

# **The Nexus between Political Instability, Defence Spending and Economic Growth in the Middle East Countries: Bootstrap Panel Granger Causality Analysis**

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## **Abstract**

*This paper investigates the direction of causality between political instability, defence spending and economic growth for 12 MENAT countries during the period 1988-2013 within a panel data framework, which considers the issues of cross-sectional dependency and slope heterogeneity among countries investigated simultaneously. We find a positive causality relationship from political instability and defence spending to economic growth for only Lebanon; a positive causality relationship from political instability and economic growth to defence spending for Jordan, Lebanon, Saudi Arabia, Morocco and Turkey; a positive causality relationship from economic growth and defence spending to political instability for Egypt, Israel and Turkey. Thus, empirical results point out that the military as a government institution have played the central role of upon economic growth and political instability for Lebanon, Egypt, Israel and Turkey.*

**Keywords:** *Political instability; Military Expenditure; Economic Growth; Bootstrap; Panel causality; Cross-sectional dependence; Slope heterogeneity*

**JEL Codes:** *C23; E60; H50; H56; O10*

## **Introduction**

The relationship between defence spending and economic growth is one of the major themes in current development literature. This special interest comes from that defence spending is not a completely economic variable but rather a mixture of economic, political, strategic, psychological and cultural.

Benoit (1978) investigated the correlation between the growth rates, investment rates, foreign aid receipts and the defence burden for 44 less-developed countries during the 1950-1965 periods. Using correlation analysis, Benoit (1978) found that the defence burden have been a positively significant determinant of growth in the selected period. This positive association between defence spending and economic growth is now called as “the Benoit hypothesis”. Aftermath this publication of the Benoit, there is a great deal of empirical literature that has scrutinized the experiences of the developed and developing economies.

In the defence economics, there are many empirical studies concerning the defence spending and economic growth relationship that give mixed results. According to the Keynesian-type demand model, an additional defence spending increase aggregate demand, capital utilization, production and employment and reduces unemployment, if there is spare capacity in the production sector. But, this demand-concentrated framework fails to consider supply-side issues, such as technology spin-offs and externalities due to the fact that it is focused on demand-side issues (Yildirim et al. 2005; Yakovlev 2007).

In the supply-side of the relationship between defence spending and growth, resources and capital are limited to use, so those used by military sector are opportunity cost in other sector. The supply side of this relationship takes into account the spill-over or the spin-off effects. According to Chan (1987), non-military investment is cut back in the presence of increased the level of military expenditure. Thus, military expenditure has a negative effect on growth due to the fact that it reduced productivity in the long-run. However, Yakovlev (2007) showed that defence spending provides expansion of technology and human resource, which can spill over into the private sector and it has a positive contribution across the industries.

In addition to the defence-growth nexus, the nexus between political instability and economic growth has been one of the most important topics in empirical research in economics in the last decade, as well. The studies focused on the political instability-growth nexus generally revealed a negative impact of political instability on economic growth.

Taking these arguments into consideration, in this study, we focus on the causality relationship between political instability, defence spending and economic growth, which is still unsettled among economists.

Structure of this paper is as follows: the links including the effects of defence spending and political instability on economic growth based on the existing literature will be explained in Section 2. The data set will be introduced in Section 3. The empirical methodology and findings will be presented in Section 4. Finally, the paper will end up with the concluding remarks.

## **Literature Review**

In the literature, there are many studies trying to examine the relationship between defence spending and economic growth. There are three different views on this relationship. The first group argued that defence spending has growth-stimulating effect due to the fact that defence spending provides market expansion for suppliers, technology development and security benefits. Moreover, this group argued that defence spending may deliver other public goods, such as airports, roads, and communication networks by producing goods with a dual-use nature (Khalid and Mustapha 2014). For instance, Blomberg (1992), in his study including regional dummies for Africa and Latin America, showed that increased political instability inhibits economic growth and increased military expenditure decreases political instability. The paper also finds that defence burden decreases economic growth but not significantly.

Shieh et al. (2002) developed an endogenous growth model to examine the linkage between military expenditures and economic growth. According to Shieh et al. (2002), a rise in military spending leads to stimulate the sustained growth rate.

Yildirim et al. (2006) investigated the military expenditure-economic growth relationship for Middle Eastern countries and Turkey for the period 1989-1999 using panel estimation methods. Applying the FEM and GMM methods, Yildirim et al. (2006) found that military expenditure is positively associated with economic growth in the Middle Eastern countries and Turkey as a whole.

Kollias et al. (2007), using the panel dynamic fixed effects to examine the relationship between military expenditures and growth for the European Union (EU15) group of countries, found a positive feedback between the two variables during the period 1961-2000 in the long-run and a positive impact of the latter on growth in the short-run.

Wijeweera and Webb (2011) explored the long-run nexus between military spending and real gross domestic product (GDP) for India, Pakistan, Nepal, Sri Lanka and Bangladesh over the period 1988-2007. Using a panel cointegration approach, Wijeweera and Webb (2011)'s results indicate that military spending is positively associated with real GDP in the selected countries.

The second view is that defence spending reduces economic growth through its crowding out effect on private investments. According to supporters of this view, excessive expenditures in the military sector would have to involve limiting economic resources for planned investment in other areas, because each increment of the defence budget brings a heavier tax burden, a bigger government budget deficit, which leads to lower savings and investments. For instance, Frederiksen and Looney (1983) tested the hypothesis that the poorer countries tend to cut back high-growth development expenditures in favour of maintaining defence programs, while the richer countries are much less likely to abandon development expenditures focused on defence. Thus, they have expected a negative correlation between defence and growth in the poorer countries, but a positive relationship between in relatively rich countries. The empirical results of Frederiksen and Looney (1983) showed that defence spending is positively associated with economic growth in the countries with the resource abundant, characterized by low growth in foreign exchange earnings, a low percentage of exports to GDP, a high debt service ratio, a low government expenditure multiplier, while defence spending is negatively associated with economic growth in the resource constrained group of countries. Thus, these results have supported to their hypothesis that financial constraints play an important role in the defence-growth relationship.

Lebovic and Ishaq (1987), examining the military expenditure-economic growth relationship for 20 Middle Eastern countries from 1973 to 1982, found that military expenditure is negatively associated with economic growth.

Pironi (2009), testing non-linear effect of military expenditures on economic growth for 90 countries, found that there exists the negative relationship between military expenditures and growth in 50 countries, which have high levels of military burden.

D'Agostino et al. (2012) investigated the nexus between corruption, military spending and economic growth for 53 African countries from 2003 to 2007. Using a dynamic panel data approach, D'Agostino et al. (2012)'s empirical findings show that higher levels of military spending and corruption are associated with lower economic growth for the group of African countries, examined.

The third view is that there is no significant relationship between defence spending and economic growth. For example, Habibullah et al. (2008) investigated the relationship between economic growth and military expenditure over the period of 1989-2004 in 12 Asian countries. Using a panel cointegration technique, Habibullah et al. (2008) found no evidence of statistically significant relationship between the two variables. Heo (2010) examined the defence-growth nexus in the United States from 1954 to 2005. The results indicate that defence spending does not significantly affect the U.S. economy. Similarly, Biswas and Ram (1986), Alexander (1990), Kinsella (1990), Payne and Ross (1992), Ward et al. (1992) and DeRouen (1994) show that there is no significant relationship between defence spending and growth.

In addition to the correlation analysis, in the literature, examining the presence of the causal relationship between the two variables, there have been mixed results over whether the causality relationship running from defence expenditure to economic growth or running from economic growth to defence expenditure. For instance, Chowdhury (1991), applying Granger causality

method for 55 developing countries, examined whether the causality relationship exists between defence spending and economic growth. The findings suggest an existence of unidirectional Granger causality running from economic growth to defence spending in seven countries, while bidirectional Granger causality relationship between the variables in three countries.

Seigle and Liu (2002), investigating the direction of causal relationship between the military expenditure and economic growth, obtained the empirical findings in support of unidirectional Granger causality running from military spending to economic growth in the case of Israel and unidirectional Granger causality running from economic growth to military spending in the cases of Egypt, Iran, Jordan and Syria.

Abu-Bader and Abu-Qarn (2003) investigated the causal relationship between civilian government expenditures, military burden, and economic growth for Egypt, Israel, and Syria. The empirical results revealed that while there is a negative bidirectional causality between total government civilian spending and economic growth in the case of a bivariate system of total government spending and economic growth, there is a negative unidirectional causality running from military burden to economic growth in the three countries and that civilian government expenditures cause positive economic growth in Israel and Egypt within a trivariate system of government civilian expenditures, military burden and economic growth.

Kalyoncu and Yucel (2006) investigated the long-run relationship between defence expenditures and economic growth by applying cointegration and causality tests for Turkey and Greece in the period of 1956-2003. The causality test results show that there is a unidirectional causality running from economic growth to defence expenditures only for Turkey.

Lee and Chen (2007) empirically examine the long-run co-movement and the causal linkages between defence spending and GDP for 27 OECD countries and 62 non-OECD countries for the 1988-2003 periods. The empirical evidences showed that there is a positive bidirectional relationship between the variables in the long-run in the case of OECD countries and that there is a negative unidirectional relationship running from defence spending to GDP in the long-run in the case of non-OECD countries. In addition to the long-run evidences, Lee and Chen (2007) found that GDP and defence spending lack short-run causalities.

Pradhan (2010) examined the relationship between defence spending, public debt and economic growth in the four Asian countries, namely China, India, Nepal and Pakistan over the period 1988-2007. The results of the panel Granger causality test revealed that there exists bidirectional causality between public debt and economic growth in the cases of China and India; unidirectional causality running from defence spending to economic growth in China and Nepal; unidirectional causality from public debt to defence spending in India.

Shahbaz et al. (2013), using the autoregressive distributive lag (ARDL) bounds testing approach to examine cointegration between military spending and economic growth for Pakistan, showed the existence of a cointegration relationship between the two variables over the period 1972-2008. In addition, the empirical results have indicated negative effect of military spending on economic growth for Pakistan's economy. Finally, unidirectional causal relationship running from military spending to economic growth has been found.

Chang et al. (2013) apply Granger causality method for 15 selected European countries during the period 1988-2010 to examine unidirection or feedback direction of causality between defence spending, per capita real capital stock and economic growth. The final empirical results indicate that there is a feedback relation between real capital stock and economic growth, a one-way Granger causality running from economic growth to defence spending and defence spending only Granger causes real capital stock.

Pan et al. (2014) investigated the causal relationship between per capita military spending and economic growth cover the period from 1988 to 2010 for 10 Middle Eastern countries. Using the bootstrap panel causality test proposed by Konya (2006), Pan et al. (2014) found the causality relationship running from per capita military spending to economic growth only in Turkey and Israel, but found unidirectional Granger causality running from economic growth to military spending for Egypt, Kuwait, Lebanon, Israel and Syria.

In addition, when the studies that examined the effect of political instability on economic growth, used as other explanatory variable in this study is investigated, these studies generally seem to reveal a negative impact of political instability on economic growth. For example, Alesina et al. (1992), using data on 113 countries from 1950 to 1982, investigated the relationship between political instability, defined as the propensity of a government collapse and per capita GDP growth. Alesina et al. (1992) obtained the findings that political instability reduces economic growth. Like Alesina et al. (1992), using changes in government as the measure of political instability, De Haan and Siermann (1996) assert that political instability causes slower economic development.

Kirmanoglu (2003) used Granger causality test in order to determine the direction of causality in the relationship between stability and economic growth. Kirmanoglu (2003) found that there is no relationship between instability and growth in 14 of the 19 countries. Moreover, for two countries, Kirmanoglu (2003) found that political stability leads to economic growth, while, for three countries, found that there is a causal relationship running from economic growth to political stability. Using Polity2 democratization score as a measure of political instability, Zureiqat (2005) revealed that political instability, measured by the lack of democracy, causes slower economic growth for 25 countries from 1985 to 2002.

Aisen and Veiga (2013) analysed the effects of political instability on economic growth for 169 countries and 5-year periods from 1960 to 2004 and found that political instability significantly reduces economic growth. Similarly, Jaouadi et al. (2014) examined the relationship between political instability and economic growth for 69 developing countries during the 1985-2012 period. The results revealed the harmful impact of political instability on economic growth.

Gurgul and Lach (2013) investigated the nexus between political instability, defined as the propensity for government change and economic growth in 10 Central and Eastern Europe countries in the period 1990-2009. The results showed that political instability had a negative impact on economic growth, but there was no causality running from economic growth to political instability

## **The Data**

The annual data for the period 1988-2013 for 12 Middle East, North Africa and Turkey (MENAT) in this study comes from the World Bank, World Development Indicators (2015) and the Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database (2015). These countries are Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Lebanon, Tunisia, Saudi Arabia, Oman, Morocco, and Turkey. The selection of the time period and of 12 MENAT countries depends on the availability of data. Moreover, the selected time period also has witnessed a rapid growth of the selected MENAT countries group.

Eviews 8.0 and Gauss 6.0 statistical packages were used in the econometric analyses. The variables, their descriptions and sources were illustrated in Table 1.

**Table 1.** Data Set

<i>Variable Name</i>	<i>Variable Description</i>	<i>Source</i>
<i>Growth</i>	Economic Growth. The data for Growth is proxied by real per capita GDP in logarithmic form.	the World Bank, WDI (2015)
<i>Defence</i>	Defence spending. The data for Defence is log of per capita military expenditure.	the SIPRI Military Database (2015)
<i>Polity2</i>	Political instability score. The score was created by subtracting the autocracy score from the democracy score, which varies between -10 (strongly autocratic) and +10 (strongly democratic).	the Polity IV Project Dataset Users' Manual (2014)

Table 2 presents descriptive statistics of data used in this paper. According to Table 2, there is no sampling bias in the data. The means of all variables are close neither to their minimum nor maximum value, which indicates that there is no disproportion.

**Table 2.** Descriptive statistics

	<i>Mean</i>	<i>Median</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Std. Dev.</i>	<i>Observation</i>
<i>Growth</i>	8.47012	8.26486	10.0998	6.71714	0.94731	312
<i>Defence</i>	5.29372	5.04996	8.22195	2.68967	1.35389	312
<i>Polity2</i>	-2.53846	-4.00000	10.0000	-10.0000	6.27390	312

Source: Author' estimations

Table 3 presents the results from correlation matrix of the variables. According to correlation matrix, the control variables, which are Defence and Polity2 are positively correlated with Growth.

**Table 3.** Correlation matrix

	<i>Growth</i>	<i>Defence</i>	<i>Polity2</i>
<i>Growth</i>	<b>1.000</b>	0.893	0.111
<i>Defence</i>	0.893	<b>1.000</b>	0.059
<i>Polity2</i>	0.111	0.059	<b>1.000</b>

Source: Author' estimations

## Methodology and Empirical Results

We investigated the direction of the causal linkages in the framework of the trivariate panel Granger causality between defence spending, political instability and economic growth for 12 MENAT countries. For this purpose, we applied panel data techniques due to well known that panel data methods give more informative data, more degrees of freedom and so, more efficiency results (Baltagi, 2005).

### 4.1 Preliminary analysis: cross-sectional dependence and slope homogeneity

In examining the causal relationships, cross-sectional dependence and slope homogeneity are two important issues. Pesaran (2006) shows that the key role of cross-section within the panel framework through the Monte Carlo experiment and suggests that ignoring cross-sectional dependency across countries with high degree of integration, such as a common market, economic and monetary union, or political union can lead to a substantial bias and size distortions. Thus, controlling of cross-sectional dependence, which could be explained that a

shock affecting individuals forming a panel may also affect other individuals seems necessary in this study examining the causality linkages between defence spending, political instability and economic growth for the MENAT countries, examined.

In this study, Breusch and Pagan (1980)'s  $LM_{BP}$  test, Pesaran (2004)'s  $CD_{LM}$  and  $CD$  tests and Pesaran, Ullah, Yamagata (2008)'s  $LM_{adj}$  test are applied in order to control cross-sectional dependence among the MENAT countries.

The test statistics can be calculated using the following panel data model:

$$y_{it} = \alpha_i + \beta_i' x_{it} + \mu_{it} \text{ for } i=1,2,\dots,N; t=1,2,\dots,T \quad (1)$$

In the cross-sectional dependence tests considered, the null and the alternative hypotheses of no cross-sectional dependence are as follows:

$$H_0 : Cov(\mu_{it}, \mu_{jt}) = 0 \text{ for all } t \text{ and } i \neq j$$

$$H_1 : Cov(\mu_{it}, \mu_{jt}) \neq 0 \text{ for at least some } i \neq j$$

The test statistics, developed by Breusch and Pagan (1980), Pesaran (2004) and Pesaran, Ullah, Yamagata (2008) are as follows:

$$LM_{BP} = T \cdot \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 : \chi_{N \cdot (N-1)/2}^2$$

$$CD_{LM} = \sqrt{\frac{1}{N \cdot (N-1)}} \left[ \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T \cdot \hat{\rho}_{ij}^2 - 1) \right] : N(0,1)$$

$$CD = \sqrt{\frac{2T}{N \cdot (N-1)}} \left[ \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right] : N(0,1)$$

$$LM_{adj} = \sqrt{\frac{2}{N \cdot (N-1)}} \left[ \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right] \frac{(T-k)\hat{\rho}_{ij}^2 - \mu_{Tij}}{\sqrt{v_{Tij}^2}} : N(0,1)$$

where  $\hat{\rho}_{ij}$  shows the estimation of the correlation coefficient among the residuals obtained from individual OLS estimations of Equation (1). Under the null hypothesis of no cross-sectional dependency the  $LM_{BP}$  test, is used when  $N$  is fixed and  $T$  goes to infinity ( $T$  is large relative to  $N$ ), is asymptotically distributed as chi-squared with  $N(N-1)/2$  degrees of freedom. Under the null hypothesis of no cross-sectional dependence  $CD_{LM}$  test, which is one of the Pesaran (2004)'s tests to examine cross-sectional dependence, is useful when  $N$  is great and  $T$  is small ( $N$  is large relative to  $T$ ) and it is asymptotically distributed as standard normal. Another test of Pesaran (2004) test to examine cross-sectional dependence is  $CD$  test, which is used when  $T$  and  $N$  go to infinity in any order, is asymptotically distributed as standard normal. The bias-adjusted  $LM$  test, proposed by Pesaran, Ullah and Yamagata (2008), is a modified version of the  $LM$  test. In  $LM_{adj}$  test statistic,  $k$  represents the number of regressors,  $\mu_{Tij}$  is the exact mean of  $(T-k)\hat{\rho}_{ij}^2$  and  $v_{Tij}^2$  is the exact variance of  $(T-k)\hat{\rho}_{ij}^2$  (Menyah et al. 2014).

When analysing panel data, the other important issue to consider is the testing of slope homogeneity. The homogeneity of the estimated coefficients for each individual in the panel is investigated using Pesaran and Yamagata's (2008) homogeneity tests in this study. Pesaran and Yamagata (2008) proposed a standardized version of Swamy(1970)'s test of slope homogeneity

for panel data models. Pesaran and Yamagata (2008) take into account the following panel data model with fixed effects and heterogeneous slopes:

$$y_{it} = \alpha_i + \beta_i' x_{it} + \varepsilon_{it}, \text{ for } i=1, \dots, N, t=1, \dots, T \quad (2)$$

where  $\alpha_i$  is unit-specific intercept and bounded on a compact set,  $x_{it}$  is a  $k \times 1$  vector of strictly exogenous regressors,  $\beta_i$  is a  $k \times 1$  vector of slope coefficients. The null hypothesis and the alternative hypothesis of interest are

$$H_0 : \beta_i = \beta \text{ for all } i,$$

$$H_1 : \beta_i \neq \beta_j \text{ for a non-zero fraction of pairwise slopes for } i \neq j.$$

Under the null hypothesis  $\Delta \xrightarrow{d} N(0,1)$  as  $(N, T) \rightarrow \infty$  so long as  $\sqrt{N}/T^2 \rightarrow 0$ ,

where the standardized dispersion statistic,  $\Delta$  is defined by  $\Delta = \sqrt{N} \cdot \left( \frac{N^{-1} S^2 - k}{\sqrt{2k}} \right)$  where  $S^2$  is the Swamy's statistic, is valid for a fixed  $N$  and as  $T \rightarrow \infty$ . Pesaran and Yamagata (2008) also proposed the following mean and variance bias adjusted version of  $\Delta$  for the small samples.

$$\Delta_{adj} = \sqrt{N} \cdot \left( \frac{N^{-1} S^2 - E(z_{iT})}{\sqrt{\text{Var}(z_{iT})}} \right), \text{ where } E(z_{iT}) = k, \text{ Var}(z_{iT}) = \frac{2k \cdot (T - k - 1)}{T + 1}.$$

The empirical findings of cross-sectional dependence and slope homogeneity tests are reported in Table 4. The results presented in Table 4 indicate that the null hypothesis of no cross-sectional dependence and the null hypothesis of slope homogeneity are rejected at 1% significance level. These findings imply that a shock occurred in one MENAT country may be transmitted to other MENAT countries and that there is country specific heterogeneity. So, it is clear that the causality test, taking into account both cross-sectional dependence and slope heterogeneity should be applied.

**Table 4.** Results for cross-sectional dependence and the slope homogeneity tests

<i>Test</i>	<i>Statistic</i>	<i>p-value</i>
<i>LM<sub>BP</sub></i>	302.412***	0.000
<i>CD<sub>LM</sub></i>	17.967 ***	0.000
<i>CD</i>	-3.181***	0.001
<i>LM<sub>adj</sub></i>	128.530***	0.000
<i>Δ<sub>test statistic</sub></i>	4.486***	0.000
<i>Δ<sub>adj test statistic</sub></i>	4.750***	0.000

\*\*\* denotes statistical significance at 1%.

Source: Author' estimations

## 4.2 Panel Granger causality test

Aftermath the findings of cross-sectional dependence and country-specific heterogeneity, we use the bootstrap panel causality approach, developed by Kónya (2006) is applied to investigate the direction of causality between political instability, defence spending and economic growth.



This causality approach is based on the Seemingly Unrelated Regressions (SUR) and Wald tests with the country specific bootstrap critical values. This approach does not require pre-testing for unit root and cointegration since country specific bootstrap critical values are generated (Kónya 2006).

In order to examine the presence of the causal relationship between two variables researchers have used Granger causality test, which pointed out by Granger (1969). Granger called a variable  $x$  causal for a variable  $y$ , if the information in past and present values of  $x$  significantly contribute to forecast  $y$  for some future period; otherwise it is said to fail granger-cause  $x$ . Zellner (1962) proposed that if there is a cross-sectional dependence in testing the Granger causality among the variables in a panel data, estimating sets of equations by the Seemingly Unrelated Regressions (SUR) procedure gives more efficient estimators than OLS estimation method. From this point of the view, we used the panel causality approach of Kónya (2006), based on SUR and considering both cross-sectional dependence and country-specific heterogeneity simultaneously. The trivariate system to be estimated under the bootstrap panel causality approach can be formulated as follows:

$$y_{1,t} = \alpha_{1,1} + \sum_{k=1}^{ly1} \beta_{1,1,k} y_{1,t-k} + \sum_{k=1}^{lx1} \delta_{1,1,k} x_{1,t-k} + \sum_{k=1}^{lz1} \varphi_{1,1,k} z_{1,t-k} + e_{1,1,t}$$

$$y_{2,t} = \alpha_{1,2} + \sum_{k=1}^{ly1} \beta_{1,2,k} y_{2,t-k} + \sum_{k=1}^{lx1} \delta_{1,2,k} x_{2,t-k} + \sum_{k=1}^{lz1} \varphi_{1,2,k} z_{2,t-k} + e_{1,2,t}$$

M

$$y_{N,t} = \alpha_{1,N} + \sum_{k=1}^{ly1} \beta_{1,N,k} y_{N,t-k} + \sum_{k=1}^{lx1} \delta_{1,N,k} x_{N,t-k} + \sum_{k=1}^{lz1} \varphi_{1,N,k} z_{N,t-k} + e_{1,N,t}$$

$$x_{1,t} = \alpha_{2,1} + \sum_{k=1}^{ly2} \beta_{2,1,k} y_{1,t-k} + \sum_{k=1}^{lx2} \delta_{2,1,k} x_{1,t-k} + \sum_{k=1}^{lz2} \varphi_{2,1,k} z_{1,t-k} + e_{2,1,t}$$

$$x_{2,t} = \alpha_{2,2} + \sum_{k=1}^{ly2} \beta_{2,2,k} y_{2,t-k} + \sum_{k=1}^{lx2} \delta_{2,2,k} x_{2,t-k} + \sum_{k=1}^{lz2} \varphi_{2,1,k} z_{2,t-k} + e_{2,2,t}$$

M

$$x_{N,t} = \alpha_{2,N} + \sum_{k=1}^{ly2} \beta_{2,N,k} y_{N,t-k} + \sum_{k=1}^{lx2} \delta_{2,N,k} x_{N,t-k} + \sum_{k=1}^{lz2} \varphi_{2,1,k} z_{N,t-k} + e_{2,N,t}$$

and

$$z_{1,t} = \alpha_{3,1} + \sum_{k=1}^{ly3} \beta_{3,1,k} y_{1,t-k} + \sum_{k=1}^{lx3} \delta_{3,1,k} x_{1,t-k} + \sum_{k=1}^{lz3} \varphi_{3,1,k} z_{1,t-k} + e_{3,1,t}$$

$$z_{2,t} = \alpha_{3,2} + \sum_{k=1}^{ly3} \beta_{3,2,k} y_{2,t-k} + \sum_{k=1}^{lx3} \delta_{3,2,k} x_{2,t-k} + \sum_{k=1}^{lz3} \varphi_{3,2,k} z_{2,t-k} + e_{3,2,t}$$

M

$$z_{N,t} = \alpha_{3,N} + \sum_{k=1}^{ly3} \beta_{3,N,k} y_{N,t-k} + \sum_{k=1}^{lx3} \delta_{3,N,k} x_{N,t-k} + \sum_{k=1}^{lz3} \varphi_{3,N,k} z_{N,t-k} + e_{3,N,t}$$

where index  $t$  refers to the time period  $t = 1, 2, \dots, T$ ,  $k$  the lag,  $ly1, ly2, ly3, lx1, lx2, lx3, lz1, lz2, lz3$  indicate the longest lags in the system, and  $N$  is the number of the members in a panel  $j = 1, 2, \dots, N$ . The error terms  $e_{1,1,t}, e_{1,2,t}, \dots, e_{1,N,t}, e_{2,1,t}, e_{2,2,t}, \dots, e_{2,N,t}$

and  $e_{3,1,t}, e_{3,2,t}, \dots, e_{3,N,t}$  are supposed to be white-noises and may be contemporaneously correlated.

In examining of Granger causality, alternative causal linkages for a country in this system can be given examples as follows: there is one-way Granger causality running from x to y if not all  $\delta_{1,j,k}$ 's are zero, but all  $\beta_{2,j,k}$ 's are zero; there is one-way Granger causality from y to x if all  $\delta_{1,j,k}$ 's are zero, but not all  $\beta_{2,j,k}$ 's are zero; there is two-way Granger causality between y and x if neither all  $\delta_{1,j,k}$ 's nor all  $\beta_{2,j,k}$ 's are zero and there is no Granger causality between y and x if all  $\delta_{1,j,k}$ 's and  $\beta_{2,j,k}$ 's are zero.

This system is estimated by the SUR estimator. Kónya (2006)'s approach tests for Granger causality from x to y and from y to x in performing Wald tests with country specific bootstrap critical values. Following Konya (2006), we use country specific bootstrap Wald critical values to implement Granger causality. Generating bootstrap Wald critical allows y and x not be necessary stationary.

Since the results from the panel causality may be sensitive to the lag structure, we determine the optimal lag structure in the equations by using 1 to 4 lags and then choosing the combinations, minimizing the Schwarz Bayesian Criterion.

The results of the causality test from political instability and defence spending to economic growth are showed in Table V. The results in Table 5 indicate that the null hypothesis of non-causality is rejected for only Lebanon. The sign of this causality relationship is estimated as positive. Thus, increased political stability and defence spending positively Granger cause economic growth. For the other MENAT countries there is no significant causality relationship running from political instability and defence spending to economic growth.

**Table 5.** Results for panel causality, trivariate model

<u>H<sub>0</sub>: Polity2 and Defence do not cause Growth</u>						
<i>Countries</i>	<i>Wald Statistic</i>	<i>Bootstrap Critical Values</i>			<i>Estimated coefficient</i>	<i>p-val.</i>
		<b>1%</b>	<b>5%</b>	<b>10%</b>		
<i>Algeria</i>	9.732	33.811	17.977	12.504	0.035***	0.002
<i>Bahrain</i>	0.971	22.019	10.115	6.767	0.033	0.324
<i>Egypt</i>	0.535	28.358	14.521	9.720	-0.455	0.464
<i>Iran</i>	5.581	23.868	12.931	8.355	0.018**	0.018
<i>Israel</i>	2.715	22.926	11.715	7.565	-0.094*	0.099
<i>Jordan</i>	6.945	25.646	13.989	9.406	0.106***	0.008
<i>Lebanon</i>	107.080***	87.009	17.807	10.012	0.172***	0.000
<i>Tunisia</i>	1.114	21.969	11.320	7.590	0.028	0.291
<i>Saudi Arabia</i>	1.597	21.313	10.958	7.442	0.047	0.206
<i>Oman</i>	0.993	19.201	10.562	7.225	-0.024	0.319
<i>Morocco</i>	1.960	30.419	14.987	9.956	0.063	0.161
<i>Turkey</i>	0.866	28.940	14.811	10.070	0.031	0.352

\*\*\*, \*\*, \* indicate rejection of the null hypothesis at the 1, 5, and 10 percent levels of significance, respectively. Critical values are based on 10,000 bootstrap replications.

Source: Author' estimations

The results in Table 6 show that there is a significant positive causality running from political instability and economic growth to defence spending in the cases of Jordan, Lebanon, Saudi Arabia, Morocco and Turkey. In the cases of Algeria, Bahrain, Egypt, Iran, Israel, Tunisia and

Oman, we do not find a statistically significant the causality relationship running from political instability and economic growth to defence spending.

**Table 6.** Results for panel causality, trivariate model

<u>H<sub>0</sub>: Polity2 and Growth do not cause Defence</u>						
Countries	Wald Statistic	Bootstrap Critical Values			Estimated coefficient	p-val.
		1%	5%	10%		
<i>Algeria</i>	0.269	28.05	13.25	8.64	0.32	0.99
<i>Bahrain</i>	2.311	18.88	9.44	6.43	-0.25	0.12
<i>Egypt</i>	1.263	25.65	14.16	9.68	0.18	0.26
<i>Iran</i>	0.184	21.79	10.70	7.37	0.21	0.66
<i>Israel</i>	0.748	27.29	15.23	10.43	0.10	0.38
<i>Jordan</i>	23.051**	26.01	14.22	9.63	1.19***	0.00
<i>Lebanon</i>	225.102***	42.71	17.21	10.38	1.74***	0.00
<i>Tunisia</i>	4.908	16.93	9.07	6.32	0.24**	0.02
<i>Saudi Arabia</i>	16.724**	26.43	13.95	9.38	1.66***	0.00
<i>Oman</i>	2.263	19.15	10.56	7.32	0.48	0.13
<i>Morocco</i>	26.947**	30.47	16.24	10.76	1.38***	0.00
<i>Turkey</i>	13.154*	26.43	14.21	9.67	0.87***	0.00

\*\*\*, \*\*, \* indicate rejection of the null hypothesis at the 1, 5, and 10 percent levels of significance, respectively. Critical values are based on 10,000 bootstrap replications.

Source: Author' estimations

The results in Table 7 indicate that there is a significant causality running from economic growth and defence spending to political instability in the cases of Egypt, Israel and Turkey. The null hypothesis of no causality running from economic growth and defence spending to political instability cannot be rejected in the cases of other MENAT countries.

**Table 7.** Results for panel causality, trivariate model

<u>H<sub>0</sub>: Growth and Defence do not cause Polity2</u>						
Countries	Wald Statistic	Bootstrap Critical Values			Estimated coefficient	p-val.
		1%	5%	10%		
<i>Algeria</i>	1.422	33.26	18.40	12.52	15.520	0.233
<i>Bahrain</i>	4.130	36.29	18.78	13.48	10.600**	0.042
<i>Egypt</i>	8.732*	30.51	12.49	8.09	9.931***	0.003
<i>Iran</i>	1.600	29.28	14.17	9.39	-6.927	0.206
<i>Israel</i>	10.746*	37.18	17.13	10.59	3.994**	0.001
<i>Jordan</i>	0.799	19.94	10.34	7.11	1.047	0.777
<i>Lebanon</i>	0.182	97.52	12.73	7.55	1.271	0.669
<i>Tunisia</i>	1.003	32.09	18.42	12.86	-5.123	0.316
<i>Saudi Arabia</i>	0.569	29.20	12.60	7.60	-0.057	0.994
<i>Oman</i>	1.792	28.02	14.86	10.43	2.061	0.181
<i>Morocco</i>	5.948	40.57	21.18	14.20	6.441**	0.015
<i>Turkey</i>	17.257**	28.38	14.60	9.81	15.938***	0.000

\*\*\*, \*\*, \* indicate rejection of the null hypothesis at the 1, 5, and 10 percent levels of significance, respectively. Critical values are based on 10,000 bootstrap replications.

Source: Author' estimations

## Conclusion

The link between defence spending and economic growth has long remained an important issue of debate in the defence economics literature. According to Keynesian-type demand model, an additional defence spending may increase aggregate demand and reduces unemployment. Alternatively, defence spending may hamper economic growth by crowding out public and private investment. In addition to the defence-growth nexus, the link between political instability and economic growth has been one of the most important topics in empirical research in economics in the last decade, as well. In the political instability-economic growth relationship, political instability in developing and developed countries is generally accepted to be an obstacle to economic growth.

The success or failure of democracy implementations is often seen as being dependent on internal factors and conditions of a state. Democratization needs to be an integral facet of planning, enacting early adoption of significant civil rights and freedoms. On the other hand, powerful democracies are more likely to exhibit greater numbers of intervention both in regards to their expansive interests, be that in geo-political or historical factors in the form of colonial legacies, and in their actual capability to undertake military intervention (Darby 2013). Hence, when analysing the effect of defence spending on economic growth, the variable of political instability, is one of elements of democratization should be added to the empirical analysis. Even though there are too many empirical studies concerning the defence spending-economic growth relationship, there are very few empirical studies concerning the political instability-defence spending-economic growth within the trivariate framework in the defence economics literature.

This paper has provided a causality analysis of political instability, defence spending and economic growth for the period 1988-2013 with a focus on Middle Eastern countries and Turkey within the trivariate framework. Applying Kónya (2006)'s bootstrap panel Granger causality approach, the paper has taken into account the issues of cross-sectional dependence and country-specific heterogeneity simultaneously.

The empirical results show a positive causality relationship from political stability (i.e. increase in Polity2) and defence spending to economic growth for only Lebanon; a positive causality relationship from political stability and economic growth to defence spending for Jordan, Lebanon, Saudi Arabia, Morocco and Turkey; a positive causality relationship from economic growth and defence spending to political stability for Egypt, Israel and Turkey. Thus, the empirical evidence also suggest that political stability is called as Granger cause of economic growth for Lebanon and defence spending is used as an insurance against political instability in the cases of Egypt, Israel, and Turkey.

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