Causality between Public Expenditure and Economic Growth: The Turkish Case.

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Causality between Public Expenditure and Economic Growth: The Turkish Case

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Abstract. This paper takes into account recent advances in econometric techniques and examines Wagner's Law of long-run relationship between public expenditure and GDP for the Turkish case over the period of 1965-2000. The relationship is supposed public expenditure to be an outcome, not cause, of growth in GDP. Causality must run from GDP to public expenditure, not other ways around. Using the co-integration test and the Granger Causality test, we empirically find no causality in both directions; neither Wagner's Law nor Keynes hypothesis is valid for the Turkish case.

JEL Classification Codes: O40, H54.

Key Words: Public expenditure, economic growth.

1. Introduction

In most countries, data based on public expenditure as a fraction of national output show that public sector has an inevitable trend of growth in the long-run (Scully, 1989). Turkey is one of these countries. Her public expenditures have been expanding for decades. For the period of 1965-2000, for example, the ratio of total public expenditure to Gross Domestic Product (GDP) was 18.02 per cent in 1965, while it was almost doubled, in just 35 years, to 35.5 per cent in 2000[1].

The phenomenon of public expenditure growth has been subject for researchers to find out what causes or has affects on it. Wagner (1883)

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[1] See Figure 3.

introduces a model that public expenditures are endogenous to economic development, i.e. growth in the economy also causes public sector expenditures to expand. Keynes (1936) and his supporters, however, raise the thought that during recession times the use of fiscal policies boosts economic activities, i.e. expansionary fiscal policies, expanding public expenditures etc., increase community output.

Wagner's law and the Keynesian theory present two opposite perceptions in terms of the relationship between public expenditure and growth in community output. While according to Wagner's approach causality runs from growth in community output to public expenditure, the Keynesian approach assumes that causality runs from public expenditure to growth in community output in times of recessions.

Wagner's model is not the only one explaining the growth of public expenditure. There are also some other models. For example, the model of *the displacement effect* and *the theory of bureaucracy* are also most common ones, explaining the expansion of public sector expenditure from different angles.

In this study, we consider Wagner's model for the case of Turkey to analyze whether the data based on the period of 1965-2000 supports Wagner's suggestion or not. To our best knowledge, there are two empirical studies based on the Turkish case and examined long-run relationship between public expenditure and economic growth. Yamak & Küçükkale's (1997) paper examined the period of 1950-1994. By taking five versions of Wagner's law[2], they found that there is an empirical support on the Wagner's law of causal relationship from economic growth to public expenditure. Contrary to Yamak & Küçükkale's (1997) findings, Demirbas's (1999) study examined the period of 1950-1990 by taking six versions of Wagner's law[3] into account. He found no support on Wagner's law of causal relationship from economic growth to public expenditure and, partly, nor Keynesian hypothesis of causal relationship from public expenditure to economic growth.

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[2] These are versions of, in turn, Peacock and Wiseman (1961), Goffman (1968), Musgrave (1969), Michas (1975) and modified version of Peacock and Wiseman (1967).

[3] These are versions of, in turn, Peacock and Wiseman (1967), Pryor (1969), Goffman (1968), Musgrave (1969), Gupta (1967) and modified version of Peacock and Wiseman suggested by Mann (1980).

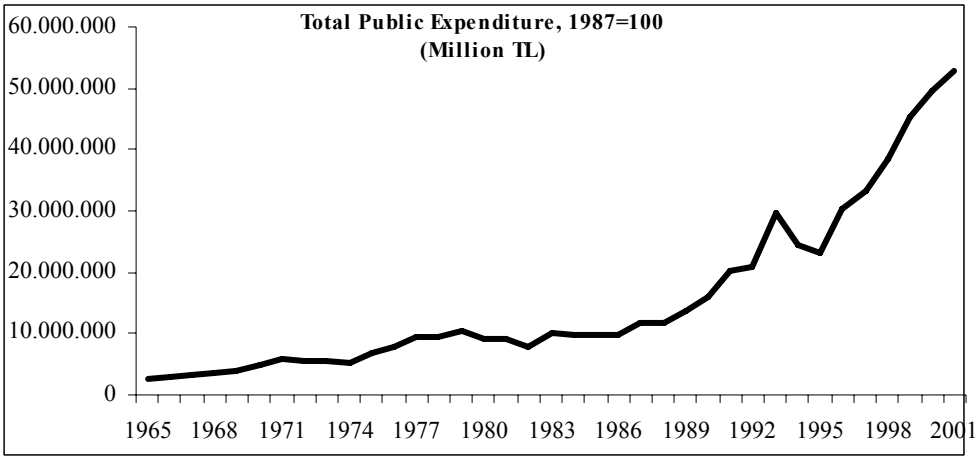
Even thought, there are numbers of empirical studies of Wagner's law based on various countries, we found only two empirical ones for the Turkish case and most importantly their findings do not confirm each others. As a matter of fact, we stress that findings of this study are important for the literature, at least, to have a clear idea of how the law can empirically be interpreted for the Turkish case.

The paper is laid out in four sections. The first section overviews the trend of public expenditure in Turkey. The second section reviews the aspect of Wagner's law. The third section provides a description on data and gives the methodology. The fourth section presents results of empirical analysis. The conclusion is presented in the fifth section.

2. Trend of Public Expenditure in Turkey

The magnitude of public expenditure is one of the applied ways to measure the size of government in the whole economy. For this purpose, it is also necessary to compare the magnitude with something else that can enable reader to get a glance idea about its size. In Figure 1, we introduce a time series data of public expenditure in a real term for the period of 1965-2001.

Figure 1: Real Public expenditures, 1965-2001

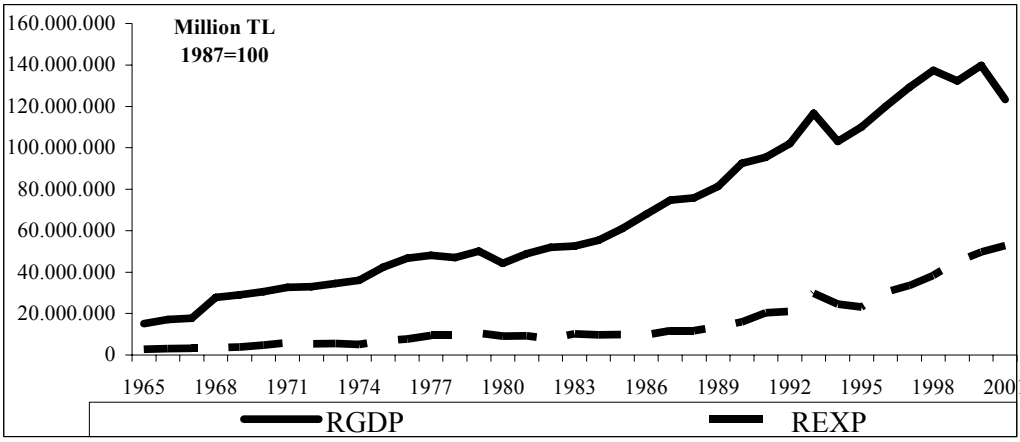


Source: State Institute of Statistics (1996:391); the Minister of Finance, http://www.gelirler.gov.tr/ gelir2.nsf, 5th May, 2003; and Central Bank of Turkey, http://tcmbf40.tcmb.gov.tr/cbt.html, 5th May, 2003.

Since the beginning of the period, public expenditure had experienced with an increasing trend. This trend itself cannot, however, give apparent idea about what would have caused to such increase. Taking 1980s policy changes on economic structure into account, it is a questionable matter that, though, Turkey started to experience with the model of open economy, and privatizing policies were in governments' agendas, public expenditure had however sharply gone up. It is especially apparent matter during the 1990s.

Figure 2 presents magnitude of both public expenditure and GDP in real terms.

Figure 2: Real Public expenditures and Real GDP, 1965-2000

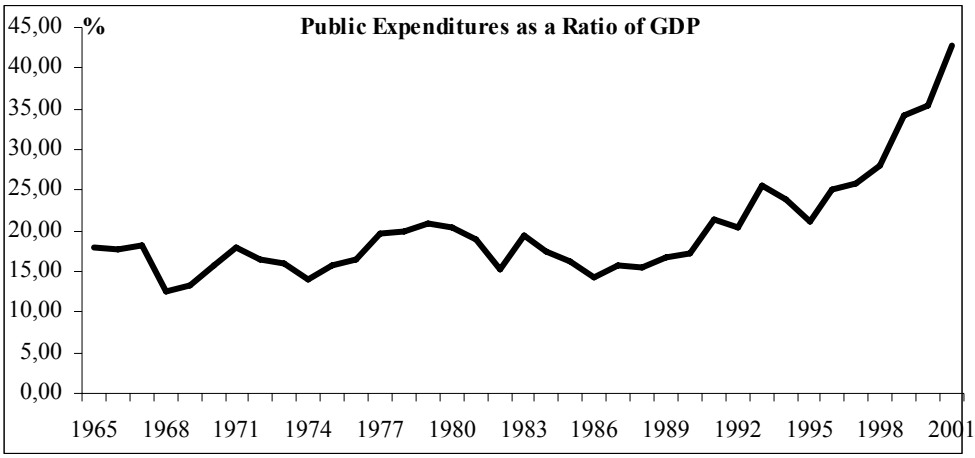


Notes: RGDP stands for Real Gross Domestic Product and REXP is Real Public expenditure.
Source: State Institute of Statistics (1996:391); the Minister of Finance, http://www.gelirler.gov.tr/_gelir2.nsf, 5th May, 2003; and Central Bank of Turkey, http://tcmbf40.tcmb.gov.tr/cbt.html, 5th May, 2003.

Comparing long-run increases in public expenditure (REXP) with the trend of gross domestic product (RGDP), it seems that they have a one-way directional trend which gives the impression of what Wagner's law suggests. However, this is an early assumption and cannot here be interpreted further.

We also need to consider percentiles of REXP and RGDP to get the ratio of REXP to GDP that would provide us an indication of resources the whole economy can make available to the public sector. These ratios are presented with Figure 3.

Figure 3: Public expenditures as a Ratio of GDP, 1965-2000



Source: State Institute of Statistics (1996:391); the Minister of Finance, http://www.gelirler.gov.tr/_gelir2.nsf, 5th May, 2003; and Central Bank of Turkey, http://tcmbf40.tcmb.gov.tr/cbt.html, 5th May, 2003.

As seen in the figure, public expenditure as a ratio to GDP did not increase until the early 1990s, i.e. during the period of 1965-1990 public expenditure was approximately between 15 and 20 percent of GDP. After the year 1990, the ratio had sharply gone up approximately from 24 per cent in 1991 to 35.5 per cent in 2000.

The controversy between findings of the earlier studies on Turkish case and increasing trend in public expenditure as a ratio of GDP is the chief reason of this study to examine the Turkish case empirically and we suppose that our findings will get tight as well as precise idea on whether the data on Turkish case can really validate what Wagner's Law assumes. Before launching the empirical part of the study, subsequent section presents a brief explanation on the assumptions of Wagner's Law.

3. Wagner's Law

The explanation of the growth-patterns or the growth of public expenditure has been discussed for decades. One suggestion on the growth came from the German economist Adolph Wagner (1835-1917). Wagner's work is based on empirical observations in a number of Western industrializing countries. Hence, his suggestion is not prescriptive, but rather explanatory in character (Peacock & Wiseman, 1967:16). It does not contain any *priori* property. He put his model forward with regard to *posterior* results, i.e. he made his suggestion depending on empirical results observed in a number of industrializing countries. His main implication is that as community output increased in the past, public expenditure grew as well.

The basic Wagnerian assumption is that public expenditure growths continuously associated with the continuing growth in community output in developing countries. Moreover, public expenditure increases at a faster rate than the growth of community output. From this point of view, Wagner termed this as "*[the] law of increasing expansion of public, and particularly state, activities' becomes for the fiscal economy the law of the increasing expansion of fiscal requirements...*".[4] Since then, this is well-known as the 'Wagner's Law'.

However, it is necessary to consider Wagner's implicit caution of financial stringency that appears in short-runs. The reason for that is explained by Wagner as "*financial stringency may hamper the expansion of state activities, causing their extent to be conditioned by revenue rather than the other way round, as is more usual. But in the long run the desire for development of a progressive people will always overcome these financial difficulties*".[5]

From Wagner's suggestion, it is obvious that expansion of public expenditure mainly derives from the consequences of social progress of progressing countries. Those social progresses are as a result of long-rung change. The law does not have any interest on short-run changes, as any of these changes, like financial stringency, would cause public expenditure not to be derived from what Wagner's law suggests, but from impermanent causes.

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[4] Gemmell (1993:104).
[5] Peacock and Wisemen (1967:17).

Wagner's suggestions had shed light on the literature that there is a correlation between growth of community output and public expenditure and this correlative relation is in one direction, i.e. from the growth of community output to public expenditure. This was the main point of Wagnerian theorem that, with the law, it was aimed to establish this suggestion as generalized on public expenditure. In other words, Wagner seems expecting the law not to be considered as inevitably everlasting, but to be considered something more than a simple *historical accident* (Peacock & Wiseman, 1967:16-8).

Wagner's law seems expecting that it is the duty of government to expand its spending in connection with increasing social progresses and such expansion does not only indicate to quantitative expansion of publicly provided goods and services, but also qualitatively increases as well.

Ever since Wagner's work translated into English, his work and ideas had motivated a large number of researchers to study 'the law of increasing expansion of public expenditure' to find out how it fits empirically in industrializing countries.

Thornton (1999) examined 6 countries using data from around mid-19th century to 1913 and found unidirectional causality from income to public expenditure, i.e. considerable support for Wagner's law in 19th century. Ram's (1986) cross-country study analyzed 63 countries and found some support on the proposition. Chang's (2002) study examined five different versions of Wagner's law for 6 countries andfound long-run relationship between income and public expenditure with the exception of one sample country. Abizadeh and Gray's (1985) cross-country study analyzed 55 countries and found support on Wagner's law for richer countries. They, however, found no support for the poorest countries. Chletsos and Kollias's (1997) study examines the validity of Wagner's law in the case of Greece by considering disaggregated public expenditure and found support for the law only in the case of defense expenditure.

Al-Faris's (2002) work put the Gulf Cooperation Council countries into the analysis to examine existence of causal relationship between public expenditure and national income and found causality from national income to public expenditure (as proposed by Wagner's law), but no support for the causality from public expenditure to national income (as proposed by Keynesian theory). Islam (2001) re-examined the proposition of Wagner's law by advanced econometric techniques and found strong support for the

law for the USA. Ram's (1987) study based 115 countries over the period 1950-1980 found that Wagner's hypothesis seems to be supported in about 60 percent of the countries and refuted for the remaining.

On the other hand, Afxentiou and Serletis's (1996) cross-country study analyzed 6 countries and Ansari et al.'s (1997) study examined 3 countries and both studies did not find any evidence of Wagner's law. Courakis et al.'s (1993) study examined 2 countries (Greece and Portugal) and found significant differences in responses to some determinants of public expenditure and between the two countries. Abizadeh and Yousefi's (1998) study focused on the causality between the growth of public expenditures and economic growth and found no evidence for the proposition. Singh and Sahni's (1984) study based on India over the period 1950-1981 found no causality to support either Wagner's law or the Keynesian theory.

Earlier studies attempted to test Wagner's law were, however, mostly interested in the elasticity of public expenditure to community output and, to find out this, several versions of the model were developed to empirically investigate the suggestion of the law. Musgrave (1969), Goffman and Mahar (1971), Gupta (1967), Bird (1971), Gandhi (1971), and Ganti and Kolluri (1979) examine the validity of Wagner's law and their findings of elasticity is greater than zero. In the line of these findings, their main interpretation was that if the elasticity was greater than zero Wagner's law exists.

One of the most important shortcomings of the earlier studies on Wagner's Law was, in general, the misassumption that when the time series data is used it is quite often to see variables as *non-stationary* in their levels. Because of this, one may obtain a very high R^2 though there is no meaningful relationship between the variables and findings of the regression analysis which could result with the problem of *spurious regression*. Such problem arises because if time series data involve exhibit strong trends, i.e. sustained upward or downward movements, the high R^2 observed is due to the presence of the trend, not to the true relationship between the variables. Therefore, it is vital to find out whether the relationship between the variables is true or spurious (Gujarati, 1995:709).

The advances in econometric techniques enabled recent researchers (See, for example, Chang, 2002; Islam, 2001; Bohl, 1996; Payne and Ewing, 1996; Demirbas, 1999) to use those techniques in their analysis to reanalyze

the traditional regression analysis applied in earlier works. Regarding such techniques, stationarity tests, i.e. unit root test, causality tests and co-integration analysis can be given as an example.

Since the aim of this study is to examine the causal relationship between public expenditure and GDP by recent advances in econometric techniques, we utilize six versions of regression models on Wagner's Law presented in Table 1.

Table 1: Versions of the Regression Model on Wagner's Law

No	Model
Model 1	$LREXP_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$
Model 2	$LREXP_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$
Model 3	$LR(EXP/GDP)_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$
Model 4	$LR(EXP/GDP)_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$
Model 5	$LRPEXP_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$
Model 6	$LRGC_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$

Notes: L is Natural Logarithms, R is Real, P is Per Capita, EXP is Public expenditure, GDP is Gross Domestic Product, GC is Government Consumption excluding Investments, β_0 is Constant, β_1 is Coefficient, μ is error, and $_t$ is time

4. Description of the Data and Empirical Methodology

4.1. Description of the Data and Their Sources

The data used in the analysis consist of Gross Domestic Product (GDP), Total Government Consumption (GC)[6], Total Public expenditure (EXP), and

[6] GC contains current public expenditure and transfer payments, and is obtained by subtracting total public expenditure from public expenditure on investments.

Mid-year Annual Population. The data in nominal values is converted to real values by Wholesale Price Index (WPI) and their natural logarithms are put into the analysis.[7]

4.2. Empirical Methodology

First, we investigate the stationarity properties of the time series using the Augmented Dickey-Fuller (ADF) test. The purpose of 'augmenting' the Dickey-Fuller (DF) regression is to get *white noise* errors. A series Y_t is said to be integrated of order d denoted by $Y_t \sim I(d)$ if it becomes stationary after differencing d times and thus Y_t contains d unit roots. A series which is I(0) is said to be stationary. To determine whether a series is stationary or non-stationary, unit root test developed by Dickey and Fuller (1979) is used. The ADF test is based on the estimate of the following regression:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{p} y_j \Delta Y_{t-j} + \varepsilon_t \qquad (1)$$

Where, Δ is the first-difference operator, p is lag, α_0 is constant, α_1 and y_{ji} s are parameters and ε_t denotes stochastic error term.

If $\alpha 1 = 0$, then the series is said to have a unit root and is non-stationary. Hence, if the hypothesis, $\alpha 1 = 0$, is rejected for the above equation it can be concluded that the time series does not have a unit root and is integrated of order zero, i.e. it has stationarity properties.

Table 2 shows the ADF test results of the time series. The results suggest that the null-hypothesis (H0) of unit root can be rejected in the first difference, I(1) and therefore all the series (i.e. LREXP, LRGDP, LRPGDP, LREXP_RGDP, LRPEXP, and LRGC) are stationary in the first difference. Since the all series are clearly stationary in I(1), the two variables of each version of Wagner's Law can be integrated of order one.

The data up to 1994 is taken from State Institute of Statistics (1996:391) and the rest is taken from the internet side of the Minister of Finance.

[7] For data sources, see the "other sources" in the reference list.

Table 2: ADF Unit Root Tests*

Variables	ADF Test Statistics**	Stationarity
LREXP	-3.88 [1] (-2.95)	I(1)
LRGDP	-8.29 [2] (-2.95)	I(1)
LRPGDP	-77.78 [2] (-2.95)	I(1)
LREXP_RGDP	-4.71 [2] (-2.95)	I(1)
LRPEXP	-3.87 [1] (-2.95)	I(1)
LRGC	-3.77 [1] (-2.95)	I(1)

* All regression estimations and test results are obtained by using Eviews 3.1 econometric software.
** ADF statistics with intercept are obtained by taking Akaike Information Criterion (AIC) into account. Lagged differences are shown in brackets and significant. MacKinnon critical values at 5% level are shown in parenthesis.

Next, we employ Engle-Granger's (1987) co-integration test to determine if the variables in the system are co-integrated. The Engle-Granger procedure needs an estimation of the co-integrating regression equation. Thus, if there are *n* series, $Y_{t1} \ldots Y_{tn}$, the co-integrating regression is given by:

$$Y_{t1} = \beta_0 + \sum_{j=2}^{n} \beta_j Y_{tj} + \varepsilon_t \qquad (2)$$

Residuals from the regression 2 are tested for the presence of a unit root using the ADF test. If the residuals, e_t, from the regression are I(0), i.e. stationary, then variables are said to be co-integrated and hence interrelated with each other in the long-run.

Table 3 Engle-Granger Residual Based on Co-integration Test Results

Model	No of lag	ADF Test Statistics
Model 1: $LREXP_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$	**3**	**-0.3394**
Model 2: $LREXP_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$	**3**	**0.8000**
Model 3: $LR(EXP/GDP)_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$	**3**	**-0.3394**
Model 4: $LR(EXP/GDP)_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$	**3**	**0.4497**
Model 5: $LRPEXP_t = \beta_0 + \beta_1 LRPGDP_t + \mu_t$	**3**	**0.6904**
Model 6: $LRGC_t = \beta_0 + \beta_1 LRGDP_t + \mu_t$	**3**	**-0.1179**
Asymptotic Critical Values		
%1	**-3.90**	
%5	**-3.34**	
%10	**-3.04**	

Note: The number of lags used in ADF regressions was selected using Akaike Information Criterion (AIC). Asymptotic Critical Values (ACV) are taken from Davidson and Mackinnon (1993:722).

The Engle-Granger residuals based on co-integration test results are presented in Table 3. Results suggest that the null-hypothesis of no co-integration between various definitions of Expenditure and GDP cannot be rejected. Since the two variables are non-stationary, integrated of order one, but not co-integrated, the model cannot be estimated in levels. Instead, the variables in the first-difference form must be used for standard Granger (1969) causality test. Now, we investigate the direction of causality between Expenditure and GDP using Granger causality test.

To perform the test, we consider the systems of equations as

$$\Delta EXP_t = \lambda_1 + \sum_{i=1}^{p} \beta_{i1} \Delta EXP_{t-i} + \sum_{i=1}^{q} \alpha_{i1} \Delta GDP_{t-i} + \mu_t \quad (3)$$

$$\Delta GDP_t = \lambda_2 + \sum_{i=1}^{l} \beta_{i2} \Delta EXP_{t-i} + \sum_{i=1}^{m} \alpha_{i2} \Delta GDP_{t-i} + \varepsilon_t \quad (4)$$

Where Δ is the first-difference operator; β_{ij}*'s* and α_{ij}'s are parameters; and λ_I*'s* are constant terms. In Equation 3, the null-hypothesis (which is as H_0: $\alpha_{11} = \alpha_{21} = \ldots\ldots = \alpha_{q1} = 0$) tested against the alternative hypothesis (which is as H_1: α_{ij}'s *are jointly significant*). If we reject H_0, we would conclude that economic growth Granger causes public expenditure. Similarly, in Equation 4, the null-hypothesis (which is as H_0: $\beta_{12} = \beta_{22} = \ldots\ldots = \beta_{l2} = 0$) is tested against the alternative one (which is as H_2: β_{ij}*'s are jointly significant*). If we reject H_0, then we would conclude that growth in public expenditure leads economic growth.

In Table 4, Granger-Causality test results are presented.

Table 4: Results of Granger-Causality Tests

	Hypothesis	Lag	P-Value	Decision
Model 1	$H_0^{(1.1)}$: LRGDP does not cause LREXP	(1,1)	0.4864	Do not reject
	$H_0^{(1.2)}$: LREXP does not cause LRGDP	(3,1)	0.1697	Do not reject
Model 2	$H_0^{(2.1)}$: LRPGDP does not cause LREXP	(1,1)	0.8961	Do not reject
	$H_0^{(2.2)}$: LREXP does not cause LRPGDP	(3,3)	0.2082	Do not reject
Model 3	$H_0^{(3.1)}$: LRGDP does not cause LREXP_LRGDP	(1,4)	0.1863	Do not reject
	$H_0^{(3.2)}$: LREXP_LRGDP does not cause LRGDP	(3,3)	0.1697	Do not reject
Model 4	$H_0^{(4.1)}$: LRPGDP does not cause REXP_LRGDP	(1,4)	0.1902	Do not reject
	$H_0^{(4.2)}$: LREXP_LRGDP does not cause LRPGDP	(3,3)	0.1604	Do not reject
Model 5	$H_0^{(5.1)}$: LRPGDP does not cause LRPEXP	(1,1)	0.9167	Do not reject
	$H_0^{(5.2)}$: LRPEXP does not cause LRPGDP	(3,3)	0.1769	Do not reject
Model 6	$H_0^{(6.1)}$: LRGDP does not cause LRGC	(1,1)	0.4654	Do not reject
	$H_0^{(6.2)}$: LRGC does not cause LRGDP	(3,3)	0.2009	Do not reject

Note: P values are of F_{WALD}-statistics. Lag denotes lag numbers in equation 3 and 4.

Table 4 reports p-values, corresponding to the causality tests. To determine the lag lengths of p, q, l, and m, Akaike's (1969) and Schwartz's (1978) *Information Criterion* and Akaike's (1987) *Final Prediction Error Criterion* are used.

On the basis of the results given in Table 3 and 4, we found that there is no long-run relationship between public expenditure and there exists no causality in any direction between GDP and public expenditure. Neither economic growth leads public expenditure to growth (as opposed to Wagner's Law) nor public expenditure growth leads economy to growth (as opposed to Keynesian hypothesis). Therefore, data based on the period of 1965-2001 do not provide evidence, parallel to the earlier findings of Demirbas (1999) but not parallel to the earlier findings of Yamak & Küçükkale (1997), that the results are not the same with what Wagner's Law or Keynes hypothesis, as conversely, suggested.

5. Conclusion

In this paper, we have examined the validity of Wagner's Law for the Turkish case over the period of 1965-2000. For this purpose, recent trend in public expenditure and literature developed on Wagner's Law are firstly explored. Our subsequent impression was that recent advances in econometric techniques must be taken into account in empirical studies for some given reasons. For this purpose, stationarity properties of the data and the order of integration of the data are, firstly, empirically investigated by the Augmented-Dickey Fuller (ADF) test. Hypothesis of a long-run relationship between public expenditure and growth in community output is tested by Engle-Granger co-integration test. ADF test results show that all the variables were non-stationary in levels, but stationary in first differences

Since the variables for each regression model are integrated of I(1), we applied co-integration test to all versions of the regression models. On the basis of co-integration results of the six versions of Wagner's Law, we found no co-integration between GDP and public expenditure. It means that there is no long-run relationship between public expenditure and GDP for the Turkish case. On the basis of the Granger causality tests, we also found that neither growth in income does have any effect on government size nor does public expenditure have any effect on economic growth.

However, recent trend in Turkish public expenditure still seems as lacuna for researchers and needs to be examined by means of other developments in the literature, especially of developments on explanation of bureaucratic pressures on budget expansion, public act towards legislative and administrative measures, and financial means.

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