Wagner's law vs. Keynesian hypothesis: New Evidence from Egypt

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ABSTRACT

In this paper, we tested the Wagner's Law against the Keynesian proposition for the Egyptian economy over the period of 1980-2012. After conducting theoretical and empirical literature, we used the Mann (1980) notation to test for the cointegration between government expenditure and GDP. Using ADF-breakpoint unit root test, Pesaran, Shin et al. (2001) bounds test for cointegration and ARDL model we estimated the long-run relationship between both variables. We found a cointegration between government expenditure and GDP with elasticity of the former to the latter equal 2.55 and the causality runs from the GDP to the government expenditure, which indicates that the Egyptian economy is Wagnerian. The paper provides some policy implication too.

Keywords: Government expenditure, Economic growth Wagner hypothesis, Keynesian model Cointegration Test, Causality and ARDL model

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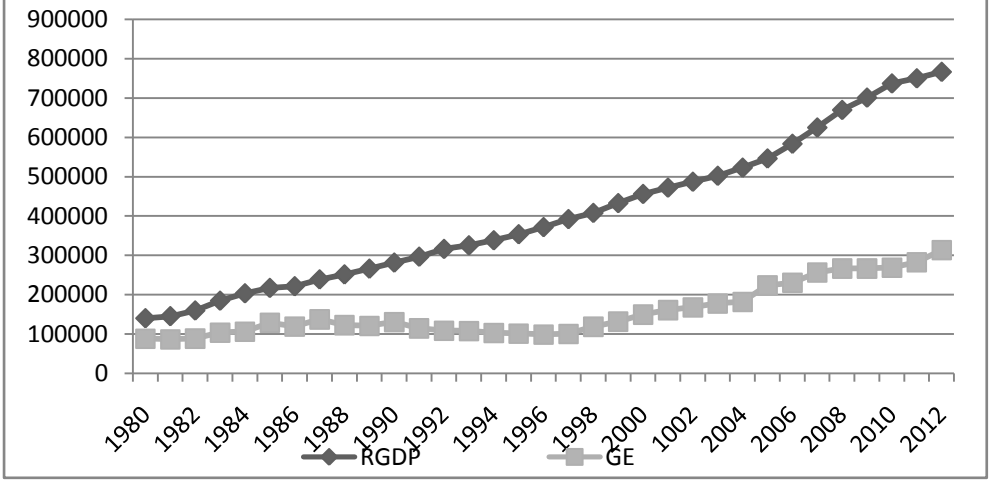
1 INTRODUCTION

The relationship between economic growth and government spending is a controversial topic in the economic literature since the great depression, (see, inter alia, (Folster and Henrekson 2001, Arpaia and Turrini 2008, Liu and Hsu 2008, Taban 2010, Menyah and Wolde-Rufael 2013, Bayrakdar, Demez et al. 2015)). This debate has been revived and fueled by the prolonged increase in the government expenditure, in both developed and developing countries, over the post-World War II years, especially, at the times of economic hardship such as financial crises in 2008. In this paper, we examine the relationship between government expenditure and economic growth by testing the validity of Wagner's law(in which the former escalates over time as the later rises)against the Keynesian proposition(in which government has to spend more to promote the economic growth)in the Egyptian economy for the period from 1980 to 2012.

As shown in figure 1, both government spending and gross domestic product (GDP) in Egypt has, almost, moved together during the period under investigation. But, at the beginning of the economic reform program, adopted by the government in 1990, it is clearly seen that the real government spending decreased slightly until 1996, afterwards, it returned back to increase, moving again in the same trend with the GDP. Therefore, it is questionable that which one of these two variables comes first, i.e. in which way the causality is running between government outlay and economic growth?

Figure I. Egyptian Real GDP and Government Expenditure.



The paper organized as the following; in section two the competing theories are represented, section three presents the empirical literature review, section four provides the model and methodology, section fivediscusses the results and finally section six concludes the paper.

2 THE COMPETING THEORIES

As mentioned above, there are two opposing notions about the government expenditure-economic growth nexus. Firstly, Wagner's law attributes the increase in the government expenditure, as a percentage of GDP, to economic growth. Secondly, and on the contrary, the Keynesian point of view which accentuates that higher government expenditure stimulates economic growth. Subsequent is a drawing of each theory.

2.1 WAGNER'S LAW

The "Law of Increasing State Activities", propounded by the German economist Adolph Wagner (1835–1917), is one of the well-known theories clarifying how government spending is related to output. It states that "*as the economy develops over time, the activities and functions of the government increase*". Accordingly, during the process of economic development the share of public spending in national income tends to expand(Magazzino, Giolli et al. 2015).

Furthermore, the increasing level of state activities, as justified by Wagner, is due to three main reasons. First, governments tend to increase their administrative and protective functions during the industrialization progresses to ensure that market forces operate smoothly. Second, a lot of public services are income elastic, for instance education, cultural events, health facilities and welfare spending. Thus, the political pressure to allocate more allowances to these services would increase due to the modern industrial society expansion. Third, the technological progress requires large-scale projects for which funds from the private sector are not adequate. Consequently, the Governments have to undertake such investments and natural monopolies and provide social and merit goods through budgetary means(Tulsidharan 2006, Menyah and Wolde-Rufael 2013). Also, Wagner's law imply that the income elasticity of the demand for public goods (and generally for government expenditures) is more than unity (Akpan 2011).

Following Wagner's law, Peacock and Wiseman (1967)suggested that the growth in public expenditure does not occur the way the Wagner's law describes, but in response to the fluctuations of booms and busts the economy may experience. They explained that during normal periods, the rise in public expenditure depends on revenue collected. Economic development entails an increase in national income and so in government revenue, this causes a gradual increase in public expenditure. But during war time, there would be an urgent need for increase in government expenditure. They, also, argued that during such periods, governments raise tax rates and enlarge tax structure to finance the increased public expenditure. Individuals will now accept new taxation levels. Because the increase in taxes displaces private expenditure for public expenditure, they called this process "displacement effect". After the war time, the new tax rates and tax structures may stand still, as people get used to them. Therefore, government expenditure start again to increase gradually(Akpan 2011, Magazzino, Giolli et al. 2015).

Additionally, Musgrave (1969) supported Wagner's law by proposing that the nexus of public spending growth with economic growth by the economic development phase, differentiating between three income elasticities of demand for public services with each stage of development; the income inelastic which occurs in the poor economies. Nevertheless, if income per capita rises quickly, the income elasticity increases. However, in the developed economies, in which more basic needs are being fulfilled, the income elasticity starts to decline(Chude and Chude 2013, Bayrak and Esen 2014).

Although, all of the above economists emphasized that the causality runs from economic growth towards government expenditures, there is no consensus yet about the mathematical expression of Wagner's law to be exploited in the empirical testing. Therefore, with multiple interpretations of the law, come different notations to test the validity of Wagner's law. Table I below summarizes the most common notations of Wagner's law:

Table I: The versions of Wagner's Law and its validity condition.

Version	Notation	Valid when:
Peacock and Wiseman (1967)	$GE_t = \alpha + \beta * GDP_t + \varepsilon_t$	$\beta > 1$
Musgrave (1969)	$\left(\frac{GE}{GDP}\right)_t = \alpha + \beta * \left(\frac{GDP}{N}\right)_t + \varepsilon_t$	$\beta > 0$ in poor economies $\beta > 1$ in fast growing PCGDP countries $\beta \downarrow$ in developed economies
Gupta (1969)	$(GE/N)_t = \alpha + \beta * (GDP/N)_t + \varepsilon_t$	$\beta > 1$
Goffman (1968)	$GE_t = \alpha + \beta * (GDP/N)_t + \varepsilon_t$	$\beta > 1$
Mann (1980)	$(GE/GDP)_t = \alpha + \beta * GDP_t + \varepsilon_t$	$\beta > 0$

GE denotes government expenditure; N refers to the number of population

2.2 KEYNESIAN VIEW

In his book "General Theory of Employment, Interest and Money", Keynes (1936)advocated that governments have to intervene to stimulate aggregate demand, at times of economic downturn, as a short run remedy. As the government expenditure is one of the aggregate demand components, any increase in it will escalate the aggregate demand, and bring about, by means of the multiplier, more employment and more output. Keynes argued that government expenditure is a component of fiscal policy and can be used as a policy instrument to influence growth. Therefore, he considered public expenditure to be exogenous.

As illustrated in the Solow (1956)neoclassical growth model, the only source of long-run economic growth is technological progress, which is determined exogenously. Accordingly, fiscal policy has no much to do for economic growth in the long run. However, productive government spending provokes the investment in human or physical capital, but this affects only the equilibrium factor ratios, rather than growth rates, in the long-run. Even though, in general, transitional growth effects will exist. Some believe that the government expenditure crowds-out private investments, reducing or eliminating the effect of the Keynesian fiscal policy (Emerenini and Ihugba 2014).

On the other hand, the defining feature of the endogenous growth models is treating technology as endogenous variable and search for the factors affect it (Chude and Chude 2013). They assume that government expenditure on human capital and on research and development enhances economic growth. The endogenous growth theory predicts that such policy may have effects on both the level and the growth rate of per capita output in the long run(Gurgul, Lach et al. 2012). Furthermore, Barro (1990)has dilated these models by including government services, which affect production and financed by taxes, and confirmed the inverted-U shaped nexus between government expenditure and economic growth. Accordingly, the economic growth rate increases as the government expenditure to GDP ratio rises until it reaches a certain point and then begins to decline. He claimed that only those productive government expenditures (on infrastructure, education, health, etc.) will boost the long run growth rate (Guerrero and Parker 2012).

To sum up, the Keynesian theory, and economic growth models in general, study government expenditures as an element affecting economic growth. So, they assume initially that causality (if exists) runs from government expenditures to economic growth. Specifically, it can be argued that the impact of government spending on growth, according to them, is likely to take a positive or negative sign or that it equals zero.

3 EMPIRICAL LITERITURE

The causal relationship between government expenditure and economic growth has been tested by several studies, some of which focused on a single country while others researched the cross-countries or panel data. For instance, Loizides and Vamvoukas (2005) examined the Granger causality between the share of total expenditure in GNP and economic growth, first using a bivariate error correction model, then by adding unemployment and inflation (separately) as a "trivariate" analysis. Using data from Greece, UK and Ireland for the period 1950-1995, they found that the causality runs from government expenditure to economic growth in the three countries in the short run and in the long run for Ireland and the UK, but it takes the opposite direction in Greece, and, in the UK, when inflation is included.

Magazzino (2012)employed the data of the EU-27 countries over time period 1970-2009,by dividing them into two groups namely "Rich" and "Poor" countries, he found that the Wagnerian hypothesis was valid only for the poor ones, concluding that Wagner's law is appropriate for developing countries. Similarly, Safdari, Mahmoodi et al. (2012) investigate short-run and long-run causality between government expenditure and economic growth for two panels of 27 Asian countries over the period 1970 to 2009.Their findings show bidirectional causality for developing countries panel, while the results of long-run causality for advanced and newly industrialized countries did not support causality in any direction.

Also, Kuckuck (2012)tested the validity of Wagner's law at deferent stages of economic development for the United Kingdom, Denmark, Sweden, Finland and Italy, classifying every one into three stages of development according to the income. His results show that the running causality from public spending to economic growth has weakened with the advanced stage of the development. These findings support Musgrave (1969) version of Wagner's hypothesis. Likewise, (Magazzino, Giolli et al. 2015) empirically tested Wagner's law using recent panel econometric techniques in 27 EU countries, for the period 1980-2013, Granger-causality test results show mixed results. That is, Wagner's law was supported in eight countries, whereas Keynes's hypothesis was valid only in four countries, bidirectional causality was found in three countries and no causality found in the rest of these 27 EU countries.

On the other hand, Keshtkaran, Piraee et al. (2012) investigated the relationship between government size and economic growth in Iran, in the period of 1971-2008, within bivariate and trivariate causality framework. The results demonstrate that the causality runs from government size to economic growth but with negative sign. If unemployment rate is used as a third regressor, there will be no causality between the two main variables in the long run. However, including oil revenue, as the explanatory variable instead ofunemployment rate, a bidirectional causality relationship between them appears in the long and short run.

Accordingly, the theoretical unanimity about the relationship between government expenditure and economic growth does not exist, so the case in empirical research. This may be due to the

differences in the used econometric methodologies, the differences among the economies and the investigated time periods, differences in the nature of underlying data and/or the test procedure (Loizides and Vamvoukas 2005). The nature of political and economic system, the shortcoming of small sample size which may, also, produce spurious outcome(Liu and Hsu 2008). Similarly, omitted variables may mask or overstate the long-run linkages between economic development and public spending(Magazzino 2012). Generally, we can classify the literature on the relationship between government expenditure and economic growth according to the causality running between them as shown in table II.

Table II: The Empirical Literature Classified According to Causality Direction.

Studies	Sample	Period
1- No Causality:		
Henrekson (1993)	Swedish	1861-1990
Bağdigen and Çetintaş (2004)	Turkish	1965-2000
Sinha (2007)	Thailand	1950-2003
Oteng-Abayie and Frimpong (2009)	Gambia, Ghana and Nigeria	1965 - 2003
Ighodaro and Oriakhi (2010)	Nigeria	1961 - 2007
2- Causality in favor of Wagner's law:		
Chow, Cotsomitis et al. (2002)	UK	1948 - 1997
Tulsidharan (2006)	India	1960 - 2000
Ghorbani and Zarea (2009)	Iran	1960 -2000
Abdullah and Maamor (2009)	Malaysia	1978-2007
Magazzino (2012)	Italia	1960-2008
Guerrero and Parker (2012)	United States	1791 - 2009
Salih (2012)	Sudan	1970-2010
Menyah and Wolde-Rufael (2013)	Ethiopia	1950-2007
Bojanic (2013)	Bolivia	1940-2010
3- Causality is in favor of Keynesian view:		
Jiranyakul and Brahmasrene (2007)	Thailand	1993 - 2006
Liu and Hsu (2008)	US	1947 - 2002
Gurgul, Lach et al. (2012)	Poland	2000 - 2008
Emerenini and Ihugba (2014)	Nigeria	1980-2012
(Ssnchez-Juarez, Almada et al. 2016)	Mexico	1925 - 2014
4- Bi-Directional Causality:		
Samudram, Nair et al. (2009)	Malaysia	1970 - 2004
Turan (2009)	Turkey	1950 - 2004
Tang (2010)	Malaysia	1960-2005
Akpan (2011)	Nigeria	1970-2008
5- Negative Sign Causality:		
Ramayandi (2003)	Indonesia	1969-1999
Zareen and Qayyum (2014)	Pakistan	1973-2012

4 EMPIRICAL MODEL AND DATA DESCRIPTION

The Egyptian economy would be appropriate to fulfil the requirements of Wagner's law in many aspects. After the peace treaty with Israel in 1978, the Egyptian economy entered into a major transition from socialism to capitalism, the major step towards this change was the "economic reform program" started on 1990 and the concomitant privatization program which made the economy more accessible to the private sector and allowed the government to dispose the burden of some loser public sector firms. Therefore, the Egyptian economy moved into industrialization, technological and institutional changes and broader political participation in consort with growing real per capita income. Consequently, Egypt seems to provide an excellent case against which one can test Wagner's Law and Keynesian proposition as it applies to a developing country. The notation proposed by Mann (1980) provide the closest interpretation to Wagner's law. Therefore, we explore the relationship between government expenditure and economic growth in Egypt using the following model:

$$\left(GE/GDP\right)_t = \alpha + \beta * GDP_t + \varepsilon_t \qquad (1)$$

GE denotes total government expenditure; GDP is the Gross Domestic Product and ε_t is the error term.

4.1 DATA

The empirical investigation using the preceding model relies on a data set from the Egyptian economy with annual data over the period 1980–2012. The government expenditure and GDP are calculated in constant prices and in national currency by deflating the values of the variables in their current prices using the GDP deflator with base year 2005. All data used in the estimation are in natural logarithm. The government expenditure data was obtained from the annual reports of the Central Bank of Egypt and GDP with its deflator were obtained from the world development indicators of the World Bank Database.

5 ECONOMETRIC METHODOLOGY

5.1 UNIT ROOT TESTS

The visual inspection of the data under investigation shows that these data exhibit some structural breaks which must be accounted for when testing and estimating the model in equation (1). Therefore, wecarry out testing the variables for stationarity by exploiting the ADF unit root test that allows for structural break which was proposed by Perron (1989) and extended by Perron and Vogelsang (1992).Presume that the structural change occur at time $t = \tau + 1$, then;

$$H_0 : y_t = \alpha_0 + \alpha_1 y_{t-1} + \mu_1 D_P + \varepsilon_t,$$
$$H_A : y_t = \alpha_0 + a_2 t + \mu_2 D_L + \varepsilon_t \qquad (2)$$

Where D_P is pulse dummy equal one if $t = \tau + 1$ and zero otherwise, and D_L denotes a level dummy equal one if $t > \tau$ and zero otherwise. Under the nullH_0, y_t is a unit root process with one-time break in the level in period $t = \tau + 1$. Under the alternative H_A, y_t is trend stationary with one break in the intercept. To test this null, one need to estimate the following model;

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \mu_1 D_L + \mu_2 D_P + \sum_i^k \beta_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

And for trend break, a trend dummy D_T starting from $\tau + 1$ is included into equations (2) and (3);

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \mu_1 D_L + \gamma D_T + \mu_2 D_P + \sum_i^k \beta_i \Delta y_{t-i} + \varepsilon_t \quad (4)$$

Then, compare the t-statistic for the null $\alpha_1 = 1$ with the critical values provided byPerron (1989).

5.2 ESTIMATION TECHNIQUES

As shown in section 6.1, the investigated variables are not integrated of the same order, in this case we still able to test for the cointegration (i.e. long run relationship) between the variables in equation (1) using the bounds cointegration test proposed byPesaran, Shin et al. (1996) and developed by Pesaran, Shin et al. (2001). This test is preferable over the Johansen (1991) trace test of cointegration because the later works only with variables integrated of the order one (i.e. all variables are I(1)), whereas the former is designed for variables of mixed integration orders(i.e. some of which are I(0) and the other variables are I(1)). Prior to bounds test, the autoregressive distributed lags ARDLhas to be estimated. This model usually denoted with the notation ARDL(p,q_1,…,q_k), where p is the number of lags of the dependent variable, q_1 is the number of lags of the first explanatory variable, and q_k is the number of lags of the *k-th* explanatory variable. The cointegrating form of the ARDL model can be written as;

$$\Delta y_t = -\sum_{i=1}^{p-1} \gamma_i^* \Delta y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q_j - 1} \Delta x_{j,t-i} \grave{} \beta_{j,i}^* - \rho y_{t-1} - \alpha - \sum_{j=1}^{k} x_{j,t-1} \grave{} \delta_j + \varepsilon_t \quad (5)$$

Where

$$EC_t = \rho y_{t-1} - \alpha - \sum_{j=1}^{k} x_{j,t-1} \grave{} \delta_j$$

$$\gamma_i^* = \sum_{m=i+1}^{p} \hat{\gamma}_m$$

$$\beta_{j,i}^* = \sum_{m=i+1}^{q_j} \beta_{j,m} \quad (6)$$

In order to estimate the ARDL model, we must specify p and $q_1, \ldots, q_k$ which can be done using the standard information criterions such as Akaike (AIC), Schwarz (SIC) and Hannan-Quinn (HQIC). Moreover, Pesaran, Shin et al. (2001)indicated that the ARDL model, unlike other cointegration estimation methods, does not require symmetry of lag lengths; each variable can have a different number of lags.

Based on the estimated ARDL model, according to the notation of equation (5), we test whether the ARDL model contains a level (or long-run) relationship between the independent and the explanatory variables using the bounds test. Simply, we test that;

$\rho = 0$

$\delta_1 = \delta_2 = \ldots\ldots = \delta_k = 0$

The test statistic based on equation (5) has a different distribution under the null hypothesis (of no cointegration), depending on whether the variables are all I(0) or all I(1). Further, under both cases the distribution is non-standard. Pesaran, Shin et al. (2001)provide critical values for the cases where all variables are I(0) and the cases where all regress or are I(1), and suggest using these critical values as bounds for the more typical cases where the variables are a mixture of I(0) and I(1).

5.3 SHORT AND LONG RUN GRANGER-CAUSALITY

If the null of no cointegration is rejected, there must be causality running, at least in one direction, between the government expenditure and GDP. There are many types of causality tests can be used in the context of time series. For example, Granger (1969)causality test is commonly used with the variables who are not cointegrated and stationary. On the contrary, Toda and Yamamoto (1995) developed a causality test which is performed without pretesting for cointegration and no matter whether the variable is I(0) or I(1). However, as bounds test confirms the cointegration between government expenditure and GDP, we need to test for the causality within a vector error correction[1] (VECM) framework. Unlike the test of Toda and Yamamoto (1995), testing for causality in a VECM context differentiates between short and long run causality, more efficient where cointegration is explicitly considered and can test for hypothesis on long run equilibrium. Consider the following bivariate error correction model;

$$\begin{bmatrix} \Delta\left(\frac{GE}{GDP}\right)_t \\ \Delta GDP_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \end{bmatrix} \times \left(\begin{bmatrix} \beta_{11} & \beta_{12} \end{bmatrix} \times \begin{bmatrix} \left(\frac{GE}{GDP}\right)_{t-1} \\ GDP_{t-1} \end{bmatrix} + \begin{bmatrix} cons \end{bmatrix} \right)$$
$$+ \left(\begin{bmatrix} \Gamma_{11} & \Gamma_{12} \\ \Gamma_{21} & \Gamma_{22} \end{bmatrix} \times \begin{bmatrix} \Delta\left(\frac{GE}{GDP}\right)_{t-1} \\ \Delta GDP_{t-1} \end{bmatrix} \right) + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \qquad (7)$$

Given the model in equation (7), the short run equations Γs ; the Wald test statistic can be used to test if GDP does not Granger-cause (GE/GDP) by testing the following hypothesis;

$$H_0 : \Gamma_{11} = \Gamma_{12} = 0 \qquad \text{against} \qquad H_A : \Gamma_{11} \neq \Gamma_{12} \neq 0 \qquad (8)$$

If H_0 can be rejected, we conclude that GDP Granger-causes (GE/GDP) but if H_0 accepted, then there is no short run causality running from the former to the later. Likewise, we can use equation (7) to test the short run causality in the opposite direction, i.e. from (GE/GDP) to GDP by testing the following hypothesis;

$$H_0 : \Gamma_{21} = \Gamma_{22} = 0 \qquad \text{against} \qquad H_A : \Gamma_{21} \neq \Gamma_{22} \neq 0 \qquad (9)$$

[1] We use VECM only for causality testing not for model estimation because the later requires all variables to be integrated of the same order and to be I(1) which is not available in our variables.

If H_0 can be rejected, we conclude that the (GE/GDP) Granger-causes GDP but if H_0 accepted, then there is no causality running from the former to the later in the short run. If the null rejected in both (8) and (9), we conclude that there is a short run feedback "bidirectional Granger-causality" between the government expenditure and GDP. Furthermore, testing for long run causality is defined the significance of the adjustment parameters α_s. If α_{11} equal zero, then the government expenditure to GDP ratio is weakly exogenous to the system in equation (7) and there is no long run causality running from it to the GDP and vice versa. Similarly, when α_{21} is statistically different from zero, then GDP is causing government expenditure to GDP ratio long rung(Hunter 1990).

6 EMPIRICAL RESULTS

6.1 RESULTS OF THE UNIT ROOT TEST

The visual inspection of the graphically depicted variables proposes that both trend and intercept exist in levels of the variables as well as possible break. Therefore, before conducting the cointegration test we proceed to test for unit root using the break point augmented Dickey-Fuller test; once with intercept and trend break and once again with trend break only. The results, illustrated in table (III), indicate that the real GDP is significantly stationary in its level, whereas the government expenditure to GDP is stationary in its first difference. Consequently, our variables are integrated with different orders, the GDP is $I(0)$ and government expenditure to GDP is $I(1)$.

Table III: Unit Root with break test Results

Variables	Intercept and trend break					Only trend break				
	Break date	**Lag No.**	**Level**	**Lag No.**	**First difference**	**Break date**	**Lag No.**	**Level**	**Lag No.**	**First difference**
GDP	1992	0	-6.47 (0.00)	0	-6.76 (0.00)	1996	0	-6.19 (0.00)	7	-6.61 (0.00)
GE/GDP	1995	3	-3.73 (0.69)	0	-8.12 (0.00)	1997	3	-4.63 (0.04)	0	-5.91 (0.00)

Lag lengths are automatically selected based on Schwarz information criterion (SIC) with maximum 8 lags. The probability of the test statistics are in parenthesis.

6.2 RESULTS OF BOUND COINTEGRATION TEST

Because we have a mixture of $I(0)$ and $I(1)$ variables, testing for cointegration can be performed using the bounds test proposed by (Pesaran, Shin et al. 2001). Table (II) illustrates the results of the bounds cointegration test; those results are based on a $ARDL(4,2)$ model. The optimal lag lengths of two for the government expenditure to GDP and one for the GDP were determined according to the Akaike info criterion (AIC) and choosing among thirty different models.

Table IIII: Bounds Cointegration Test results

Significance	**Critical Value Bounds**	
	I(0) Bound	I(1) Bound
10%	**5.59**	**6.26**
5%	**6.56**	**7.3**
2.5%	**7.46**	**8.27**
1%	**8.74**	**9.63**
Null Hypothesis: No long-run relationships exist		
F - Statistic	**8.567764**	

It is clearly seen from table (IIII) that the test statistic is greater than the I(1) bound critical value at 2.5 percent which indicates the existence of a significant long run relationship between the government spending and GDP according to Mann (1980) version of Wagner's law as presented in equation (1).

6.3 MODEL ESTIMATION RESULTS

The next step is estimating the model in equation (1) in the way explained in section 5.2. By way of explanation, we populate our variables into the ARDL model shown in equation (5) to explore the level relationship (i.e. the long run relationship) between the government spending and GDP as well as the short run association. Then, we can write our model in ARDL(4, 2) form as follows;

$$\Delta(GE/GDP)_t = \sum_{i=1}^{4} \phi_i \Delta(GE/GDP)_{t-i} + \sum_{i=1}^{2} \eta_i \Delta GDP_{t-i} + break + trend$$
$$- \psi\left((GE/GDP) - (\beta_1 GDP_{t-1} - break - const - trend)\right) \qquad (10)$$

The results of the estimated parameters for the short run ϕ and η, the long run β and the adjustment or the error correction term ψ are shown in table (V). The results illustrated in panel A of table (V) indicate that the elasticity of the growth rate of the government spending to GDP ratio to the growth rate of real GDP is significant at 10% and equal 0.71, that is one percent increase in the real GDP growth rate is related to 0.71% increase in the growth rate of the government spending as percent of GDP. This result support the findings of Menyah and Wolde-Rufael (2013)for the Ethiopian economy and the results for the United Kingdome and Ireland by Loizides and Vamvoukas (2005)

Table V: The Estimated short and long run parameters of the $\mathrm{ARDL}(4,2)$ **Model**

(A)- Short Run Coefficients				
Variable	**Parameters**	**Coefficient**	**t-Statistic**	**Prob.**
$\Delta(GE/GDP)_{t-1}$	ϕ_1	0.011235	0.063817	0.9498
$\Delta(GE/GDP)_{t-2}$	ϕ_2	0.273787	1.698472	0.1057
$\Delta(GE/GDP)_{t-3}$	ϕ_3	0.315651	1.807454	0.0866
$\Delta(GDP)_t$	η_1	0.712915	1.818424	0.0848
$\Delta(GDP)_{t-1}$	η_2	-0.989529	-2.470031	0.0232
break	-	-0.078784	-1.658760	0.1136
trend	-	-0.040963	-3.369352	0.0032
Error correction	ψ	**-0.398818**	**-4.096675**	**0.0006**
(B)- Long Run Coefficients				
GDP_t	β_1	2.553855	4.867194	0.0001
break	-	-0.197543	-1.614601	0.1229
constant	-	-62.101252	-4.577968	0.0002
trend		-0.102711	-5.345991	0.0000
Cointegration equation:	$(GE/GDP)_t = 2.5539 * GDP_t - 62.10 - 0.10 * trend$			

Estimates of the long run elasticities, as presented in panel (B) of table (IIII),reveal that the real government expenditure is positively and significantly related to the real GDP. That is; the long run elasticity of the former to one unit change in the later is 2.55 at more than 1% level of significance. Therefore, we conclude that the case of the Egyptian economy is in favour of Wagner's Law.Our result is a bit higher than those found by Menyah and Wolde-Rufael (2013) for the Ethiopia in which the long run elasticity of the government expenditure to GDP is 1.73 to 1.79. Also, it is higher than the elasticity of the government spending to GDP in the Malaysian economy which was found to equal 0.17 to 0.44 in Abdullah and Maamor (2009) study.

Apparently, the error correction term ψ is highly significant and negatively signed confirming the existence of the long run relationship between government expenditure and GDP and equals -0.3988, which implies that any short run deviation, from the long run equilibrium relationship, requires 2.5 years, after any shock occurs, to be corrected and restoring the steady state long run equilibrium. Additionally, it confirms that the long run causality between the government spending and GDP must exist at least in one direction.

6.4 LONG AND SHORT RUN CAUSALITY RESULTS

To identify the direction of the causality between the government expenditure and GDP, we estimate the VECM in equation (7) and test for the weak exogeneity of each variable and test for the short run granger non-causality. The results, shown in table (VI) panel (A), demonstrate

that the adjustment parameters are negatively signed as expected but only significant for the GDP (i.e. $\alpha_{11} = 0, \text{but } \alpha_{21} \neq 0$) which means that the government expenditure is weakly exogenous to the system of equation (7) referring to the fact that causality is running from GDP to government spending in the long run for the case of Egypt. Likewise, the results for short run causality, as shown in table (VI) panel (B), statistically reject the null H_0 of equation (8) at well less than 10% level of significance. Therefore, we conclude that GDP Granger-causes (GE/GDP) in the short run. Adversely, we cannot reject the null of equation (9), and then there is no causality running from the other way around in the short run. This result in the same line with (Chow, Cotsomitis et al. 2002, Tulsidharan 2006, Abdullah and Maamor 2009, Ghorbani and Zarea 2009, Magazzino 2012, Salih 2012, Bojanic 2013, Menyah and Wolde-Rufael 2013).

Table VI: long and short run causality results

A- Long run causality (Weak Exogeneity test)			
	Error Correction:	D(GE/GDP)	D(GDP)
	CointEq1	-0.023104	-0.036904
		[-1.29560]	[-4.34383]
B- Short run causality			
Dependent variable: D(GE/GDP)			
Excluded	Chi-sq	df	Prob.
D(GDP)	3.457714	1	[0.0630]
All	3.457714	1	[0.0630]
Dependent variable: D(GDP)			
Excluded	Chi-sq	df	Prob.
D(GE/GDP)	1.355070	1	[0.2444]
All	1.355070	1	[0.2444]

P-values are in square brackets.

To some up, the Egyptian economy is Wagnerian. That is, both the long run and the short run estimates and causality tests provide clear evidence of a positive and statistically significant causal relationship running from GDP to government expenditure.

7 CONCLUSIN

In this paper, we have tested the validity of Wagner's Law against the Keynesian proposition for the Egyptian economy over the period of 1980-2012. Therefore, we surveyed both theoretical and empirical literature. Based on Mann (1980) notation, we tested for the cointegration between government expenditure and GDP using Pesaran, Shin et al. (2001) bounds test and estimated the long-run relationship using ARDL model. We found a cointegration between both variables, and government expenditure elasticity to GDP equal 2.55 and the causality runs from the latter to the former, which indicates that the Egyptian economy is Wagnerian.

On the basis of our finding, because there is no causality running from government spending into GDP, the Egyptian policy makers can use the reduction in the growth rate of the

government expenditure as stabilizer without fearing its negative effect on growth. This policy implication agrees with the policy package recommended by the International Monetary Fund (IMF.) for developing countries. But, however, the economic effect of each type of the government expenditures should be considered in order to avoid any side effect of government expenditure reduction.

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