

# THE RELATIONSHIP BETWEEN PUBLIC SECTOR REVENUES AND EXPENDITURES IN TURKEY

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## ***ABSTRACT***

*Since the 2008 financial crisis, the topic about the relation of public revenues on the expenditures in affecting fiscal sustainability has received particular attentions by several economists. For this reason, it is necessary to investigate revenue and expenditures relationship for Turkey. In this paper, the empirical relationship between two variables has been investigated by providing econometric models. First, we employed classic and structural break unit roots. After determining the level of unit root of mentioned series, the study found evidence of a cointegration relation between the government revenues and expenditures by employing Bounds test approach. Then, ARDL method was used with the aim of examining the short and long-run coefficients of co-integration relations. According to Bounds Test results, two variable was found to be a cointegrated. The findings of the ARDL method revealed that the change in public sector revenues have significant impact on public sector expenditures. This study provided the evidence of financial sustainability of expenditures with government revenues which can be supported the concept of fiscal sustainability in Turkey.*

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***Jel Classification:*** H27,H 53, C51

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## **1. INTRODUCTION**

Public expenditure is one of the most significant and controversial issues of our time. In many industrialized countries, skyrocketing and chronic budget deficits have constantly raised the ratio of public debt to GDP. After balanced budgets and even surpluses in the late 1990s, these countries has returned to deficits in recent years. Their public debt has grown to more than twice the size of GDP. These developments raise serious concerns about public debt sustainability.

The sustainability of public debt could be explained by the Ricardian Equivalence theory. This theory points that public deficit has massive effects on current consumption of households. The tax discounts which lead to budget deficit, will not stimulate aggregate demand. Household will perceive future tax raises and feel a net wealth effect therefore they will save to pay future tax raises. As a consequence, public policy (about) decrease in taxes or expanding expenditures may no effect on employment and output in the short run (Bittante, 2013). An increase in the deficit ratio reduces investment per head and hence capital per head in the long run (Carlbreg, 2012:197). “A rational individual should be indifferent between paying \$1 in taxes today, and paying \$1 plus interest in taxes tomorrow. Since the timing of taxes does not affect an individual's lifetime budget constraint, it cannot alter his consumption decisions”(Berheim,1987:3).

Followed to Keynesian macro policies, public expenditures and debt has risen constantly after the 1970s and the rise in public debt was bigger than the GDP growth in many industrialized country. Avoiding the public debt crises, political efforts have been increased to reduce future deficits. Maastricht criteria which require the public deficit and public debt relative to GDP mustn't be more than %3 and %60 respectively was signed by the European union countries (Greiner and Fincke, 2015:1)

The main purpose of this study is to carry out the nexus between public sector revenues and expenditures in Turkey as a dynamic industry based economy. The rest of the article is organized as follows: studies which analysis the relationship between public sector revenues and expenditures are explained in the Literature review. The second part of the study discusses Autoregressive-Distributed Lag (ARDL) model and data sources used to test the relation between public expenditures and revenues in Turkey. The third section provides empirical results while the last part is reserved for our comments concerning the issue.

## **2. LITERATURE REVIEW**

The debate on the relationship between public sector revenue and spending has been investigated by several studies (Narayan, 2005, Nyamongo et al, 2007 Payne et al 2008, Ogujiuba and Abraham 2012, Dizaji,2014)

Narayan carried out evidence for cointegration and causality between public revenue and public expenditure for nine Asian countries using Bound Test approach. This suggests that in these Asian countries, expenditure decisions are made in isolation from revenue decisions. According to bound test results; there is a cointegration relationship between public expenditure and public revenue for Indonesia, Sri Lanka and Nepal indicates that public revenue and public expenditure are not moving too far apart.

Nyamongo et al, (2007) investigates the relationship between public sector revenues and expenditures in South Africa between the years 1994-2004 (monthly data). They concludes that government revenue and expenditure are cointegrated, which indicates that in the long run these variables are linked. Government expenditure and government revenue decisions are not made in isolation, the budget deficit will not be unmanageable.

Payne et al (2008) examined sustainability of Turkish budget deficit using annual data from 1968 to 2004. They employed Johansen–Juselius test of cointegration between public revenues and expenditures. According to their results; there is support for the existence

of a long-run stable relation between public revenues and expenditures in a specification which allows for an unknown structural break, the government may face difficulties in financing its future debt.

Ogujiuba and Abraham 2012 found that revenue and expenditure are highly correlated and that causality runs from revenue to expenditure in Nigeria. The VECM model also supports that there is a significant long run relationship between public revenue and expenditures suggesting that disequilibrium in expenditure can be adjusted in the long run.

Dizaji (2014) used VAR analysis and found that the strong causality was running from government revenues to government expenditures in Iranian economy. Generally, the results support the revenue–spending hypothesis for Iran.

### 3- DATA AND METHODOLOGY

In this study, the relation between public expenditures and revenues in Turkey during the years between 2004-2016 years has been evaluated using quarterly data of public expenditures and revenues. The expenditures and revenues data have been collected from statistic database of Ministry of Finance General Directorate of Budget and Fiscal Control in Turkey. Econometric analyses are covering monthly data between the years of 2004M1 and 2016 M1. The *log* transformation of public expenditures and revenues has been shortly titled LKH and LKG respectively in the following equations.

We applied ADF and PP standard tests for stationary to the variables and also investigated the stationary with structural breaks tests developed by Zivot-Andrews (1992), Ng-Perron (2001) and Lee-Strazicich (2003). Following the stationarity tests of the series, we analyzed the cointegration relationship based on Pesaran et al.(2001) bounds tests.

Autoregressive Distributed Lag Models (ARDL) and Vector Error Correction Model (VECM) methods were later used to check a co-integrated relationship between public expenditures and revenues in both the long-run and short-runs. The ARDL bound test approach has several advantages over the Johansen's cointegration method following (Habibi and Rahim, 2009: 1927): First the ARDL model its ability to detect long run relationships and solve the small sample size problem. Second the ARDL approach can be applied irrespective of whether the underlying regressors are purely first order integrated,  $I(1)$ , purely zero order integrated,  $I(0)$ , or a mixture of both. Third advantage is in ARDL, one can include dummy variable in the cointegration test process.

#### 3.1. Empirical Results

##### 3.1.1. Unit Root Tests

The stationary properties of two variables are investigated by ADF(1979), PP(1988). According to test results, two series are the stationary in their first difference. However, unit root tests with structural breaks including Zivot-Andrews (1992), Ng-Perron (2001) Lee and Strazicich (2003) tests suggest LKH is stationary in its first difference and LKG is the stationary is integrated of order  $I(0)$ <sup>1</sup>.

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<sup>1</sup> Tables of estimated and standard critical values of unit roots has not been presented in this article in order to save space. The tables could be taken from authors.

### 3.1.2. Bound Test Co-Integration Approach

After illustrating stationary properties of all time series, we employ Bounds Test approach (Pesaran et al.,2001) to determine the cointegration relationship among variables. The Unrestricted Error Correction model (UECM) should be constructed to perform Bound Test approach due to the cointegration relationship.

UECM specification used in this study is shown in following equation.

$$\Delta(LKH)_t = \beta_0 + \beta_1(LKH)_{t-1} + \beta_2(LKG)_{t-1} + \sum_{i=1}^p \beta_3\Delta(LKH)_{t-i} + \beta_4\Delta(LKG)_{t-i} + u \quad (I)$$

where,  $\Delta LKH$  refers to the monthly percent change for the public expenditures,  $\Delta LKG$  is monthly percent change for public revenues. In the equation 1, “p” refers to the number of lags and  $u^t$  refers to the error term of a time series.

We will test the null hypothesis of for our study and cointegration relation will be compared with calculated F statistics and tabulated F statistics values in Pesaran et al. (2001). If the computed F-statistic falls outside the critical bounds, a conclusive decision can be made regarding co-integration without knowing the order of integration of the regression (Narayan and Narayan, 2004:103).

**Table 1. Bound Test Results**

K	F Statistics	Critical Value at %5 Significance Level	
		Buttom	Upper
1	54.94	4.94	5.73

k : the number of independent variable in the UECM equation 1. Critical values of buttom and upper levels are taken from the table’s values at Pesaranet. al. (2001:300)

According to Table 1.1., estimated F statistics is higher than the upper bound of the critical values and so the null hypothesis of no co-integration is rejected. As a result, we found a significant long run cointegration relationship in the variables of UECM equation by employing Bound Test.

### 3.2. ARDL Model

Since Bound test supported the evidence of a long-run equilibrium among variables, we can employ ARDL model to determine the long and short run static relationship. ARDL model specification for our study is presented in equation 2.

$$\Delta(LKH)_t = \beta_0 + \beta_1(LKH)_{t-1} + \beta_2(LKG)_{t-1} + ut \quad (2)$$

In order to determine the optimal lag length in equation 2, maximum lag number of 8 is taken and ARDL (4,1) model is selected using the Schwarz information criterion. The coefficients of long ARDL regression model are shown in Table 2. According to diagnostic checks, the model has no serial correlation, heteroscedasticity and misspecification problems.

**Table 2. ARDL (4,1) Model Long and Short Term Parameter Estimations**

Estimated Long Term Coefficient Using ARDL (4,1)		
Variable	Coefficient	T statistics
LKR	0.91	21.56*
C	2.58	2.14
Error Correction Coefficient for the ARDL (4,1)		
Variable	Coefficient	T statistics
ECT(1)	<b>-0.86</b>	-10.48*
Diagnostic Check		
$X^2_{\text{NORM}}$	0.38/0.97	
$X^2_{\text{WHITE}}$	1,82/0.10	
$X^2_{\text{RAMSEY}}$	0.17/0.67	

\*denotes %1 significance level, \*\* denotes %5 significance level and  $X^2_{\text{NORM}}$ ,  $X^2_{\text{WHITE}}$ ,  $X^2_{\text{RAMSEY}}$  refer to autocorrelation, normality and Regression Equation Specification Error respectively .

According to results obtained from ARDL (4,1) model, computed t-statistics for the independent variable are all statistically insignificant except in the short-run.

According to the (4,1) model coefficients of public revenue are positive as expected in theory. Both of the variables are significant. Moreover, diagnostic test results show that the model has no autocorrelation and normality problem. According to the model results, again, heteroskedasticity problem is not been also observed. Results in regressions indicate it is statistically robust to estimate these models to get conclusions about the relationship between public expenditures and revenues.

The evidence indicates an evidence of the sustainability in fiscal policy in the long-run. Correlation between the error terms of the equilibrium relationship implies that nearly 0.8% (ECM coefficient = 0.86) of disequilibrium of the previous year's shock can be eliminated in the following year.

## CONCLUSIONS

In this paper we consider an important topic the nexus between public expenditure and public revenue for the Turkish economy using 2004-2016 monthly data. Avoiding the public debt crises, political efforts are increased to balance between public sector expenditures and revenues. Our study found evidence of a cointegration relation between the government revenues and expenditures by employing Bounds test approach. ARDL method was used with the aim of examining the short and long-run coefficients of co-integration relations. According to Bounds Test results, public sector revenues and expenditures were found to be a cointegrated. The findings of the ARDL method revealed that the change in public sector revenues have significant impact on public sector expenditures in the short and long period. This study provided the evidence of financial sustainability of expenditures with government revenues which can be supported the concept of fiscal sustainability in Turkey. Therefore, it is recommended that the government should improve the revenue and find new alternatives of finance to induce public expenditures.

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