

## A Fiscal Space Analysis In Terms Of Turkey's Domestic Debt<sup>1</sup>

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### Türkiye'nin İç Borcu Açısından Mali Alan Analizi<sup>2</sup>

#### Abstract

Restrictions on the use of fiscal policies due to high levels of public debt have affected the fiscal spaces of many countries. In consequence, these countries had to adopt structural economic reforms to create a fiscal space. Fiscal policies adopted in the 2000s has created different results in Turkey than they did in other developing countries. These policies subsequently yielded huge reductions in budget deficits, public debt ratios and interest payments, which have enabled Turkey to create the fiscal space needed. Within this framework, after providing a definition for fiscal space, we calculated Turkish fiscal space for the period between 2000:Q1-2015:Q4. Our estimates suggest that although there is ample fiscal space for Turkey to use fiscal policies, increasing public debt might restrain using such policies and cause fiscal fatigue.

**Keywords** : Fiscal Space, Fiscal Fatigue, Fiscal Reaction Function, Debt Limit, Turkey.

**JEL Classification Codes** : E60, E62, H60, H63.

#### Öz

Kriz sonrası maliye politikalarının kullanımını sınırlayan yüksek kamu borçları birçok ülkenin mali alanını etkilemiştir. Sonuçta, bu ülkeler mali alan yaratmak için yapısal ekonomik reformları benimsemek zorunda kalmışlardır. 2000'li yıllarda benimsenen maliye politikası Türkiye'de farklı sonuçlar yaratmıştır. Bu politikaların esas sonuçları, bütçe açıkları, kamu borçları ve faiz ödemelerindeki muazzam düşüşlerdir. Böylece Türkiye mali alan yaratmıştır. Bu çalışma çerçevesinde, ilk olarak mali alan tanımlanmıştır. Daha sonrasında 2000:Ç1-2015:Ç4 arası dönemde Türkiye için mali alan hesaplanmıştır. Tahminler maliye politikalarının kullanımı için yeterli mali alan olmasına rağmen, kamu borçlarının artışının böylesi politikaların kullanımını sınırlayabileceğini ve mali yorgunluğa sebep olabileceğini göstermektedir.

**Anahtar Sözcükler** : Mali Alan, Mali Yorgunluk, Mali Tepki Fonksiyonu, Borç Limiti, Türkiye.

<sup>1</sup> This study bases on the unpublished master thesis of Suleyman Kasal which is titled "Fiscal Space and Fiscal Rule" and supervised by Ozay Ozpence in Pamukkale University Social Sciences Institute on 07/04/2017.

<sup>2</sup> Bu çalışma Süleyman Kasal'ın 07/04/2017 tarihinde Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü'nde Özay Özpence Danışmanlığında sunulan "Mali Alan ve Mali Kural" başlıklı yayımlanmamış yüksek lisans tezine dayanarak hazırlanmıştır.

## 1. Introduction

Low primary balance with the high public debt both in developed and developing countries after the 2008 global crisis have prevented the effective use of fiscal policies and caused questioning of the policies that these countries have implemented in the past. Countries fall into fiscal fatigue because of the increases in public debt and they became unable to react to high debt level. These countries have limited fiscal space and policies because of the high public liabilities they have after the 2008 global crisis. Therefore, these countries have begun to seek various ways to expand their fiscal space. Fiscal space is defined as availability of budgetary room that allows a government to provide resources without giving harm to the government's financial capacity. To put it differently, it is the difference between the current public debt of countries and the public debt limit set as a result of policies that the countries have implemented in the past. A debt limit occurs at the point where countries fall into fiscal fatigue. Debt limit is significantly affected both by the policies in the past and present.

Today, the countries with high public debt are searching for the causes of these past debts. This view supports the view above. Moreover, today the countries (Such as Greece, Spain, and Portugal) with higher public debt than others because of policies they have not implemented in the past have encountered fiscal adjustment policies.

Today these countries with high public debt have undertaken great responsibilities. This is another issue to discuss. Turkey has implemented strong reforms and policies by the Transition to a Strong Economy Programme (TSEP)<sup>3</sup> in 2001; by implementing the 6.5% primary balance rule and the similar fiscal rules<sup>4</sup> between 2002:Q1-2007:Q4<sup>5</sup>. This programme was successful in reducing the public debt and interest burden and creating the

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<sup>3</sup> *After the desperate and consecutive fluctuation and crises that Turkey has experienced in 1990s, the need for a strong reform had become inevitable. For this reason, Turkey decided to cooperate with IMF in 1999 and implement important economic programs. In this context, Turkey signed three stand-by agreements: 17th Stand-by agreement (1999-2002), 18th Stand-by agreement (2002-2005), and 19th Stand-by agreement (2005-2008). This period is as one may expect called the stand-by period in which fiscal consolidation policies, all types of fiscal rules were implemented in the framework of fiscal consolidation policies. Primary balance rule was the most important fiscal rule among them (Kaya & Yilar, 2011: 64-65).*

<sup>4</sup> *Following the February 2001 crisis, Turkey made significant legislative and regulatory adjustments to fix the severely damaged public fiscal structure. The first of these was the Public Financial Management and Control Law No. 5018 (PFMCL) which regulated the budget and public expenditures, and the Public Finance and Debt Management Law No. 4749 which aimed to create effective public debt management. Prior to these arrangements, an amendment was made in 2001 to the Central Bank of the Republic of Turkey (CBRT) in order to provide discipline in public fiscal management and to achieve an effective structure. This amendment terminated the Treasury's ability to receive short-term advances from the CBRT. Thus, inflationary pressures that might happen through monetary expansion was prevented.*

<sup>5</sup> *The main goal of this program, TPSE, was firstly to get out of the crisis and then solve the structural problems that created the instability. Strengthening the public financing balance was important and all the regulations must be within the framework of efficiency, flexibility, and transparency (Atac, 2013: 281-282).*

fiscal space. Thus, this programme not only help economic revival during 2002-2007 but also help to manage the impact of the 2008 global crisis.

The main objective of this study is estimate to the fiscal space for Turkey in the period between 2000:Q1-2015:Q4 and to examine whether Turkey has fiscal fatigue or not. Therefore, first, we will examine the concepts of fiscal space and primary balance, and the importance and the relationship between these concepts. After that, we estimate how the primary balance responds to the increasing debt whether there is fiscal fatigue in Turkey. In the next chapter, the fiscal space of Turkey for the period 2000:Q1-2015:Q4 is calculated. Conclusion section is an important finding in the understanding of the primary balance and fiscal space.

## 2. Definition of Fiscal Space

The fiscal space in the context of fiscal sustainability problems and budget constraints, which the countries have faced following the 2008 crisis, has been described as the difference between the current debt level of the public and the debt limit imposed by the policies historically applied by the politicians<sup>6</sup> (Ostry et al., 2010: 6; Ghosh et al., 2013a: 4).

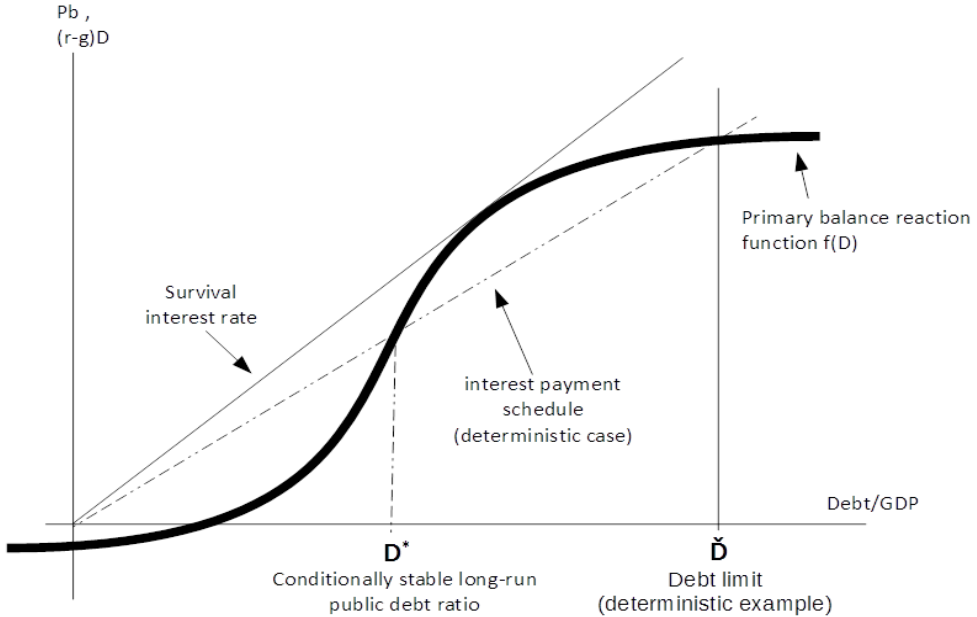
The fiscal space emerges from fiscal reaction function,  $pb_t=f(d_{t-1})$ , which is a cubic function. Therefore, there is a negative relation between the primary balance<sup>7</sup> and the public debt in low debt levels at first, but as the debt increases, the governments become more responsive, and this relationship gives positive returns; after a debt point where fiscal fatigue may be happening, the primary balance fails to respond to increasing public debt. (Ghosh et al., 2013b: 138). Figure 1 shows this case.

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<sup>6</sup> Apart from this definition, the fiscal space; has also been defined as the difference between the current government spending level and the maximum government spending level (Development Committee, 2006: 14), the years of tax collection required to pay public debt (Aizenman & Jinjark, 2010: 1) and the current tax revenue and maximum tax revenue (Laffer Curve's peak point) (Park, 2012: 3).

<sup>7</sup> The primary balance is a very important indicator in assessing the sustainability of budget deficits and in terms of determining whether the net debt of the public sector improved or worsened more. Therefore, although the budget deficits are sustainably manageable, a primary balance should be achieved at least to pay the interest of the debt. Also, the primary balance (deficit) could reflect the success of policies in moving the economy towards a sustainable growth path (Blejer & Cheasty, 1991: 1655). For this reason, it may be said that the primary balance is one of the most significant means in terms of increasing the fiscal room for maneuver of countries and thus gives options for a better setting of fiscal policies.

**Figure: 1**  
**Determination of Debt Limit in a Deterministic Case**



Source: Ostry et al., 2010: 8; Ghosh et al., 2013a: 11; Ghosh et al., 2013b: 138.

In Figure 1, the vertical axis indicates the primary balance/GDP ratio and the interest-growth rate difference,  $(r-g)D$ , while the horizontal axis shows the public debt/GDP ratio. The broken line represents the interest payment schedule, the solid line represents the survival interest rate<sup>8</sup> curve, and the black curve represents the nonlinear fiscal reaction function. The point  $D^*$  where the two curves intersect for the first time represents the long-run public debt ratio and point  $\tilde{D}$  represents the public debt limit. The area between  $D^*$  and  $\tilde{D}$  points means that the governments can still make high interest payments with a high primary balance. However, beyond the  $\tilde{D}$  point, this situation cannot be sustained. For this reason, the area between  $D^*$  and  $\tilde{D}$  points represents the fiscal space while beyond point  $\tilde{D}$  represents a fiscal gap (Bastos & Pineda, 2013: 8).

The debt limit and hence the fiscal space of a country is also affected by the economic growth rate and the interest rate paid on public debt. When the interest rate paid for the

<sup>8</sup> The survival interest rate is the highest nominal long-term sovereign interest rate a country can survive without getting trapped in a vicious cycle in which its rising interest payments outstrip its ability to service its debt, ultimately resulting in a default without extraordinary fiscal policy action. (Zandi et al., 7: 2011).

public debt increases, the cost of paying for the liabilities will entail collection of higher taxes and cause harm to the economic incentives and may weaken economic growth. Persistence of large budget deficits may reduce the room that governments have to increase spending when there is an economic downturn or a threat to national security (Feldstein, 2016). In contrast, the countries with strong growth rates and very low interest rates on public debt have high debt limits and therefore have ample fiscal space (Zandi et al., 2011: 2). For this reason, in the calculation of a country's debt limit and fiscal space, the interest-growth rate difference is of great importance.

### 3. Literature Review

The first estimate of fiscal space calculated by Bohn (1998). In the study Bohn (1998) has used United States data for the period 1916-1984, he tried to measure governments respond to the public debt. He examined whether the governments had taken accurate measures for the debt. In this study, he developed a cubic model and attempted to determine the response of the primary balance to the debt-GDP ratio. He finds significant evidence that historically, the US government had responded to increasing public debt by increasing the primary balance. He stated that the link between primary balance and the debt-GDP ratio was significant in terms of the sustainability of the fiscal policy.

Mendoza and Ostry (2007) looks at fiscal solvency and public debt sustainability over the period 1990-2005 with the panel data method The paper debates this issue for a large panel of 34 emerging market and 21 industrial countries. The main finding is that the conditional response of primary fiscal balances to changes in government debt be positive and found that the fiscal policies which the countries implemented were "responsible" in response to increased public debt.

As Aizenman and Jinjark (2010) calculated fiscal space and they defined the fiscal space as the number of years of tax revenues that are necessary to repay a country's debt. In this study, they measure the outstanding public debt relative to the de facto tax base for 75 countries during the periods of 2000-2006 and 2009-2010 and concluded that countries with greater de facto fiscal space prior to the global crisis have higher fiscal stimulus in the 2009-2010 period.

Hajnovic et al. (2012) using data 1995-2008, estimated the fiscal reaction functions and the critical debt levels of EU governments with assuming that the primary balance reaction is a fourth degree polynomial. As a reason for them to estimate the fourth-degree polynomial reaction function, the authors suggested that the rise in the public debt rate would be even greater in its later stages and might resemble a higher-order polynomial. They outlined the diversity in the availability of fiscal space with the euro zone and attempted to estimate the critical debt levels which differ across countries. In addition, Hajrovic et al. (2012) found that institutional reforms play an important role in moving countries away from "critical debt levels".

Park (2012) defines the fiscal space as revenue generating capacity which is the difference between the current tax revenue level of a country and the maximum tax revenue it could collect (the peak of the Laffer Curve). In moving away from this definition, he has attempted to calculate how the aging population of the USA, Germany, Italy, France, Canada, and Japan affected the fiscal spaces of these countries in the period between 1995 and 2009. And as a result, he concluded that the US has larger fiscal space in capital taxation than other countries, and Germany's fiscal space is tight although Germany's current effective capital tax rate is relatively low. In addition, he concluded that Canada, Japan, and the United States had more fiscal space than France, Germany, and Italy because of the impact of the aging of population on tax revenue.

Ghosh et al. (2013a) using the panel data for 23 advanced economies over the period 1970-2007, and they sought an answer to the question of how high public debt can rise without compromising fiscal solvency. They find evidence of a fiscal reaction function and use it to compute fiscal space. They find strong support for the existence of a third degree non-linear reduced form relationship between the primary balance and (lagged) public debt that exhibits the fiscal fatigue characteristics of the 23 advanced economies. According to this, they stated that the countries have demonstrated a positive response to their rising public debt ratios through the primary balance, in fact based on the estimated coefficients, the marginal response of the primary balance to lagged debt starts to decline at debt levels of around 90-100% of GDP becoming negative as the debt ratio approaches about 150% of and that these countries have fallen into fiscal fatigue. In addition, they stated from a policy perspective that the debt limits they estimated for these countries were the significant in recognizing the need for fiscal consolidation.

Ghosh et al. (2013b) examine how currency union membership affects sovereign risk pricing for Eurozone countries given their fiscal space. They argue that currency union membership has offsetting effects on debt sustainability. Finally, they reach the conclusion that pre-crisis CDS and bond rates were below on the contrary post-crisis CDS and bond rates were above those implied by Eurozone members fiscal space. To put it shortly, in the pre-crisis periods Eurozone countries kept the rates of CDS and the bond interest for a given fiscal space at a lower level than that predicted. However, when the in the post-crisis period, CDS and bond interest rates of Eurozone countries rose more sharply than the estimations depending on the current fiscal spaces of the countries.

The first study examining the interaction of fiscal space and the fiscal rules was Nerlich and Reuter (2015). In the paper they analyze 27 EU countries over the period 1990-2014. Their analyse show that countries with more fiscal space tend to have higher discretionary expenditures but this could reduce by fiscal rules. Fiscal rules would cause a decline in budget deficits and debt levels by backing up fiscal discipline. Fiscal rules will help fiscal space to grow, leading to increased investor confidence in public finance.

In this study mostly method of Ghosh et al. (2013a) will be followed. Firstly, we will calculate fiscal space for Turkey and then will try to evaluate whether the fiscal rule applied

by the country had an affect on fiscal space. In addition, we try to reach the conclusion that fiscal rule creates the fiscal space.

#### 4. Methodology

Although many different methods use in the literature to calculate fiscal space, as stated in the previous section, in this paper we follow the approach used in Ghosh et al. (2013a) and Nerlich and Reuter (2015). Firstly, we will clarify Ghosh et al. (2013a) method and afterwards we will evaluate the analysis used for Turkey in the following section.

Ghosh et al. (2013a) used a standard budget constraint to estimate to calculate debt limit and to measure the fiscal space for each country. A standard budget constraint is expressed as follows:

$$\Delta D_t = (r_t - g_t)D_{t-1} - PB_t \quad (1)$$

Where  $\Delta D_t$  is the ratio of the government debt/GDP rate,  $PB_t$  (primary balance) is the primary balance/GDP rate,  $r$  is the real interest rate on debt, and  $g$  is the real growth rate.

Later Ghosh et al. (2013a) began their analysis by predicting how the primary balance would react to debt. According to this, governments would not react in the first stage of rise in the government debt, but they would respond at further increasing stages of debt by increasing the primary balance ratio. Ghosh et al. (2013a) asserts that if the primary balance exhibits 'fiscal fatigue' such that it does not keep pace with higher interest payments as debt rises, then there will be a debt level above which the debt dynamics become explosive and the government will necessarily default. For this reason, there would be a debt limit for governments. Thus, Ghosh et al. (2013a) approximated by a cubic fiscal reaction function under the assumption that governments would exhibit the fiscal fatigue behavior. This fiscal reaction function follows that:

$$PB_{i,t} = \phi_{i,t} + f(D_{i,t}) + v_i + \varepsilon_{i,t} \quad (2)$$

Where  $PB_{i,t}$  indicates the primary balance/GDP rate of country  $i$  at time  $t$ .  $\phi$  includes other variables that may affect the primary balance/GDP rate other than the lagged values of debt. These variables might be; output gap, government expenditure gap, the openness of a country to international trade, inflation, oil prices, age dependency ratio, future age dependency, political stability, IMF regulations, and fiscal rules.  $v_i$  indicates the country fixed effect. Moreover, the function  $f(D_{i,t})$  is a cubic polynomial function containing the lagged values of debt and is usually written as;

$$f(D_{i,t}) = \beta_1 D_{i,t-1} + \beta_2 D_{i,t-1}^2 + \beta_3 D_{i,t-1}^3 \quad (3)$$

Whereas the debt limit is the maximum debt level at which governments can fulfill their obligations, and the existence of the turning point of the following equation is required to be found because of the presence of a cubic polynomial function:

$$\phi_{i,t} + f(\tilde{D}) = (r_{i,t} - g_{i,t})\tilde{D}_{i,t} \quad (4)$$

Where  $f(\tilde{D})$  function is,

$$f(\tilde{D}) = \beta_1\tilde{D}_{i,t} + \beta_2\tilde{D}_{i,t}^2 + \beta_3\tilde{D}_{i,t}^3 + \lambda \quad (5)$$

Where  $\beta$  coefficients are the coefficients estimated from equation (3) to estimate the debt limit, is calculated from equation (2) and shows the fixed effects of countries. So Ghosh et al. (2013a) first estimated the fiscal reaction function in their study and then calculated an appropriate interest-growth rate difference,  $(r_{i,t} - g_{i,t})\tilde{D}_{i,t}$  later, they calculated the fiscal space for a country by predicting the debt limit.

## 5. Model and Analysis

### 5.1. Model

Our theoretical framework motivated by Ghosh et al. (2013a). This paper estimates fiscal reaction function and the government Internal Debt Stock<sup>9</sup>/GDP limit for Turkey over the period 2000:Q1-2015:Q4 using Ordinary Least Squares (OLS). Turkish economies priority over the period 2002-2007 was a fiscal austerity that targeted 6.5% surplus (primary balance/GDP). This paper will evaluate the impacts of this fiscal rule motivated by Ghosh et al. (2013a) with time series analysis as follows:

$$PB_t = \beta_1 D_{t-1} + \beta_2 D_{t-1}^2 + \beta_3 D_{t-1}^3 + \beta_4 OG_{t-1} + \beta_5 EG_{t-1} + \beta_6 INF_t + FR_t \mathfrak{D}_t + \varepsilon_t \quad (6)$$

where primary balance  $PB_t$  represents a dependent variable. Other variables are  $D_{t-1}$  and  $D_{t-1}^2$ ,  $D_{t-1}^3$  representing lagged debt, lagged debt square, and lagged debt cubic variables respectively.  $OG_{t-1}$  denotes the lagged output gap,  $EG_{t-1}$  the government lagged expenditure gap, and  $INF_t$  the inflation variable. In addition, the  $FR_t \mathfrak{D}_t$  variable is the dummy

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<sup>9</sup> First of all, it is necessary to explain why the ratio of internal debt stock-GDP was used in this study. When the public sector in Turkey is examined historically, the public sector was financed by choosing the internal borrowing option and did not use the option of foreign borrowing very much. However, foreign borrowing in Turkey became an option that was resorted to by the private sector after 2002. In another respect, the public sector in Turkey has employed the internal borrowing option as a policy tool and is continuing to do so. Nevertheless, when looked from another aspect, the internal borrowing option in Turkey is a more important option than the foreign borrowing option in creating the fiscal space. Moreover, the internal debts are more controllable and manageable than external debts.



variable representing the 6.5% primary balance rule applied to the period between 2002:Q1-2007:Q4. According to this, the dummy variable  $\mathbb{D}_t$  is contained in the model as follows:

$$\mathbb{D}_t = \begin{cases} 1 & \text{if a rule exists,} \\ 0 & \text{if a rule does not exist} \end{cases} \quad (7)$$

In the model, the lagged values of the output gap and expenditure gap series are included. The main reason for this is the assumption that governments can intervene with the primary balance at least one period later.

Moreover, following the estimation of the fiscal reaction function, the interest-growth rate difference,  $(r_t - g_t)$ , will be used to calculate the debt limit. Data of the interest rate, are taken from the public sector internal borrowings' compound interest rate which were adjusted to the inflation. In fact, this interest rate is paid for debt and reflects the market perception in the public sector<sup>10</sup>.

The average of Turkey's real growth rates during the 2000:Q1-2015:Q4 period was taken as the growth rate. The interest-growth rate difference that is calculated for the period between 2000:Q1-2015:Q4 is -3.36%. After measuring this rate, a debt limit for Turkey was estimated by finding the largest root of the following equation with  $\beta_1, \beta_2, \beta_3$  coefficients, which are estimated from equation (6):

$$(r_t - g_t)\check{D}_t = \beta_1\check{D}_t + \beta_2\check{D}_t^2 + \beta_3\check{D}_t^3 \quad (8)$$

where  $\check{D}$  represents the debt limit during the 2000: Q1-2015: Q4 period that will be calculated. Contrary to Ghosh, et al. (2013a)  $\lambda$ , which reflects the country fixed effects, is not used in this equation because of it is not panel data. Upon estimation of the debt limit, the fiscal space  $FS_t$  that is defined as the difference between the debt limit and the actual level of debt,  $D_t$ , will finally be calculated as follows:

$$FS_t = (\check{D}_t - D_t) \quad (9)$$

## 5.2. Data and Variables

All the data and variables that we use in the model are shown in Table 1.

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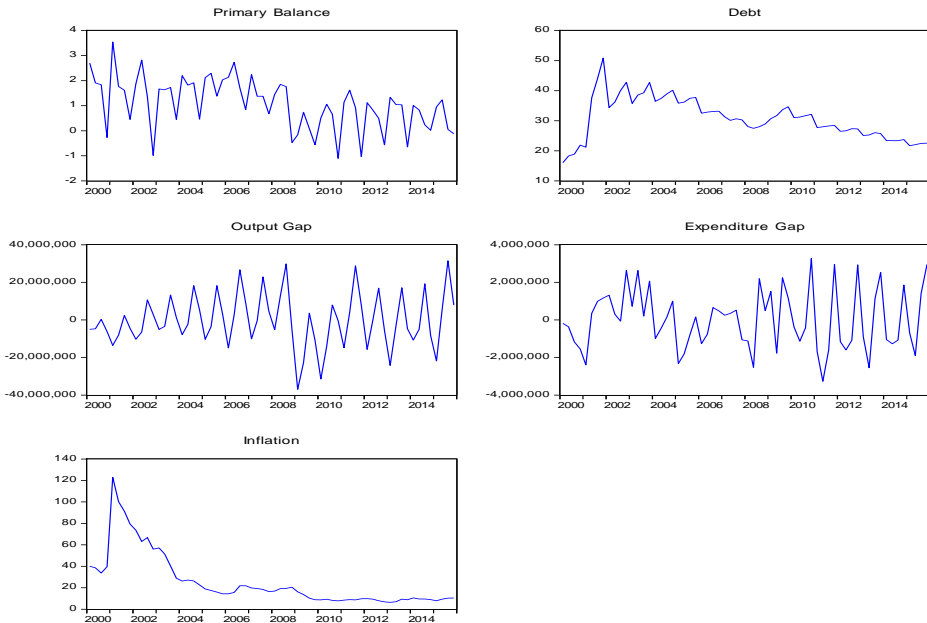
<sup>10</sup> Ghosh et al. (2013a), Ghosh et al. (2013) have used two approaches to estimate the interest rate on the public debt. One among these is the interest rate estimated by the market approach and the other one is the risk premium inherently acquired from the stochastically estimated model. The average of inflation-adjusted real interest rates that was paid from the government during the period 2000:Q1-2015:Q4 was taken for this study.

**Table: 1**  
**Data**

Variable	Symbol	Explanation	Source
Primary balance <sup>11</sup>	PB	Primary balance/GDP (%)	Ministry of Finance General Directorate of Public Accounts
Internal Debt Stock	D	Internal debt stock/GDP (%)	Central Bank of Republic of Turkey (CBRT)-Electronic Data Delivery System (EDDS)
Output gap	OG	Difference between potential GDP and real GDP. Calculated with Hodrick-Prescott (HP) filter.	CBRT-EDDS
Government expenditure gap	EG	Difference between potential expenditure and realized public expenditure. Calculated with HP filter.	CBRT-EDDS
Inflation	INF	% change over prices	CBRT-EDDS
Interest rate	R	Inflation adjusted-compound average real interest rate of Treasury made, cash internal borrowing	Treasury
Growth ratio	G	Real growth ratio (%)	CBRT-EDDS
Fiscal rule	FR	2002:Q1-2007:Q4 period implemented 6.5% primary surplus rate. Used as the dummy variable in the model.	CBRT-EDDS

Figure 2 and Figure 3 present respectively raw data and seasonally adjusted data used in the econometric model.

**Figure: 1**  
**Raw Data, 2000:Q1-2015:Q4**



<sup>11</sup> For the primary balance and expenditure variables, consolidated budget data between periods 2000:Q1-2005:Q4 and 2006:Q1-2015:Q4 were used, and the central government budget data was used for the 2006:Q1-2015:Q4 period. The main reason for this is the change in the budgetary calculations after the 2006.

**Figure: 2**  
**Seasonally Adjusted Data, 2000:Q1-2015:Q4**



### 5.2.1. Breakpoint Unit Root Test

In this paper augmented Dickey Fuller (ADF) unit root test is conducted to investigate the stationary of the variables. The results of the breakpoint unit root test for the seasonally adjusted variables are shown in Table 2.

**Table: 2**  
**Results for Breakpoint Unit Root Test, 2000:Q1-2015:Q4**

Variables	ADF	Break Dates
Primary Balance (PB) (Intercept Model)	-5,464*** [-4,949]	2008:Q3
Debt (D) (Intercept and Trend Model)	-5,380*** [-5,347]	2009:Q1
Expenditure Gap (EG) (Intercept Model)	-6,853*** [4,949]	2003:Q2
Output Gap (OG) (Intercept Model)	-4,427* [4,193]	2007:Q3
Inflation (INF) (Intercept and Trend Model)	-14,046*** [-5,719]	2003:Q3

*Notes: Lag lengths have been automatically determined based on the modified Akaike information criterion (AIC) and Schwartz criterion (SC).*

*\*, \*\* and \*\*\* indicates respectively 10%, 5% and 1% significance levels.*

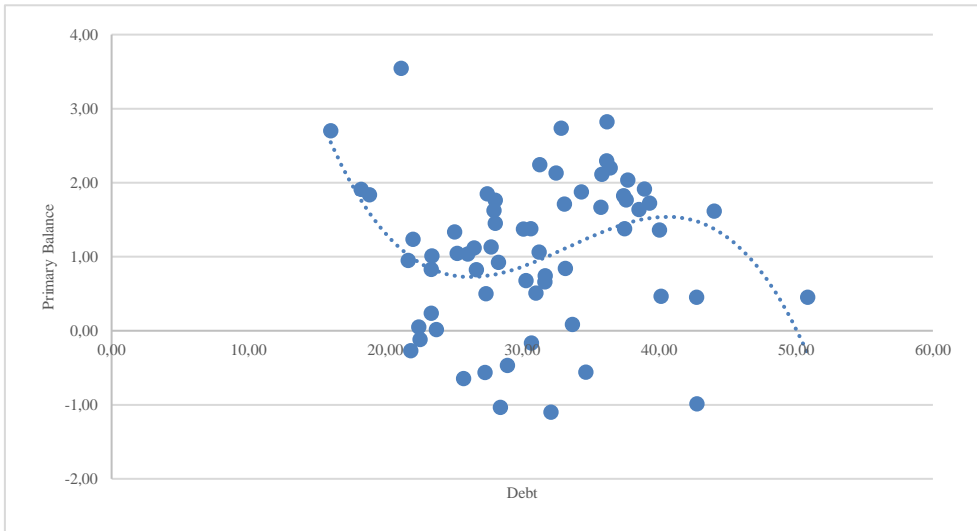
*[...] indicates t the statistical values.*

According to the results of the breakpoint unit root test given in Table 2, PB, Debt, EG, and INF variables are statistically significant at a 1% level, and the OG variable is statistically significant at a 10% level. When looking at the break dates that emerged from the results, it is seen that the break of the PB variable in 2008:Q3, the Debt variable in 2009:Q1, the EG variable in 2003:Q2, the OG variable in 2007:Q3, and the INF variable in 2003:Q3. According to this, the variables are stationary with the breaks, namely  $I(0)$ . There is a coincidence between the break dates and policy implementations and/or important events. For example; the break in the PB variable emerged immediately after the removal of a 6.5% primary surplus rule implemented during the 2002:Q1-2007:Q4 period, and the break in the EG variable indicates that public fiscal discipline started to be provided after the February 2001 crisis.

### 5.2.2. Estimating Fiscal Reaction Function and Measuring Fiscal Space

Prior to the measurement of the fiscal space, it is necessary to determine whether Turkey had a fiscal fatigue behavior during the 2000:Q1-2015:Q4 period. For this purpose, it was important to see how the primary balance reacted to the lagged debt values. Figure 3 shows how Turkey responded to the increased public debt.

**Figure: 3**  
**Primary Balance Response to Debt, 2000:Q1-2015:Q4**



Source: Calculations of author.

According to Figure 3, it is seen that the primary balance responded to a decrease at the initial stages of the debt, and, as for the later stages of the debt, it had a positive response. However, after a certain point, it seemed that the primary balance could not react to the government debt, and this relationship started to weaken, and it was seen that fiscal fatigue

appears at that high debt level. Furthermore, it also reveals that there may be a cubic polynomial function and thus the existence of a debt limit. Therefore, the lagged debt, lagged debt square and lagged debt cubic values are included in the econometric model.

The primary balance is important in terms of understanding the state of fiscal policies implemented in a country, and the coefficients that might emerge as a result of econometric analysis must be interpreted accordingly. As a matter of fact, it was expected that the primary balance would respond to the public debt "negatively," "positively," and "negatively," respectively. The expectation for the output gap coefficient in the model is positive because the output gap that is "positive" indicates that fiscal policy can be used the counter-cyclical and stabilization purposes (Turan, 2011: 98). Another reason underlying this expectation is that the fiscal policy has been implemented responsibly in this period. Periodical rises in government expenditures led to deterioration of the government budget ratio and lowered the primary balance (Hajnovic et al., 2012: 15), the expectation for the expenditure gap coefficient is "negative." The expectation of the primary surplus rule applied in Turkey between 2002:Q1-2007:Q4 is "positive." The main reason is that primary balance has positively affected the debt limit and thus played an important role in creating a high fiscal space. As a matter of fact, this situation is also shown by the results of the econometric analysis in Table 2. The expectation for the inflation coefficient is positive. This is to avoid the from the negative effects of inflation on the budget which is caused by the primary balance. In fact, Turkey had a very serious step in their struggle against inflation in this period, and these efforts produced economic gains.

**Table: 3**  
**Estimation Results for Fiscal Reaction Function, 2000:Q1-2015:Q4**

Dependent Variable: Primary Balance (PB.)		
Independent Variables		Results
Lagged Debt	$\beta_1$	-1.068*** [-3.716]
Lagged Debt Square	$\beta_2$	0.0342*** [3.800]
Lagged Debt Cubic	$\beta_3$	-0.0003*** [-3.983]
Output Gap	$\beta_4$	1.97E-08** [2.245]
Expenditure gap	$\beta_5$	-1.14E-07* [-1.865]
Inflation	$\beta_6$	0.009** [2.596]
Fiscal rule	$\Delta_t$	0.627** [2.969]
C		11.310*** [3.851]
R <sup>2</sup>		0.55
Prob(F-statistics)		<0,01
DW		1.93

Notes: \*, \*\* and \*\*\* marks means respectively 10%, 5% and 1% significance levels.

[...] indicates t the statistical values. The model is estimated using the OLS method. In order to avoid any heteroscedasticity problem when using OLS method, the Huber-White test was used for analysis.

According to the results given in Table 3, the coefficients are statistically significant and consistent with the expectations. R<sup>2</sup> is 0.55. Apart from this, according to the diagnostics tests, there is no serial correlation or heteroscedasticity problem in the model. The reaction

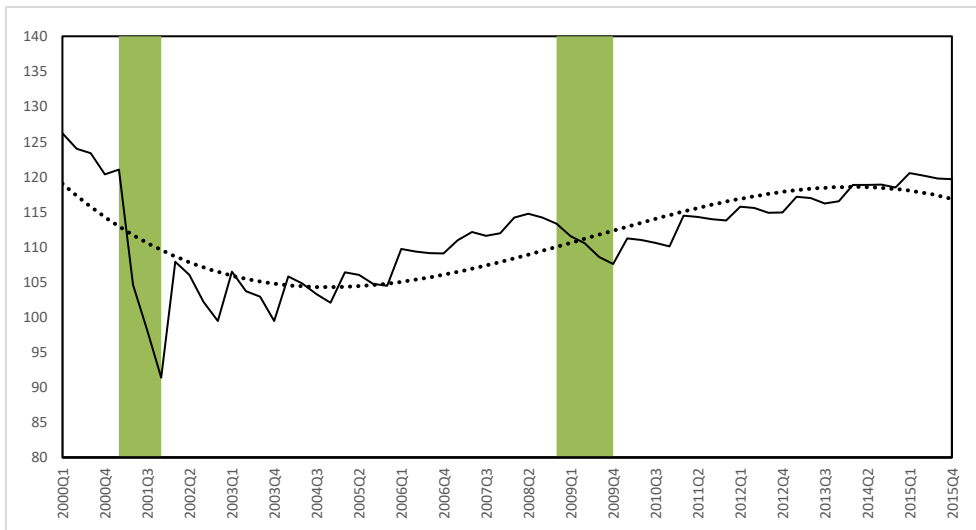
of the primary balance to the government debt in Turkey is estimated respectively as "negative," "positive," and "negative". These results also indicate that the excessive increases in debt ratios in Turkey might lead to fiscal fatigue. The output gap coefficient has been found to be "positive" at a 10% level. According to this result, it can be said that the fiscal policy applied within this period in Turkey shows a counter-cyclical characteristic. The government expenditure gap coefficient found to be "negative" and statistically significant; it indicates that the increases in the government expenditure within same period have adversely affected the primary balance.

The estimated coefficient of the inflation variable is positive. It indicates that inflationary pressures may increase the primary balance in a positive direction.

As a fiscal rule, the coefficient of the primary balance rule contained in the model has been found to be positive and significant, as expected. Accordingly, it is suggested that the primary balance rule has supported the sustainability of the fiscal policy in this period.

After the fiscal reaction function was estimated, the debt limit was estimated by using equation (8), about 142.2% for that period. The fiscal space was calculated according to equation (9) and using the rate -3.36% ( $r-g$ ), and the FS is shown in Figure 4.

**Figure: 4**  
**Fiscal Space (FS)/GDP in Turkey (%), 2000:Q1-2015:Q4**



Source: Calculations of the author. Gray lines represent the 2001 and 2008 crisis, respectively.

As clearly seen in Figure 4, the fiscal space of Turkey following the November 2000 and February 2001 crises has shrunk considerably. The 6.5% primary surplus rule and the crisis packages implemented after the economic crisis ensured the creation of ample fiscal

space in the 2002:Q1-2007:Q4 period. In this period, the sharp decrease in the budget deficits, the rapid decrease in public debt rates, and the reduce in the interest rates were effective in the creation of the fiscal space. The rapid enlarging of fiscal space within this period hindered the shrinking of fiscal space after 2008 crisis compared to 2001 crisis and this had a positive impact on getting out the crisis. From 2008 onwards, with the absence of the primary surplus rule, indications show that the created fiscal space after the 2008 crisis is relatively lower than the fiscal space created during the 2002:Q1-2007:Q4 period. This clearly demonstrates the importance of fiscal policies that includes fiscal rules.

## 6. Discussion and Conclusions

This paper analyzed the fiscal space that is defined as the difference between the country's current debt level and its debt limit for Turkey in the 2000:Q1-2015:Q4 period. First, we find that Turkey has fiscal fatigue characteristics because of primary balance responses to lagged debts. Second, we estimate the debt limit with the interest rate-growth rate differential. Finally, we measure the fiscal space for Turkey during the 2000:Q1-2015:Q4 period. We conclude that the fiscal reforms and policies that were mentioned at the beginning of the study which were implemented in Turkey in the 2002:Q1-2007:Q4 period would be an important guide in terms of expanding the fiscal space. Another point worth noting is that, although Turkey today has a low debt ratio when compared to countries with high debt ratios, it needs to create even more fiscal space for fiscal maneuvers and the difficulties it might come across. For this, as put forth by the econometric analysis above, it may be possible to apply the primary surplus rule and debt rule. Another reason for the usability of the primary surplus rule as a fiscal rule is that it is one of the basic conditions for the public sector that it is able to achieve a sustainable balance. Consequently, fiscal rules aiming at fiscal sustainability and effort to increase in the fiscal space can be considered as a policy option. This issue should be examined in depth in future studies.

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