private consumption, government nondefense consumption, export, and defense. By studying the impact of DE on economic growth, the indirect effects of defense section on private section consumption is assessed. Results of this research, using time-period of 1974-2005 and OLS method, showed that direct impact of ME on economic growth is positive, but indirect impact of military section on private consumption section is negative.

Dunne (2010) has studied the impact of ME on economic growth of countries of Sub-Saharan Africa during 1988-2006. Using an augmented Solow model and dynamic panel econometric technique, he showed the negative effects of ME on economic growth of countries in this region.

Yilirim, Ocal, and Keskin (2011) examined the impact of ME on economic growth of 133 countries of the world during 2000-2008. Using Feder-Ram's model and augmented Solow model of ME and economic

growth and applying econometric methods of OLS and GS-2SLS showed that ME impacts significantly on economic growth.

Ozun and Erbaykal (2011) investigated the relation between ME and economic growth for 13 member states of NATO during 1949-2006. Using causality Toda and Yamamoto test, results of this research showed that there is not a causality relationship between ME and economic growth of 6 member states (including Belgium, Canada, Denmark, Germany, Italy, and the US). There is one-way causality between ME and economic growth of 6 member states (including the UK, France, Greece, the Netherlands, Norway, and Portugal). Also, there is Bidirectional causality between ME and economic growth in Turkey.

Farzanegan (2011) investigated the impact of ME on economic growth of Iran during 1959-2007. Impulse response function (IRF) techniques, Analysis of Variance (VDA), and Granger causality test were used. The results showed one-way causality relationship from the ME to economic growth. Also, economic growth indicates a positive reaction to shocks from the ME.

Al-Hamdi (2012) studied the link between oil revenue and ME of the oil countries in the Persian Gulf region. He showed that oil plays a more significant role in determining ME in oil countries than the non-oil ones. The results of his paper showed that there is a strong correlation between oil revenue and ME in oil countries of Persian Gulf region. He also believed that the ratio in the marginal propensity to spending on DE is going to increase the tension in the oil countries and consequently increase ME which might lead to devastating results economically and socially.

Dunne and Nikolaïdou (2012) investigated the impact of ME on economic growth of 15 member states of the European Union during 1961-2007. Using econometric panel data models and augmented Solow, they concluded that increasing ME will not result in growth and economic development.

Shahbaz, Afza, and Shabbir (2013) investigated whether ME was the result of economic growth of Pakistan during 1972-2008. To this end, they used Atesoglu's model for ME and economic growth and accumulation econometric analysis and causality. Results of this research showed a negative relationship between ME and economic growth in long-term and a one-way path from the ME to economic growth.

#### **4. Model and Methodology**

The augmented Solow model was used in this research to study the impact of ME on economic growth of oil-producing and non-oil producing countries of the Middle East. Mankiw, Romer, and Weil (1992) proposed the generalized Solow model. It was used by Knight, Loayza, and Villanueva (1996) to study the impact of ME on economic growth. In this model, the basic assumption was that the ratio of ME to GDP affects the production through level effects on the efficiency (Smith and Buckley, 2005). The starting point

of this model includes a Cobb-Douglas neoclassical production function with constant return to production scale and production variables (Y), capital (K), technical progress or efficiency of the workforce (A), and labor (L).

$$Y(t) = K(t)^\alpha [A(t).L(t)]^{1-\alpha} \quad 0 < \alpha < 1 \quad (5)$$

Labor and technical progress grows in accordance with the following relation:

$$L(t) = L(0)e^{nt}, \quad A(t) = A(0)e^{gt}m(t)^\theta \quad (6)$$

In the relations, n: exogenous rate of growth of the labor force, g: exogenous rate of growth of technology, and m: ratio of ME to GDP. According to the right side equation of relation 2, efficiency is not related only to exogenous growth rate of technology, but also any change in the share of ME of state affects the efficiency by elasticity  $\theta$  (Night, Loayza and, Vilanova, 1996:12-13). Additionally, according to this equation, changes in the ratio of ME to GDP affect the level, not the growth.

This shift will change the path of balanced growth of the economy. In other words, the level of per capita production increases at any point of time, but the growth rate of per capita output does not change the path of balanced growth (Smith and Buckley, 2005).

If the capital saving rate is shown as S (the percentage of production that is allocated to investment), the main equation of Solow pattern for each unit of effective labor is extracted as the following:

$$k_e' = sk_e^\alpha - (n + g + \delta)k_e \Leftrightarrow \frac{\delta \ln k_e}{\delta t} = se^{(\alpha-1)\ln k_e} - (g + n + \delta) \quad (7)$$

Steady state level of  $\frac{K}{A.L} = k$  (per capita capital of effective labor) and  $\frac{Y}{A.L} = y$  (per capita GDP of effective labor) is calculated from the following relations:

$$k_e^* = \left[ \frac{s}{n+g+\delta} \right]^{\frac{1}{1-\alpha}} \quad , \quad y_e^* = \left[ \frac{s}{n+g+\delta} \right]^{\frac{\alpha}{1-\alpha}} \quad (8)$$

Making linear relation the Equation (7) by approximate expansion of Taylor series in nearness of sustainable level of k and by using the left Equation of (8) we have:

$$\frac{\partial \ln k}{\partial t} = (\alpha - 1)(g + n + \delta)[\ln k(t) - \ln k^*] \quad (9)$$

We can show that y moves to  $y^*$  with a similar rate of k to  $k^*$

Then:

$$\frac{\partial \ln y}{\partial t} = (\alpha - 1)(g + n + \delta)[\ln y(t) - \ln y^*] \quad (10)$$

Using the Equation of (10) and changing t to t-1 in this equation for use in empirical studies, we have:

$$\text{Ln}y_e(t) = e^z \ln y_e(t-1) + (1 - e^z) \ln y_e^*, \quad z = (\alpha - 1)(n + g + \delta) \quad (11)$$

Using relations (6), (8), and (11), an equation for per capita income ( $y = Y/L$ ) is obtained (Dunne, 2010:7):

$$\text{Ln}y(t) = e^z \ln y(t-1) + (1 - e^z) \left\{ \ln A_0 + \frac{\alpha}{1-\alpha} [\ln s - \ln(n+g+\delta)] \right\} + (\theta \ln m(t) - e^z \theta \ln m(t-1) + (t-(t-1)e^z)g \quad (12)$$

Finally considering:

$$x_1 = s, x_2 = n + g + \delta, x_3 = m, x_4 = m_{t-1}, \gamma = e^z > 0, \beta_1 = \frac{(1-e^z)\alpha}{1-\alpha-\beta} > 0, \\ \beta_2 = -\beta_1 < 0, \beta_3 = \theta, \beta_4 = -e^z \theta = -\gamma \beta_3, \eta_t = g(t - (t-1)e^z), \mu_i = (1-e^z)A_0$$

Dynamic Panel Data model is found as follows:

$$\text{Ln}y_{i,t} = \gamma \text{Ln}y_{i,t-1} + \sum_{j=1}^4 \beta_j \text{Ln}x_{j,i,t} + \eta_t + \mu_i + \nu_{it} \quad (13)$$

Based on the above analysis, above Dynamic Panel Data model is estimated to study relation between ME and economic growth.

Definitions of the variables in the Equation of (13) are as follows:

$\text{Ln}y = \ln(\frac{\text{GDP}}{\text{TLF}})$  natural logarithm of GDP per capita. It is calculated by GDP ratio to the population, as proxy of measuring economic growth.

$\text{Ln}x_1 = \ln(\frac{\text{INV}}{\text{GDP}})$  : natural logarithm of the ratio of gross fixed capital formation to GDP as a measurement indicator of capital saving rate (s)

$\text{Ln}x_2 = \ln(n + g + \delta)$  :

Natural logarithm of total growth rates of effective labor, technology, and depreciation.

In this study, following the studies of Knight, Loayza and, Villanueva (1996), Dunne (2010) and Dunne and Nikolaïdou (2012), overall rates of technology growth and depreciation is considered equal to a fixed amount of 5% ( $g+\delta=0.05$ ).

$\text{Ln}x_3 = \ln(\frac{M}{\text{GDP}})$  natural logarithm of the ratio of ME to GDP , as measurement index of ME share of production (M) .

$\text{Ln}x_4 = \ln(\frac{M}{\text{GDP}})(-1)$ : The natural logarithm of the ratio of ME to GDP with an interruption.

I: represents countries of the Middle East (i=1, ..., 14)<sup>1</sup>, t: represents time

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1. The studied countries in research are: Bahrain, Egypt, Iran, Jordan, Lebanon, Kuwait, Oman, Israel, Turkey, Qatar, Saudi Arabia, Syria, Emirates and Yemen.

period of 1988-2012,  $\mu_i$  as the constant effect of countries,  $\eta_t$  as the constant effects of time, and  $V_{it}$  is a random error.

In order to study the issue more closely, the Middle East countries have been divided into two groups of countries, as oil producing (including: Bahrain, the UAE, Iran, Kuwait, Oman, Qatar, Saudi Arabia, Syria, and Yemen) and non-oil (including: Egypt, Jordan, Lebanon, Israel and Turkey) producing countries. The source data of M/GDP variable is Stockholm International Peace Research Institute (SIPRI), and data sources of other variables is World Development Indicators (WDI).

#### 4.1. Empirical Model

Since the dependent variable was emerged with a lag in the right side of the equation in model of research (Equation 13), we face a dynamic panel data model. The form of a dynamic pattern is as follows:

$$Y_{i,t} = \alpha Y_{i,t-1} + \beta X'_{i,t} + \mu_i + \varepsilon_{i,t} \quad (14)$$

where:

$Y_{it}$  : Dependent variable

$X'_{it}$  : Vector of independent variables that are applied as Instrumental variable

$\mu_i$  : Error factor of sections

$\varepsilon_{it}$  : Error factor of i-section in t-time

When dependent variable is emerged in the right side as lag and as an endogenous variable in combined data model, OLS estimators are not compatible (Arellano and Bond, 1991), thus, 2SLS two-stage estimate methods of Anderson and Hsiao or Generalized Method of Moments (GMM) of Arellano and Bond are useful in this situation.

According to Matyas and Sevestre, 2SLS estimates may be due to a problem in the choice of means, large variances for the coefficients obtained, and when the estimates are not statistically significant. So, two-stage GMM method was suggested to solve this problem by Arellano and Bond. Arellano and Bond suggested the following differential equation:

$$(15) \quad Y_{i,t} - Y_{i,t-1} = \alpha(Y_{i,t-1} - Y_{i,t-2}) + \beta(X'_{i,t} - X'_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

Thus, the first step is making the difference to eliminate  $\mu_i$  from the model. In the second stage, the waste remaining of the first stage is used to balance the variance covariance matrix. In other words, this method creates some variables as instrumental variables to have consistent and unbiased estimates (Baltagi, 2005).

The GMM estimator consistency depends on credibility of the lack of

serial correlation of error terms and means which can be tested by two provided tests by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) .The first test is Sargan which is the predetermined limitations which test the credibility of tools. Sargan (J-Statistic) has distribution of  $\chi^2$  with equal degrees of freedom with high numbers of limitations. The second test is Serial Correlation which tests quadratic serial correlation differential error sentences by M<sub>2</sub>. In this test, GMM estimator is compatible when there is not a quadratic serial correlation in error sentences of first-order differential equation. Not rejection of H<sub>0</sub> in both 2 tests provides some evidences as reasons of lack of serial correlation and the validity of tools.

In this research, to perform statistical and econometric model analysis, Panel unit root tests by Eviews7.0 software were used at first to check the stationary of data. Then, model of research was estimated by Stata11.0 software.

### 5. Empirical results

The normal econometric methods in empirical works are based on assumptions about the stationary of the variables of the study; due to probability of false estimation by non-stationary variables and citation to these estimations, the results will be misleading (Baltaji, 2005). So, it is necessary to be sure about state of stationary and non-stationary of the data.

Im, Pesaran, and Shin (IPS) tests and Augmented Dicky Fuller-Fisher (ADF-F) tests were used in this research to study about stationary of variables. In this test, the null hypothesis (H<sub>0</sub>) shows existence of a unit root. The results of these tests are presented in Tables 1 and 2.

According to results of above tables, H<sub>0</sub>, based on unit root of variables or non-stationary in all of variables under study in confidence level of 5% is rejected. So, all of variables were stationary and their co-integration degree is zero. As all of the variables of the model are stationary at 5% confidence level, so without worrying about the unit roots of variables and occurrence of false regression problems, we can estimate the model.

**Table 1. Results of unit root test results of Im, Pesran, and Shin**

Variable	Value in the test for sample			
	All countries of the Middle East	Oil-produced countries of the Middle East	Non-oil-produced countries of the Middle East	Stationary degree
Ln(GDP/TLF)	-7.821(0.0000)	-8.143(0.0000)	-6.77(0.0000)	I(0)
Ln(n+g+δ)	-2.242(0.0000)	-1.833(0.0334)	-4.621(0.0000)	I(0)
Ln(INV/GDP)	-14.132(0.0000)	-13.123(0.0000)	-14.553(0.0000)	I(0)
Ln(M/GDP)	-9.788(0.0000)	-8.154(0.0000)	-12.872(0.0000)	I(0)

\*The numbers inside parentheses indicates the possibility level.

Source: calculations of research by Eviews7.0 software.

**Table 2. Results of generalized unit root test of Fisher- Dicky Fuller**

Variable	Value in the test for sample			Stationary degree
	All countries of the Middle East	Oil-produced countries of the Middle East	Non-oil-produced countries of the Middle East	
Ln(GDP/TLF)	222.234(0.0000)	228.146(0.0000)	234.008(0.0000)	I(0)
Ln(n+g+δ)	68.078(0.0000)	69.224(0.0000)	96.655(0.0000)	I(0)
Ln(INV/GDP)	248.148(0.0000)	202.348(0.0000)	248.664(0.0000)	I(0)
Ln(M/GDP)	228.087(0.0000)	198.211(0.0000)	236.812(0.0000)	I(0)

\* The numbers inside parentheses indicates the possibility level.

Source: calculations of research by Eviews7.0 software.

Before estimating the model by generalized moment method, F-Leamer statistic with degrees of freedom as N-1, NT-K-N is used to ensure about selection between Panel data method and Pooling Data, where K is the number of explanatory variables included in the model. N is number of sections, T is time period:

$$F = \frac{RRSS - URSS / N - 1}{URSS / NT - K - N}$$

In above relation, RRSS is restricted residual sum of squares result of estimation of Panel model of OLS method and unrestricted residual sum of squares (URSS). According to H0 of this test, each of the sections has the same intercepts (necessity of using pooling data). The alternative hypothesis (H1) points to difference of intercepts of each section (necessity of using panel data). As calculations of this research achieved the possibility of accepting the null hypothesis for the entire Middle East, oil and non-oil countries in the region, respectively as 0.0039, 0.0012 and 0.0000, H0, as the ability to estimate data by pooling method is not accepted. It is necessary to estimate the models for all the samples by panel data method. As previously explained, due to the continuous dependent variable as an explanatory variable, we face a dynamic panel data model. Generalized method of moments (GMM) is used to estimate it. Results of generalized Solow model in ME and economic growth for the Middle East countries in the period time of 1988-2012 and by GMM for the Middle East countries and the separation of oil and non-oil countries are presented in the Table 3. The results of the top of table show that all the variables of the samples under study were significant at the 95 percent confidence level and are statistically valid.

In addition, the calculated coefficients sign realize our expectation to estimate the model according to the literature review. Also, results of Sargan test and the serial correlation represent compatibility of GMM estimator, according to the calculated probability levels in bottom part of table 3. So, results of the estimated coefficients are confirmed statistically and are interpretable.

**Table 3. Results of estimation of model of research by GMM method**

Variable	Coefficients		
	All countries of the Middle East	Oil-produced countries of the Middle East	Non-Oil-produced countries of the Middle East
Ln(GDP/TLF) (-1)	0.185(0.000)	0.241(0.000)	0.152(0.000)
Ln(n+g+δ)	-0.94(0.029)	-0.124(0.048)	0.081(0.031)
Ln(INV/GDP)	0.161(0.000)	0.191(0.000)	0.123(0.000)
Ln(M/GDP)	-0.058(0.010)	-0.071(0.018)	-0.021(0.029)
Ln(M/GDP) (-1)	-0.013(0.035)	-0.021(0.022)	0.008(0.026)
Constant	-0.228(0.000)	-0.512(0.000)	0.084(0.000)
Diagnostic tests			
Test name	Probability level		
Sargan test	0.69	0.62	0.58
Continuous correlation test	0.83	0.68	0.64

\* Numbers in parentheses indicate the possibility level.

Source: Calculations of research using Stata11.0 software.

According to results of Table 3, impact factor of ME on economic growth of countries of the Middle East is calculated as -0.058. It means that 1% increase of ME to GDP in the Middle East countries results in decrease of economic growth of these countries about 0.058%. These results also showed that the increase of ME of the Middle East countries decreases economic growth of these countries. Since budgets of education, health and reconstruction investment are allocated to ME, the MEs affect negatively on trade balance of the Middle East countries. Since most of the countries of the Middle East are importers of military equipment, this negative impact of ME on trade balance seems reasonable. The lag of the ratio of ME to GDP affects negatively on economic growth of current period of time, 1% increase in this ratio decreases economic growth of next period about 0.013%. Therefore, it is resulted that although MEs in the countries of the Middle East are necessary, but it is harmful for economic growth of these countries. The sign of other estimated variables is as expected and based on empirical studies. The result of Table 3 shows that 1% increase in n+g+δ variable (effective labor growth rate +0.05) decreases economic growth in long-term about 0.094%.

In most developed countries, population and labor force is regarded as a main factor of economic growth. But in developing countries (such as Iran), different evidences show that population and labor force have no impact on economic growth. Even sometimes it was considered as a limited factor of growth. Clear and hidden unemployment of labor force or limitation of work is a reality of economy of developing countries. As expected, based on theories of microeconomics, with the increase of a factor of production and its position beyond a certain level, not only this factor does not affect economic growth, but also it decreases production.

The lag GDP per capita affects significantly on economic growth of countries under study than other variables, about 1% increase of this variable increases economic growth about 0.185%, ceteris paribus. This result shows that the change in GDP per capita in a period, not only affects in that period,

but also recession or boom of this period affects the next periods. The ratio of gross fixed capital formation to GDP, according to the theories, has a positive and significant coefficient; 1% increase of this variable, increases economic growth about 0.161%. The estimating results of the separation of model into two groups of oil and non-oil countries of the Middle East countries are stated in the third and fourth columns of Table 3. The obtained control variables signs for both groups are completely in accordance with the signs obtained for the estimated model of all countries of the Middle East and are in accordance with the theoretical and empirical studies. The important thing is that the negative impact of ME on economic growth of oil-producing countries in the Middle East is more than the non-oil countries. So that 1% increase in the ratio of ME to GDP, economic growth in oil-producing countries in the Middle East declines about 0.071%. Meanwhile, 1% increase in the ratio of military spending to GDP, economic growth in non-oil countries in the region will be reduced about 0.021%.

Given that most of the oil producing countries of the Middle East are the major importers of arms and weapons in the world, they do not have developed defense industry, and efficiency of labors of military section in these countries is low, due to negative effects of ME on commercial balance, and lack of economic positive leakage effects; the impact of MEs and producing arms and war equipment inside country on economic growth is negative and in oil countries is more than the non-oil ones, as expected.

## 6. Conclusions

Although scholars believe that MEs are necessary to maintain internal and external security, there is agreement about their effects on economic growth. While some studies have evaluated that the effects of ME on economic growth are positive, the results of some other studies have shown negative effects of ME on economic growth. Obviously, the results of any study depend on the conditions prevailing in the region, which in turn provide more studies. The purpose of this study was to evaluate the effect of MEs on economic growth in the Middle East countries and also oil and non-oil countries, considering the importance of place of these countries in a sensitive and strategic region, as well as their increasing MEs. For this purpose, after a short review of ME of the world and the Middle East, an augmented Solow model was designed during 1998-2012 for ME and economic growth for countries of the Middle East and its oil-producing and non-oil-producing countries.

The Generalized moment method (GMM) was used in the combined data framework to estimate the model. The accuracy of these estimates is confirmed by Sargan tests and continuous correlation. The results of estimating the model suggest a negative relationship between ME and economic growth of oil and non-oil countries in the Middle East. In addition, negative impact of ME in oil-producing countries is more than non-oil

producing countries. Generally, military expenditure is one of the causes of the consolidation of the socio-political system and can be directly and indirectly increase economic growth. If a state is able to produce its required weapons and arms and even export them to other countries, it gains a considerable amount of currency income. It has a positive direct impact on foreign payments balance and economic growth. Creating security in the country is one of the reasons for increasing ME. The increase of domestic and foreign investment in the country has positive impacts. It results in increasing work and employment, gross domestic product, and finally economic growth (indirect impact). As a result of excessive increase in DE, governor faced with some limitations in finance resources, which makes some problems for investment in non-military affairs and the decrease of economic growth is a result of it.

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