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Econometric Testing of the Displacement Effect: the Saudi Experience

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Abstract

In this paper we have to explore the Displacement Effect in Saudi Arabia during the period (1970-2012) for real oil GDP and Non Oil GDP. We used a method as a time series econometrics techniques to examine how far the Displacement Effect validity can be applied in Saudi economy, by Using time series annual data for the periods during (1970 to 2012), (1970 to 1990) and (1991 to 2012). Three distinct time series techniques have been applied. The results obtained from the analyses find that the Peacock and Wiseman Version of Wagnerian proposition can explain the growth of government in Saudi Arabia, which holds for both the oil and non-oil income cases, and we have a structural break in the data. The findings also note that the existence of strong causality for Peacock and Wiseman Version of Wagner's law in the long run.

Keywords: Displacement Effect, Co-integration, Error Correction Model, Augmented Dickey Fuller, Government Expenditure, Economic Growth, Saudi Arabia
JEL Codes: O11, O53, H50

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1. INTRODUCTION

This paper aims to test Peacock and Wiseman's (1961) 'displacement effect hypothesis', which originally attempted to explain the proportional increase in time government expenditures overtime in the United Kingdom through time by making reference to unexpected social and political events. They found that government expenditure in the United Kingdom did not follow a smooth trend, but instead deviated from the observed trends by jumping up at separate times to respond to certain socio-political and economic events. This provided a rationale for shift in the level of government expenditures through displacing the previous trend.

The Peacock and Wiseman's (1961) 'displacement effect hypothesis' relates to Wagner's law by developing a different approach as to why government expenditures increase. They contend that under normal conditions of peace and economic stability, changes in public expenditure are rather limited unless some major crisis occurs, which necessitates an increase in government intervention. In other words, Peacock and Wiseman (1961) argue that during social and political upheavals, government expenditures move beyond the secular trend it follows by responding to the upheavals with increased government expenditures as required. However, they argue that the expansion in the government expenditure will not just be temporary. In other words, after such upheaval and crises over, the government expenditures will not go back to the pre-crisis level. Peacock and Wiseman (1961) explain this by referring to the tolerable level of taxation imposed on the taxpayers, as taxpayers will be more tolerable for tax increases during social and political upheavals, which finances increased government expenditures during such periods. However, they further argue that government expenditure will not go back to the previous level after such upheavals as government exploit the tolerable taxation level of the taxpayers and keep the government

expenditures at the new level. This, thus, implies that the new level of government expenditures displaces the previous level. Consequently, the size of the public sector will remain able at a higher level until the next shock.

This paper, hence, aims to test the validity of the 'displacement effect hypothesis' in the case of Kingdom of Saudi Arabia, which has recently experienced two important political events: Gulf War I and II. In addition, the impact of oil booms and busts should also be considered as sources of shift from the trend in the development of public expenditures, which may also result in displacement for certain period of time if not in the long-run. All these can be observed in Figure 1, which shows the trends in the share of government expenditures in GDP. As can be seen the shift in 1970s, and then in 1980s and later the trend between 1990 and 1994 can be considered as deviation of the trend due to mainly political reasons, which can be explained by the 'displacement effect', which is the subject matter of this paper.

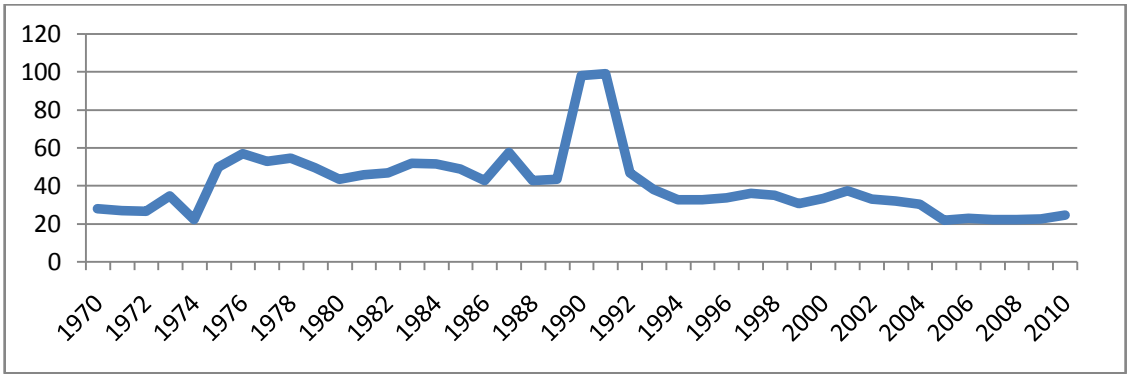

Figure 1: Share of Government Expenditure in GDP
Source: Ministry of Economy and Planning, (2010). Achievements of the Development Plans: Facts and Figures, Saudis Arabia.

Figure 2 also depicts the trends in the absolute level of government expenditures with the objective of locating the deviations from the trends. With the increase in oil revenues after the first oil shock in early 1970s, an increasing trend continues over the years. The jump in the trend in 1980 indicates even higher percentage increase in the government expenditures and therefore shifts the trends upward. The trend reaches its peak in around 1983 and returns to the original trend in 1988. Thus, the shift between 1980 and 1988 could perhaps be explained by displacement effect. Then another deviation from the trend can be seen in 1991 due to the increased defence expenditures mainly because of the First Gulf War. This sudden jump goes back to the original trend in 1995, which again indicates observation-based evidence for displacement hypothesis. Relatively smaller deviations from the trends are also observed in 1997 and 2000, which is followed by continuous trend since then.

This study, therefore, considers that Peacock and Wiseman's 'displacement hypothesis' can explain deviations from the trends, and in particular the recent wars and other relevant events can be considered potential reasons of deviation in the Saudi government expenditures. The data used in this study is the time series annual data for the 1970 to 1990 period being the pre- Gulf War II, and 1991 to 2012 period being the post-Gulf War II, which has been used to analyse the developments in government expenditure (GE) in relation to economic growth by making particular reference to 'displacement hypothesis'.

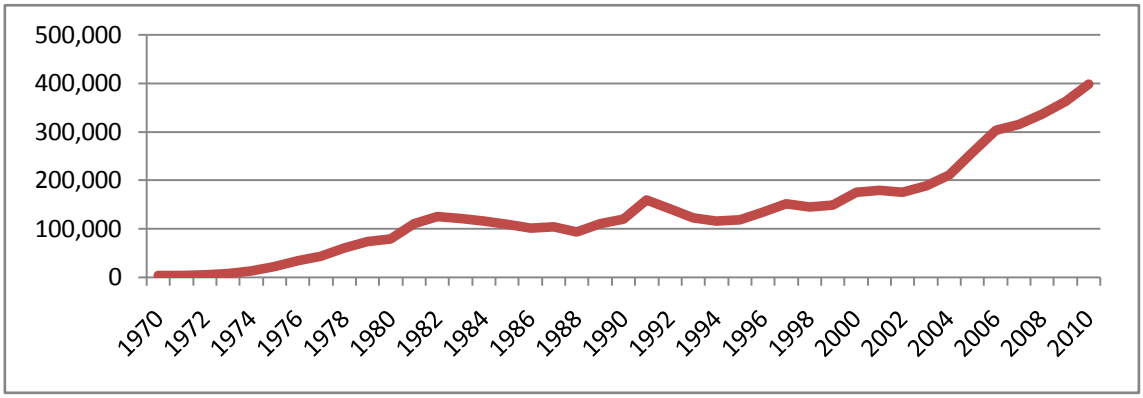

Figure 2: Trends in the Absolute Level of Government Expenditures in Saudi Arabia
Source: Ministry of Economy and Planning, (2010). Achievements of the Development Plans: Facts and Figures, Saudis Arabia.

2. THE DISPLACEMENT EFFECT HYPOTHESIS

Peacock and Wiseman's (1961) observation on the developments of public expenditures lead to the 'displacement effect hypotheses in case of the UK. As explained and mentioned above, the hypothesis states that due to some social and political events and crises government expenditures, as expected, would increase in response to the increased public expenditures during such times. However, according to the hypothesis, after such incidences, the government expenditures would stay in the new level rather than going back to the pre-crises level and trend, implying a shift and displacement.

The hypothesis, however, indicates two important dimensions as discussed in the literature; the structural break from the trend but also the ratchet impact indicating the initial jump in the government expenditures due to such events. These are explained in the following sections.

2.1. Structural Break

Wars and other social and political upheavals are capable of displacing this notion of tolerable tax rates and hence displacing the level of government expenditures. After such events, government expenditure may fall again, but not to their previous levels. Therefore, public expenditure grows in a discontinuous and stepwise fashion, the steps occurring at times of major social upheavals (Demirbas, 1999). In other words, Peacock and Wiseman investigated that both citizens and government hold divergent views about the desirable size of public expenditures and the possible level of government taxation. This divergence can be adjusted by social disturbances that destroy established conceptions and produce a displacement effect. People will accept, in a period of crisis, tax levels and methods of raising revenue that in quieter times would have been intolerable, and this acceptance remains when the disturbance itself has disappeared. Thus, the hypothesis indicates that there is the structural change aspect in government expenditures in terms of the trend.

In explaining the 'displacement effect hypothesis', Henrekson (1990: 246) states "Peacock and Wiseman (1961), adopt a clearly inductive approach to explaining the growth of government expenditure. When Peacock and Wiseman observed that expenditures over time appeared to outline a series of plateaus separated by peaks, and that these peaks coincided with periods of war and preparation for war they were led to expound the 'displacement effect' hypothesis". Such an explanation refers to the structural break nature of the hypothesis. Diamond (1977), therefore, presented the displacement effect as a theory of structural break. He used the Chow test (1960), comparing two periods separated by a social upheaval, and he found that, if this shows significant structural change and there has been displacement.

2.2. A Ratchet Effect

The 'ratchet effect' refers to the restrained ability of processes to be reversed once a specific thing has happened. The term is used within the 'displacement effect hypothesis' to describe the seemingly irreversible expansion of government in times of crisis in his book. In other words, as explained due to the expansionary government expenditures during crises periods, governments then have difficulty in reducing government expenditures back to the original level after the initial temporary needs due to war, natural or economic crisis. The government's exploitation of taxpayers' tolerance plays an important role in this process. Thus, the main argument of the ratchet effect is that if there is a crisis and government expenditures grows as a result, then the public expenditure might decline but not to the previous level as there would be resistance against such a move.

According to Bird (1972), within the displacement effect, this has called 'ratchet effect'. This is due to the fact that, for Bird (1972) crises are likely to have short-term implications for government expenditure ratio rather than leading to a permanent upward displacement for. Thus, Bird (1972) acknowledges the ratchet effect but rejects the displacement effect. In another study, Peacock and Wiseman (1979) argued that in the extreme, the ratchet effect interpretation of the displacement effect leads to the denial of its very existence.

3. TESTING OF DISPLACEMENT EFFECT

Gupta (1967) was the first to attempt to subject the displacement effect to empirical testing in the case of European countries. He found significant displacement in all cases except for Sweden after the Second World War, and also found significant displacement caused by the Great Depression in the case of the USA and Canada. Legrenzi (2004) argued that the displacement effect for Italy lay within a multivariate revenue-expenditure model of government growth. His result for long-run analysis shows the effect of GDP on the government's growth. Otherwise, he found that the short-run analysis shows some evidence for the displacement effect in terms of a lower resistance against tax financing of government expenditure during the Second World War. Another study by Henry and Olekalns (2000) investigated the Peacock and Wiseman's 'displacement effect' to explain the increases in the ratio of government expenditure to GDP in the UK. They used a data set extending back to 1836, and found instances where displacement may have occurred.

In an attempt to search for the 'displacement effect' in the case of Saudi Arabia, Peacock-Wiseman version of Wagner's Law is utilised, which is presented in Table 1 in real GDP.

Table 1: The Original Version of Peacock-Wiseman with Real GDP

No	Function	Version	Year
1	$L(GE) = \alpha + \beta\ L(GDP)$	Peacock-Wiseman	1961

In addition, the Non Oil GDP version of the Peacock and Wiseman's Wagner Law exposition is depicted in Table 2.

Table 2: The Version of Peacock-Wiseman with Real Non-Oil Sector of GDP

No	Function	Version	Year
1	$L(GE) = \alpha + \beta\ L(\text{Non Oil GDP})$	Peacock-Wiseman	1961

3.1. Ordinary Least Square (OLS)

The ordinary least square test (OLS) is employed to determine the parameters in the equations. R^2 reflects the regression equation's ability to determine the dependent variable's behaviour. The adjusted R^2 is for the degrees of freedom. We have to use the logarithm model because the parameters of the logarithm model have an explanation as elasticises.

On the other hand, to find out whether there is a structural break between two periods or not, we will split the observations into two groups, which used; we then calculate the chow test, which is like an F- test, (Chow, 1960), following formula (1):

$$F = \frac{RSS_c - (RSS_1 + RSS_2)/k}{(RSS_1 + RSS_2)/n - 2k} \quad (1)$$

The hypotheses tests are:

$H_{0:}\beta i = 0$; (There is no structural break)

$H_{1:}\ \beta 1 \neq 0$; (There is a structural break)

3.2. Stationarity and Unit Root Tests

In testing Wagner's Law, the non-stationary property of the series must be considered first. There are many alternative tests available to examine whether the series are stationary or non-stationary. If the variables under investigation are stationary, this means that the variables do not have unit roots, then the series said to be 1(0). If the variables under investigation are non-stationary in its level form but stationary in its first-difference form, which means that the variables do have unit roots, then they are said to be 1(1). In recent years many macroeconomic time series are non-stationary which means that they contain unit roots that cause many econometric problems. To test the validity of Wagner's Law in the case if Saudi Arabia; we used Augmented Dickey Fuller (ADF) (1979) method to test the unit root (equation 2).

$$\Delta y_t = \alpha + \beta y_{t-1} + \sum_{t-i}^{k} \Delta y_{t-i} + \varepsilon_t \quad (2)$$

3.3. Co-integration Test

Co-integration test was used to test the relationship between economic growth and government expenditure. Granger (1980) was the first to propose a connection between non-stationary series and long-run equilibrium. The purpose of conducting co-integration is to explore whether the data exhibit a long-run relationship. Engle and Granger (1987) developed and introduced the theory of co-integration.

Johansen (1988), and Johansen and Juselius (1990) presented that the variables under investigation are performed for each version of the Wagner's Law to search for the existence of a long-run equilibrium relationship between the two variables GE and GDP as well as for GE and Non Oil GDP.

3.4. Error Correction Model (ECM)

Engle and Granger (1987) provide such a procedure. The procedure is known as the "Error-Correction Models". The aim of Error-Correction Models is to determine whether co–integration exists between two variables; there must be Granger causality in at least one direction, but the most valuable aspect is that co-integration does not reflect the direction of causality between the variables. The error correction models (ECM) are expected in equation (3) and (4):

$$\Delta Y_t = a_1 + \beta_1 ECT_{t-1} + \sum_{i=1}^{n} \delta_i \Delta Y_{t-1} + \sum_{i=1}^{n} \Omega_i \Delta X_{t-1} + e_t \quad (3)$$

$$\Delta X_t = a_2 + \beta_2 ECT_{t-1} + \sum_{i=1}^{n} \mu_i \Delta Y_{t-1} + \sum_{i=1}^{n} \epsilon_i \Delta X_{t-1} + e_t \quad (4)$$

Where: (ECT_{t-1}): The error correction term lagged one period, is equivalent to $(e_t = Y_t - \alpha - \beta X_t)$, this represents the disequilibrium residual of a co-integration equation.

4. EMPIRICAL RESULTS

This study focused on testing Displacement effect by using the Peacock and Wiseman versions of Wagner's, Law. The model is expanded, as mentioned before, with the addition of political and economic dummy variables, the results from OLS test are presented in Table 3.

Table 3: Displacement Effect with Political and Economic Variables (Real GDP) for 1970-2012

Variables	Coefficient	t-stat	Probability
C	5.006246	5.509902	0.0000
LNGDP	0.321715	3.603543	0.0010
D1973	0.778761	3.773290	0.0006
D1976	1.280299	6.966756	0.0000
D1983	0.407364	3.659938	0.0009
D1991	0.080591	0.673151	0.5055
D1997	0.111410	0.797913	0.4306
D2001	0.157782	1.072245	0.2914
D2006	0.470858	3.261902	0.0026
R^2	0.979187	Durbin-Watson stat	1.759770
Adjusted R-squared	0.974142	F-statistic	194.0718

The results, as depicted in table 3, shows that all variables are significant except for the dummy variables for First Gulf War in 1991, for 1997 financial crisis, and for the Second Gulf War in 2001 is not. These findings are consistent with Wagner's Law of increasing state activities, which states the income elasticity of demand for public goods is greater than unity. In addition, the findings in table 3 indicate that the dummy variables, D1973, D1976, D1983 and D2006 are statistically significant for the period 1970-2012 for Saudi Arabia. Thus, it can be concluded that the events indicated by the significant dummy variables have caused a change in the government expenditures in Saudi Arabia.

In order to test the existence of 'displacement effect' in the case of Saudi Arabia, as mentioned, structural test was used. For this, the data are split into two: 1970-1990 and 1991-2012. The estimation for Peacock and Wiseman version of Wagner's Law in relation to the 'displacement effect' is conducted initially for only 1970-1990 period, and the results are depicted in table 4. It should be noted that only the relevant variables are included in the model, namely D1973, D1976 and D1983, as the data covers only until 1990.

Table 4: Displacement Effect with Real GDP

	1970 – 1990		
Variables	Coefficient	T-Stat	Probability
C	0.036244	0.035622	0.9720
LNGDP	0.812822	8.102681	0.0000
D1973	0.042101	0.225312	0.8244
D1976	0.683955	4.258447	0.0005
D1983	0.418495	5.155309	0.0001
R-squared	0.990514	Durbin-Watson stat	2.773533
Adjusted R-squared	0.988281	F-statistic	443.7560
	1991-2012		
C	11.73833	13.59206	0.001
LNGDP	0.232955	0.744838	0.634
D1991	0.082179	0.615821	0.521
D1997	0.166333	2.073080	0.056
D2001	0.263462	3.088118	0.006
D2006	0.490176	5.929548	0.005
R-squared	0.917577	Durbin-Watson stat	0.001
Adjusted R-squared	0.888140	F-statistic	0.634

The findings in Table 4 shows that except for the dummy variable for the 1973 oil shock all the variables are significant. It should be noted that this finding is consistent with Wagner's Law. In addition, having D1976 and D1983 dummy variables indicates an important result in terms of displacement effect, as oil shock in 1976 generated large income for public expenditures to expand, and 1983 global recession created fiscal crisis in Saudi Arabia as well. Therefore, these two dummy variables help to verify displacement hypothesis in terms of divergence of government expenditures from its trend due to economic expansion and crisis. However, the insignificance of dummy variable for 1973 oil shock is rather unexpected, which can be explained through initial inexperience of the government in directing the new economic wealth to economic development through expanding government expenditures. In other words, the social capital in terms of economic development perhaps was much lower; and therefore the use of resources for economic development was not prioritised. As part of the structural test, the second part of the data for 1991-2012 is also examined for the presence of displacement effect. As can be seen in table 5, the GDP and D1991 variables are not significant, and the rest of the dummy variables for 1997, 2001 and 2006 are significant at 5% level of significance.

It should be noted that although GDP variable is not significant, this finding is still consistent with Wagner's Law of increasing state activities, as the income elasticity of demand for public goods is greater than unity. The dummy variables D1997, D2001, and D2006 are all significant indicating the impact of these variables in creating shift in the government expenditures during the period 1970 to 2012. However, it is difficult to explain as to why D1991 indicating the impact of 1991 First Gulf War on the Saudi government expenditures is not significant.

Table 5: Displacement Effect with Non Oil GDP

	1970 – 2012		
Variables	Coefficient	T-Stat	Probability
C	-1.663560	0.572393	-2.906324
LN Non Oil GDP	1.040415	0.059883	17.37416
D1973	0.189706	0.084801	2.237078
D1976	0.095467	0.106051	0.900197
D1983	-0.057862	0.049004	-1.180754
D1991	-0.054312	0.045195	-1.201744
D1997	-0.030112	0.052661	-0.571803
D2001	0.061700	0.054692	1.128137
D2006	0.144582	0.057034	2.535015
R-squared	0.997142	Durbin-Watson stat	1.269720
Adjusted R-squared	0.996449	F-statistic	1439.122

In regards to searching for the 'displacement effect' with Non Oil GDP, as the results in Table 5 depicts, none of the variables including the GDP is not significant, despite the fact that the coefficients values of each of the variables indicate a certain level of impact. As part of the structural change test, Chow test, Table 6 shows the results for the period of 1970-1990 and 1991 – 2012 with the relevant dummy variables.

As the results in Table 6 demonstrate, except for D1976 all the variables are significant with Non Oil GDP having full significance and also high coefficient estimate as compared to other variables.

As for the 1991-2012 period, as the results in table 6 indicates, none of the variables show any statistical significance. It can therefore be concluded that oil revenues play an important role in determining the government expenditures, as when comparing the results with the results in the previous section the role of oil revenues is rather clear.

Table 6: Displacement Effect with Non Oil GDP 1970 to 1990

	1970 – 1990		
Variables	Coefficient	T-Stat	Probability
C	-1.797123	-4.369981	0.0004
LN Non Oil GDP	1.054415	24.50498	0.0000
D1973	0.175285	2.918593	0.0096
D1976	0.074266	0.982622	0.3396
D1983	-0.070775	-2.018635	0.0596
R-squared	0.998730	Durbin-Watson stat	2.773533
Adjusted R-squared	0.998431	F-statistic	3342.748
	1991-2012		
C	1.787005	4.008829	0.445767
LN Non Oil-GDP	0.787996	0.318562	2.473602
D1990	-0.057546	0.124379	-0.462665
D1997	0.017427	0.089406	0.194924
D2001	0.110417	0.092334	1.195845
D2006	0.228385	0.126219	1.809441
R-squared	0.942636	Durbin-Watson stat	1.223875
Adjusted R-squared	0.922149	F-statistic	46.01129

The result of the Chow-test in Table 7 implies that structural break is a reality in the Saudi Arabian government expenditures at least in terms of 1970-1990 and 1991-2012 period. In addition, with the existence of dummy variables and their significance, the validity of 'displacement effect' is verified in the case of Saudi Arabia.

Table 7: Structural Break Test

Period	F-test	F-table
1986-1990	23.44	4.0847
1991-2012	30.04	4.0847

After conducting, the research with OLS in search for displacement effect in the case of Saudi Arabia, unit root and co integration test used for the data for government expenditures (LGE) and gross domestic product (LGDP) for the period 1970-2012, but it is applied to split data 1970-1990 to 1991-2012 with the objective of locating the structural breakdown. Table 8 presents results of the ADF for stationary unit root tests on each variable.

Table 8: Unit Root Test for Stationary for Real GDP

Variables	Augmented Dickey-Fuller
1970-2012	
L(GDP)	-3.23
L(GE)	-3.88
L(Non Oil GDP)	-4.12
Critical Values 5% level	-2.937
1970-1990	
L(GDP)	-3.756
L(GE)	-3.877
L(Non Oil GDP)	-4.330
Critical Values 5% level	-3.00
1991-2012	
L(GDP)	-4.105
L(GE)	-5.521
L(Non Oil GDP)	-4.147
Critical Values 5% level	-3.600

The results in Table 8 indicates that each variable used in Peacock and Wiseman version of Wagner's Law in the case of Saudi Arabia indicate that the series are stationary after the first difference. Applying ADF unit root tests (table 9), thus, it is established that each of the variables used in all Peacock and Wiseman version of Wagner's Law is cointegrated at first order, or I(1), which can be tested for long-run relationship between the variables.

Table 9: Contegration Regressions Results for Real GDP

Versions	Dependent Variables	Coefficient	T-Stat	Probability	R^2	DW
				1970 – 2012		
		0.467	4.16	0.021	0.651	0.973
Peacock & Wiseman	LGE			1970 – 1990		
		1.101	14.02	0.006	0.882	0.705
				1991 – 2012		
		0.511	0.62	0.763	0.532	0.921

Table 10: Cointegration Regression Results for Non Oil GDP

Versions	Dependent Variables	Coefficient	T-Stat	Probability	R^2	DW
				1970 – 2012		
		1.024	17.12	0.004	0.932	1.171
Peacock & Wiseman	LGE			1970 – 1990		
		0.987	20.44	0.000	0.929	1.913
				19901– 2012		
		0.663	2.74	0.002	0.961	1.192

The results in Table 9 and 10, present OLS time series results for the entire 1970-2012 and also the split periods. The results show that there is a long run relationship between the government expenditure (GE) and economic growth (GDP) for Non Oil GDP in Saudi Arabia for the entire period as well as for the split periods as the independent variable is significant. However, in the case of real-GDP version, the next step is to test cointegration by using Johansen cointegrating test.

With the cointegration test for Peacock and Wiseman version, in the case of real GDP for the periods 1970-2012, 1970-1990 and 1991-2012, table 11 shows that cointegration relationship is found indicating the existence of one cointegration equation in the relationship between LGE and LGDP.

Table 11: Johansen Co-integration Test results with Real GDP

Versions	Hypothesized No. of CE(s)	Eigen value	Trace Statistic (Long Run)	Critical Value 5%
		1970 – 2012		
Peacock	None	0.29806	22.5771	15.41
& Wiseman	At most 1	0.18983	8.4206	3.76
		1970 – 1990		
Peacock	None	0.320153	8.233101	15.41
& Wiseman	At most 1	0.046326	0.901238	3.76
		1991 – 2011		
Peacock	None	0.287262	10.06590	15.41
& Wiseman	At most 1	0.151812	3.293070	3.76

In the case of Non Oil GDP, Table 12 shows that there is a long run equilibrium relationship between Non Oil GDP and government expenditures as found in Peacock & Wiseman version of Wagner's Law in searching for 'displacement effect' with respect to Non Oil GDP at 5% level of significance. Thus, results

indicate that the real total government expenditure and Non Oil GDP are subject to an equilibrium relationship in the long run.

Table 12: Johansen Co-integration Test results with (Non Oil GDP)

Versions	Hypothesized No. of CE(s)	Eigen value	Trace Statistic (Long Run)	Critical Value 5%
		1970-2012		
Peacock	None	0.318982	15.16845	15.41
& Wiseman	At most 1	0.004756	0.185938	3.76
		1970-1990		
Peacock	None	0.598345	18.71788	15.41
& Wiseman	At most 1	0.070389	1.386793	3.76
		1991 – 2012		
Peacock	None	0.337350	8.642084	15.41
& Wiseman	At most 1	0.020385	0.411915	3.76

In this, the Granger Causality for Peacock and Wiseman version for real GDP and Non Oil GDP for the entire period and also for the split periods is tested. The following section of this paper, in the case of real GDP for the period of 1970- 2012 and for 1970-1990, it can be concluded that there is bi-directional causality between government expenditures and GDP in the case of Peacock and Wiseman version of Wagner's Law in search of 'displacement effect'. But, the period 1991-2012, shows that LGE causes LGDP, while the result for LGDP causing LGE is not that string albeit the results show that LGDP causes LGE about 50% of the time.

In the case of Non Oil GDP for the period of 1970-2012 and 1970-1990, the feedback of causality from L Non Oil GDP to LGE, can be concluded that there is also bi-directional causality between government expenditures and Non Oil GDP in the case of Peacock and Wiseman version of Wagner's Law in search of 'displacement effect', and it is rather weak, from GDP to government expenditures for the period of 1991-2012.

In regards to the Error Correction Model (ECM) for Peacock and Wiseman version of Wagner's Law for 'displacement effect', the results in table 13 for the period of 1970 to 2012, 1970 to 1990 and 1991 to 2012 with real GDP indicate, that there is long-run causality that runs from GDP to GE. It can therefore be concluded that Peacock and Wiseman version of Wagner's Law for 'displacement effect' is found to hold for GDP in the case of Saudi Arabia.

Table 13: Causality with Error Correction Model (ECM) test with (Real GDP)

Versions	Variables	ECTt-1	T-Stat
	1970 – 2012		
Peacock	L(GE)	-0.22349	-1.08
& Wiseman	L(GDP)	0.67767	1.67
	1970 – 1990		
Peacock	L(GE)	-0.52349	-1.54
& Wiseman	L(GDP)	0.86667	1.67
	1991 – 2012		
Peacock	L(GE)	-0.6459957	-3.02
& Wiseman	L(GDP)	1.377322	0.87

As the results in table 14 for the period of 1970 to 2012, 1970 to 1990 and 1991 to 2012 with Non Oil GDP indicate, that there is long-run causality that runs from GDP to GE. It can therefore be concluded that Peacock and Wiseman version of Wagner's Law for 'displacement effect' is found to hold for Non Oil GDP in the case of Saudi Arabia.

Table 14: Causality with Error Correction Model (ECM) test with Non Oil GDP

Versions	Variables	ECTt-1	T-Stat
	1970 – 2012		
Peacock	L(GE)	-0.7523	-0.54
& Wiseman	L(Non Oil GDP)	0.42890	0.78
	1970 – 1990		
Peacock	L(GE)	-0.80127	-0.99
& Wiseman	L(Non Oil GDP)	0.460949	0.81
	1991 – 2012		
Peacock	L(GE)	-0.78442	-5.42
& Wiseman	L(Non Oil GDP)	-0.12992	-1.43

5. CONCLUSION

Gupta (1967) and Diamond (1977) argued that the displacement effect leads to the share of national income devoted to government expenditure increasing with GDP due to further interventions during social, political and economic upheavals.

In this chapter, thus, the relationship between the government expenditure and economic growth is examined using the Peacock & Wiseman version of Wagner's Law for 'displacement effect hypothesis' for Saudi Arabia using time series annual data for the 1970 to 2012 period but also for the split data 1970 to 1990 and 1991 to 2012 with the objective of locating the structural change in the development and trend of government expenditures.

The results through all the method used and applied to the various levels of data indicate that there is a structural break in the trend and development of government expenditures in Saudi Arabia. First, using Ordinary Least Square (OLS) for real GDP and Non Oil GDP tests the regressions for the Peacock and Wiseman of Wagner's Law for 'displacement effect'. Secondly, the Augmented Dickey-Fuller for stationary Unit Root Test for real GDP and Non Oil GDP is applied. In the case, the levels of the series tested, the null-hypothesis of non-stationary cannot be rejected for any of the series. Third, these results suggest that there is a cointegrating relationship between government spending and national income. The equilibrium relationship indicates that the major determinant of government expenditure in Saudi Arabia, in the long run, is national income. Fourthly, Granger causality tests were employed to confirm the causality direction between the variables. In the long run, statistically significant evidence is found indicating government expenditures Granger causing GDP and also the feedback causality in the GDP causing government expenditures. The similar results have been establishing by using the ECM.

In conclusion, as the empirical evidence presented in this chapter shows thorough analysis of structural break, it can be concluded that government expenditures in Saudi Arabia has not only followed a secular growth but also experienced structural jumps from one period to another due to certain economic reasons such as the large oil revenues due to oil shocks, and also negative impact of world recession and also the 1997 financial crisis on fiscal policy, but also due to political reasons such as Gulf Wars in the recent years. Further studies can be conducted through other empirical methods to locate the beginning and ending periods of the impact of such economic, social and political events have had on the trend and development of public expenditures in Saudi Arabia, as this study only shows the structural breaks but not the periods of impact. Thus, it can be concluded that this study provides initial empirical evidence in favour of 'displacement effect hypotheses of Peacock and Wiseman through using Peacock and Wiseman version of Wagner's Law in different forms and through different econometric methods.

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