Government expenditure and Economic Growth in MENA Region

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Abstract
This paper investigates the causal relationship between government expenditure and GDP for MENA region countries by using panel unit root tests and panel cointegration analysis for the period 1970-2010. The results show a strong causality from economic growth to government expenditure in these countries. However, government spending does not have any significant effects on GDP. It means that it is the GDP that drives government expenditure in mentioned countries, not vice versa. Moreover, income elasticity of government expenditure is estimates 2.7 much more than unity. So, Wagner’s law seems to being confirmed for countries under examination. It is suggested that the distinct characteristic of the mentioned countries is likely due to their inefficient governments and poor institutions

JEL classification: O40, O15, I20, C33, C10

Keywords: Panel Unit Root, Panel Cointegration, Granger Causality, Government Expenditure, MENA region countries

1. Introduction

The relationship between government spending and Gross Domestic Product (GDP) has been the subject of two competing propositions. The first and the more popular is Wagner’s law. Wagner’s law suggests that there is a long-run tendency for government spending to increase relative to GDP. In other words, the causality of the relationship between government spending and GDP runs from GDP to government spending. The second suggestion is associated with Keynes. To Keynes, government spending is an exogenous variable and a policy instrument for increasing GDP. Consequently, he claims that the causality of the relationship between government spending and GDP runs from expenditure to GDP.

Wagner identified three key reasons for increased government spending. First, administrative and protective role of government will rise as a country’s economy develops. Second, with expansion of an economy, government welfare expenditures would raise, particularly on education and health. He implicitly assumed that the income elasticity of demand for public goods is more than unity. Finally, progress in technology requires government to take on certain economic services for which private sector may downside (Cooray, 2009). On the other hand, Keynes holds public expenditure as an exogenous variable which can be used as a policy instrument to motivate economic growth. These two opposite arguments reveal the viewpoints over the issue of what is the causal relationship between economic growth and government expenditure.

Moreover, Governments performs two functions- protection (and security) and provisions of certain public goods (Abdullah, 2000). Protection function consists of the rule of law and enforcement of property rights. This helps to minimize risks of criminality, protect life and property, and the nation from external aggression. The provisions of public goods include defense, roads, education, health, and power, to mention few. Some scholars argue that increase in government expenditure on socio-economic and physical infrastructures promotes economic growth. For example, government expenditure on health and education raises the productivity of labor and increase the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power, etc, reduces production costs, increases private sector investment and profitability of firms, thus encouraging economic growth. Supporters of this view concluded that expansion of government expenditure contributes positively to economic growth.

However, some economists claim that increasing government expenditure threat economic growth and higher expenditure may shrink performance of the economy. For example, in an attempt to finance growing expenditure, government may raise taxes and/or borrowing. Higher tax discourages firms and laborers, reducing investment, income and demand. Moreover, if government increases borrowing (especially from the banks) in order to finance its expenditure; it will crowd out the private sector, leading to reducing private investment. Furthermore, in a tender to
remain in power, politicians and governments officials sometimes increase expenditure and investment in unproductive plans or in goods that the private sector can manufacture more efficiently.

The focus of the paper is, therefore, to examine the relationship between government expenditure and economic growth in in Middle East and North Africa (MENA) region countries for the period 1970-2010. The direction of causality between these two variables is examined by utilizing a cointegration and error correction modeling framework. The paper is organized in four sections. Section 2 discusses the methodology, data and empirical results of the study. Section 3 concludes.

2. Data and empirical results

We apply a two variable model to examine the causal relationship between government expenditure(GE) and GDP. The data were obtained from world development indicators. Data used in the analysis are annual time series during the period 1970-2010 on (logarithm of) real GDP and government expenditure(GE) in constant 2000 prices in local currency units for MENA region countries. The choice of the starting period was constrained by the availability of data.

To test the nature of association between the variables while avoiding any spurious correlation, the empirical investigation in this paper follows the three steps: We begin by testing for non-stationarity in the two variables of GE and GDP. Prompted by the existence of unit roots in the time series, we test for long run cointegrating relation between two variables at the second step of estimation using the panel cointegration technique developed by Pedroni (1995, 1999). Granted the long run relationship, we explore the causal link between the variables by testing for granger causality at the final step.

2.1. Panel Unit Roots Results

The panel data technique referred above has appealed to the researchers because of its weak restrictions. It captures country specific effects and allows for heterogeneity in the direction and magnitude of the parameters across the panel. In addition, it provides a great degree of flexibility in model selection. Following the methodology used in earlier works in the literature we test for trend stationarity of the two variables of GE and GDP. With a null of non-stationary, the test is a residual based test that explores the performance of four different statistics. Together, these four statistics reflect a combination of the tests used by Levin-Lin (1993) and Im, Pesaran and Shin (1997). While the first two statistics are non-parametric rho-statistics, the last two are parametric ADF t-statistics. Sets of these four statistics have been reported in Table 1.

The first two rows report the panel unit root statistics for GE and GDP at the levels. As we can see in the table, we cannot reject the unit-root hypothesis when the variables are taken in levels and thus any causal inferences from the two series in levels are invalid. The last two rows report the panel unit root statistics for first differences of GE and GDP. The large negative values for the statistics indicate rejection of the null of non-stationary at 1% level for all variables. It may, therefore be concluded that the two variables of GE and GDP are unit root variables of order one, or, I (1) for short.

<table>
<thead>
<tr>
<th>Table 1: Test of Unit Roots for GE and GDP</th>
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<tbody>
<tr>
<td>GE</td>
</tr>
<tr>
<td>GDP</td>
</tr>
<tr>
<td>ΔGE</td>
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<tr>
<td>ΔGDP</td>
</tr>
</tbody>
</table>

***significant at 1%

2.2. Panel Cointegration Results

At the second step of our estimation, we look for a long run relationship among GE and GDP using the panel cointegration technique developed by Pedroni (1995, 1999). This technique is a significant improvement over conventional cointegration tests applied on a single country series. While pooling data to determine the common long run relationship, it allows the cointegrating vectors to vary across the members of the panel. The cointegration relationship we estimate is specified as follows:

\[ GE_{it} = \alpha_i + \delta_t + \beta_1 GDP_{it} + \varepsilon_{it} \]  

(1)

Where \( \alpha_i \) refers to country effects and \( \delta_t \) refers to trend effects. \( \varepsilon_{it} \) is the estimated residual indicating deviations from the long run relationship. With a null of no cointegration, the panel cointegration test is essentially a test of unit roots in the estimated residuals of the panel. Pedroni (1999) refers to seven different statistics for this test. Of these
seven statistics, the first four are known as panel cointegration statistics; the last three are group mean panel cointegration statistics. In the presence of a cointegrating relation, the residuals are expected to be stationary. These tests reject the null of no cointegration when they have large negative values except for the panel-\(v\) test which reject the null of cointegration when it has a large positive value. All of these seven statistics under different model specifications are reported in Table 2. The statistics for all different model specifications suggest rejection of the null of no cointegration for all tests except the panel and group ADF-tests. However, according to Perdroni (2004), \(\rho\) and PP tests tend to under-reject the null in the case of small samples. We, therefore, conclude that the two unit root variables GE and GDP are cointegrated in the long run. Moreover, the average income elasticity of government expenditure(\(\beta\)) is estimated about 2.7, much greater than one. So, Wagner’s law is proved to be correct for the MENA countries.

### Table 2: Results of Panel Cointegration test

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<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>9.18***</td>
<td>-2.69**</td>
<td>-6.72***</td>
<td>-1.17</td>
<td>-9.54***</td>
<td>-5.51***</td>
<td>-1.01</td>
</tr>
</tbody>
</table>

***significant at 1%
** significant at 5%

### 2.3. Panel Causality Results

Cointegration implies that causality exists between the series but it does not indicate the direction of the causal relationship. With an affirmation of a long run relationship between GE and GDP, we test for Granger causality in the long run relationship at the third and final step of estimation. Granger causality itself is a two-step procedure. The first step relates to the estimation of the residual from the long run relationship. Incorporating the residual as a right hand side variable, the short run error correction model is estimated at the second step. Defining the error term from equation (1) to be \(ECT_{it}\), the dynamic error correction model of our interest is specified as follows:

\[
\Delta GDP_{it} = \alpha_{yi} + \beta_{yi} ECT_{i t-1} + \gamma_{yi1} \Delta GE_{i t-1} + \gamma_{yi2} \Delta GE_{i t-2} + \\
\delta_{yi1} \Delta GDP_{i t-1} + \delta_{yi2} \Delta GDP_{i t-2} + \varepsilon_{yit}
\]  

(2)

\[
\Delta GE_{it} = \alpha_{Gi} + \beta_{Gi} ECT_{i t-1} + \gamma_{Gi1} \Delta GE_{i t-1} + \gamma_{Gi2} \Delta GE_{i t-2} + \\
\delta_{Gi1} \Delta GDP_{i t-1} + \delta_{Gi2} \Delta GDP_{i t-2} + \varepsilon_{Git}
\]  

(3)

Where \(\Delta\) is a difference operator; ECT is the lagged error-correction term derived from the long-run cointegrating relationship; the \(\beta_{yi}\) and \(\beta_{Gi}\) are adjustment coefficients and the \(\varepsilon_{yit}\) and \(\varepsilon_{Git}\) are disturbance terms assumed to be uncorrelated with mean zero. Sources of causation can be identified by testing for significance of the coefficients on the lagged variables in Eqs (2) and (3). First, by testing \(H_0 : \gamma_{yi1} = \gamma_{yi2} = 0\) for all i in Eq. (2) or \(H_0 : \delta_{Gi1} = \delta_{Gi2} = 0\) for all i in Eq. (3), we evaluate Granger weak causality. Masih and Masih (1996) and Asafu-Adjaye (2000) interpreted the weak Granger causality as ‘short run’ causality in the sense that the dependent variable responds only to short-term shocks to the stochastic environment.

Another possible source of causation is the ECT in Eqs. (2) and (3). In other words, through the ECT, an error correction model offers an alternative test of causality (or weak exogeneity of the dependent variable). The coefficients on the ECTs represent how fast deviations from the long run equilibrium are eliminated following changes in each variable. If, for example, \(\beta_{yi}\) is zero, then GDP does not respond to a deviation from the long run equilibrium in the previous period. Indeed \(\beta_{yi} = 0\) or \(\beta_{Gi} = 0\) for all i is equivalent to both the Granger non-causality in the long run and the weak exogeneity (Hatanaka, 1996).
It is also desirable to check whether the two sources of causation are jointly significant, in order to test Granger causality. This can be done by testing the joint hypotheses $H_0 : \beta_{yi} = 0$ and $\gamma_{yi} = \gamma_{yi2} = 0$ for all $i$ in Eq. (2) or $H_0 : \beta_{Gi} = 0$ and $\delta_{Gi1} = \delta_{Gi2} = 0$ for all $i$ in Eq. (3). This is referred to as a strong Granger causality test. The joint test indicates which variable(s) bear the burden of short run adjustment to re-establish long run equilibrium, following a shock to the system (Asafu-Adjaye, 2000).

The results of the F test for both long run and short run causality are reported in Table 3. As is apparent from the Table, the coefficients of the ECT and GDP are significant in the GE equation which indicates that long-run and short-run causality run from GDP to government expenditure. So, GDP strongly Granger-causes government expenditure. Moreover, the interaction terms in the GE equation are significant at 1% level. These results imply that, there is Granger causality running from GDP to government expenditure in the long-run and short-run, while government expenditure have a neutral effect on GDP in both the short- and long-run. In other words, GDP is weakly exogenous and whenever a shock occurs in the system, government expenditure would make short-run adjustments to restore long-run equilibrium.

<table>
<thead>
<tr>
<th>Source of causation(independent variable)</th>
<th>Dependent Variable</th>
<th>Short-run</th>
<th>Long-run</th>
<th>Joint (short-run/long-run)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔGDP</td>
<td>ΔGE</td>
<td>ECT(-1)</td>
<td>ΔGDP, ECT(-1)</td>
</tr>
<tr>
<td></td>
<td>F=5.73***</td>
<td>F=0.91</td>
<td>F=0.89</td>
<td>F=10.61***</td>
</tr>
<tr>
<td>ΔGE</td>
<td>F=5.73***</td>
<td>F=0.91</td>
<td>F=0.89</td>
<td>F=10.61***</td>
</tr>
</tbody>
</table>

***significant at 1%

4. Conclusion

The objective of this study is to examine Granger causality between government expenditure and income for MENA region countries over the period 1970-2010. The panel integration and cointegration techniques are employed to investigate the relationship between the two variables: government expenditure and GDP. The empirical results indicate that we cannot find enough evidence against the null hypothesis of unit root. However, for the first difference of the variables, we rejected the null hypothesis of unit root. It means that the variables are I(1). The results show that there is a long-run relationship between government expenditure and GDP with an income elasticity estimated about 2.7. Utilizing Granger Causality within the framework of a panel cointegration model, the results suggest that there is strong causality running from GDP to government expenditure with no feedback effects from government expenditure to GDP for MENA region countries. It means that it is the GDP that drives the government expenditure in mentioned countries, not vice versa. So the findings of this paper support the point of view that it is higher economic growth that leads to higher government expenditure. To summarize, in the case of the MENA countries, it seems that Wagner’s Law is much more appropriate than Keynesian theory. The findings of this research do not support the conventional Keynesian framework that causality runs from government expenditure to national income.

References