



## SUSTAINABILITY OF FISCAL POLICY: AN EMPIRICAL EXAMINATION FOR TURKISH ECONOMY

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### ABSTRACT

Our paper aims to examine the sustainability of Turkish fiscal stance over the period 2006:1-2013:3. The long-run relationship between the tax revenues and the government expenditures are analyzed with regard to the framework of Hakkio and Rush (1991) by employing the bounds testing methodology of Pesaran, Shin and Smith (2001) which test the cointegration in terms of whether the series are  $I(0)$ ,  $I(1)$  or mutually cointegrated. To investigate the degree of fiscal sustainability, we estimate a long-run ARDL model. We find evidence of weak sustainability condition since the empirical results reveal the existence of cointegration relation though the long-run coefficient is found to be smaller than one.

## 1. INTRODUCTION

In the last decades, the persistence of rising budget deficits have aroused interest on the sustainability of the fiscal balance for Turkish economy. Although the sustainability phenomenon has been widely discussed (Özatay 1997; Akçay et al. 2001; Kalyoncu 2005; Kuştepelı and Önel 2005), particularly in the aftermath of 2001 financial crisis, a few recent studies (Kia 2008; Payne et al. 2008; Budina and Wijnbergen 2009) focused on the issue. In this context, we aim to examine the long-run sustainability of fiscal stance by using the framework of Hakkio and Rush (2001). The empirical part of our study stresses on two points which are the analysis of cointegration relationship between the tax revenues and government expenditures and the determination of long-run coefficients. For those purposes, after the implementation of bounds testing procedure of Pesaran et al. (2001) to examine the cointegration, we estimate the ARDL long-run model to analyze the degree of sustainability.

The remainder of the paper is organized as follows. In Section 2 we discuss the theoretical background of the sustainability discussion. In Section 3 we discuss data, methodology and empirical results. We give the concluding remarks in Section 4.

## 2. THEORETICAL FRAMEWORK

Following the similar analytical frameworks of Hamilton and Flavin (1986), Wilcox (1987) and Kremers (1989); Hakkio and Rush (1991) developed a new approach to analyze the budget deficit sustainability through the intertemporal budget constraints. This approach of Hakkio and Rush (1991) arises from the government's one-period budget constraint,

$$G_t + (1 + i_t)B_{t-1} = R_t + B_t \quad (1)$$

where  $B_t$ ,  $G_t$ ,  $R_t$  and  $i_t$  present the government debt, government expenditures excluding interest payments, government revenues and the interest rate, respectively. Solving forward the equation (1) for  $t+1$ ,  $t+2$ ,... periods, the intertemporal budget constraint of government is derived as follows:

$$B_0 = \sum_{t=1}^{\infty} r_t (R_t - G_t) + \lim_{n \rightarrow \infty} r_n b_n \quad (2)$$

where the discount factor  $r_t = \prod_{s=1}^t \sigma_s$  and  $\sigma_s = (1 + i_s)^{-1}$ . Equation (2) implies that for the intertemporal budget solvency to be hold, the limit should equal to zero. More briefly, outstanding stocks of bonds should equal to the present value of the government budget surplus. Otherwise, Ponzi scheme in which government finances debt by debting would probably arise with regard to the model.

Rearranging the regarding equations through some assumptions, the model is reduced to be as:

$$R_t = \alpha_0 + \alpha_1 GR_t + u_t \quad (3)$$

where  $GR_t$  implies the government expenditures including the interest payments on public debt. The cointegration relation between the government expenditures and revenues is interpreted in support of fiscal sustainability. In addition to the existence of a long-run relationship, if  $\alpha_1 = 1$  then it leads to strong sustainability while weak sustainability emerges if  $0 < \alpha_1 < 1$ . Thus, the estimation of long-run coefficients carries a vital importance to determine the degree of sustainability.

### 3. METHODOLOGY AND EMPIRICAL RESULTS

We utilize monthly data over the period 2006:1-2013:3 to analyze the fiscal stance of Turkish economy. The data which is seasonally adjusted by Census X12 methodology is obtained from CBRT Electronic Data Distribution System. As the first step of the ARDL methodology, we employ bounds testing procedure for cointegration of Pesaran et al. (2001) which provides the opportunity to examine the long-run relationship irrespective of the integration order of the series. To test the cointegration relation for equation (3), we estimate the conditional error correction form of the ARDL model,

$$\Delta REV_t = \alpha_0 + \alpha_1 t + \beta_1 REV_{t-1} + \beta_2 GOV_{t-1} + \sum_{i=1}^p \delta_i \Delta REV_{t-i} + \sum_{i=1}^p \phi_i \Delta GOV_{t-i} + u_t \quad (4)$$

where REV and GOV represent tax revenues and government expenditures including interest payments as a percentage of GDP. Case IV (unrestricted intercept and restricted trend case) and V (unrestricted intercept and unrestricted trend case) which are defined by Pesaran et al. (2001) are based on the testing of null hypotheses  $H_0: \alpha_1 = \beta_1 = \beta_2$  and  $H_0: \beta_1 = \beta_2$ , respectively. On the other hand, Case III (unrestricted intercept and no trend case) relies on the test of the joint significance of the lagged variables for the model in which the deterministic trend is excluded. In addition to the F-tests, the long-run relationship can also be examined by means of the t-test of Banerjee et al. (1998) which tests the null  $H_0: \beta_1 = 0$ , in the models with and without trend. Since the asymptotic distributions of both statistics are non-standard, the F- and t-statistics are compared to lower and upper asymptotic critical values which correspond to I(0) and I(1) regressors, respectively. As a consequence of the cointegration testing procedure, three alternative results could be obtained that are;

- i) F- or t-statistic > upper bound (cointegration)
- ii) F- or t- statistic < lower bound (no cointegration)
- iii) lower bound < F- or t- statistic < upper bound (inconclusiveness of the inference )

Our empirical results regarding the bounds testing are presented in Table 1. The appropriate lag lengths are selected by means of Schwarz Bayesian Criteria (SBC) and Lagrange Multiplier Statistics for autocorrelation. As a consequence, both models with and without trend are estimated with 2 lags as in equation (4). Finally, we compare the F- and t-tests reported in Table 1 to the lower and upper critical bounds and find evidence of long-run relationship between tax revenues and government expenditures with regard to Case V at %5 significance level.

**Table 1: Cointegration Results**

	P	F <sub>IV</sub>		F <sub>V</sub>		t <sub>V</sub>		F <sub>III</sub>		t <sub>III</sub>	
<b>REV-GOV</b>	2,2	4.974495		7.310706		-3.797040		3.354538		-2.531771	
<b>Critical values</b>		<b>I(0)</b>	<b>I(1)</b>	<b>I(0)</b>	<b>I(1)</b>	<b>I(0)</b>	<b>I(1)</b>	<b>I(0)</b>	<b>I(1)</b>	<b>I(0)</b>	<b>I(1)</b>
<b>%1</b>		9.15	10.09	8.74	9.63	-3.96	-4.26	6.84	7.84	-3.42	-3.82
<b>%5</b>		7.02	7.73	6.56	7.30	-3.41	-3.69	4.94	5.73	-2.86	-3.22
<b>%10</b>		6.07	6.74	5.59	6.26	-3.13	-3.40	4.04	4.78	-2.57	-2.91

**Notes:** p values indicate the appropriate lag lengths for the models with and without trend, respectively which is selected by SBC and LM autocorrelation tests. I(0) and I(1) show the lower and upper bound critical values.

Although the evidence of cointegration between the variables in question could be evaluated in support of fiscal sustainability, we also estimate long-run ARDL model to intensify this finding with regard to the coefficient conditions. Thus, we next estimate the long-run coefficients derived from the ARDL(1,1) model which provides the minimum SBC value. The long-run coefficients are shown in Table 2.

**Table 2: Long-run ARDL Model**

<b>Estimated long-run coefficients from ARDL (1,1)</b>			
<b>Dependent variable: REV</b>			
<b>Regressor</b>	<b>Coefficient</b>	<b>Standard error</b>	<b>t-stat (prob)</b>
GOV	0.10605	0.046909	-2.2608 (0.027)
intercept	0.0019659	0.1142E-3	17.2164 (0.00)
trend	0.3596 E-5	0.5883 E-6	6.1122 (0.00)

According to the results in Table 2, all coefficients are found to be statistically significant. Moreover, although we find evidence of long-run relationship, the low and negative value of the government expenditure coefficient smaller than 1 could be an indicator of weak sustainability of the fiscal deficits for Turkish economy. More briefly, the tax expenditures could fail to finance the rising government expenditures.

#### **4. CONCLUSION**

Turkish economy has experienced macroeconomic instabilities and several crises as a consequence of fiscal deficits since 1960s. Thus, the analysis of the sustainability of fiscal balance has a vital importance to shape the economic policies. Within this objective, we examine the sustainability of budget deficits by utilizing the intertemporal budget solvency framework of Hakkio and Rush (1991) for the recent period of Turkish economy. The long-run relationship between the government revenue and expenditures are analyzed by means of bounds testing methodology. The empirical results assert the existence of cointegration relation which supports the fiscal sustainability.

However, we find that  $\alpha_1$  coefficient is smaller than 1 through to the estimation of long-run ARDL model implying the weak sustainability. Thus, the appropriate macroeconomic policies should be implemented to eliminate the risk of government in financing the future debt.

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