

5. TESTING THE FISCAL THEORY OF THE PRICE LEVEL IN TÜRKIYE BY USING STRUCTURAL BALANCE DATA

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Abstract

The fiscal theory of the price level (FTPL) emphasizes the distinction between Ricardian and non-Ricardian regimes and claims that if non-Ricardian regime prevails in an economy, the price level will be pinned down by fiscal policy rather than monetary policy. To determine the dominant regime in Türkiye we use quarterly fiscal data (primary balance and government debt) and run bivariate VAR analysis. Additionally, we subdivide primary surplus into its components as structural and cyclical balance data and conduct trivariate VAR analysis. The results strictly show that the non-Ricardian regime prevails in the period 1996-2005. However, for the period 2006-2019, the bivariate results show that the Ricardian regime is dominant, while the trivariate model findings show that the government structurally follows non-Ricardian policies.

Keywords: FTPL, structural budget balance, non-Ricardian fiscal policies, VAR, ECM

JEL Classification: C22; E31; E62

1. Introduction

The distinction of Ricardian (R) and non-Ricardian (NR) regimes is at the heart of the fiscal-monetary policy debates. In an **R** regime, fiscal authority is expected to finance the outstanding public debt by future primary surpluses. This implicitly assumes that the government faces an intertemporal budget *constraint*. On the contrary, in an **NR** regime, fiscal authority does not commit to paying outstanding debt with current or future primary surpluses. Woodford (1995) argues that **R** regime is one *special case* in which fiscal policies have no role in the determination of the price level (Woodford, 1995, 3). Moreover, Cochrane (1999) claims that there might not be a constraint for a government but *preferences* (Cochrane, 1999, 336).

Once we accept that the government has not budget constraint and can freely determine the future primary surpluses regardless of its nominal liabilities, we might expect fiscal policy can play a major role in price level determination. This argument lies at the core of the fiscal

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theory of the price level (FTPL). The pioneers³ of the FTPL assert that monetary policy alone would not be sufficient to control and/or determine the price level and cannot be separated from fiscal policy.

The well-known quantity theory ($MV = Py$) excludes fiscal policy and states that the price level will be determined as long as the nominal money supply equals the nominal money demand. However, Woodford (1995) argues that this view means that the nominal money supply changes in accordance with the price level, but that this price level is determined by the money supply itself (Woodford, 1995, 1). As a result, the price level under these circumstances will be indeterminate. On the other hand, the Taylor rule puts monetary aggregates aside and focuses on nominal interest rates. Taylor rule can control inflation because nominal interest rates are increased by the central bank faster than expected inflation. However, Cochrane (2011) claims that the price level still undetermined if the central bank follows a Taylor rule with an **R** fiscal rule (Cochrane, 2011, 606). Cochrane (2011) also argues that the pinned-down price level can only be reached if governments follow an **NR** (at least partially) fiscal regime (Cochrane, 2011, 607).

The FTPL says the price level is determined by government debt, the present value of future tax and spending plans; it does not refer to monetary policy. Thus, an equation different from the quantity theory of money is offered:

$$B_t/P_t = (\text{Present value of future primary balances at time } t), \quad t=0,1,\dots \quad (1)$$

where B_t is government liabilities including debt and money base at time t , and P_t is the current price level. E(1) can be regarded as the government intertemporal budget constraint (hence IBC). In an **R** set-up in which fiscal policies have no real effect on aggregate demand, if public real debt increases, the government adjusts current and future primary surpluses and keeps the IBC steady. In this *special* case, as Woodford (1995) says, fiscal considerations play no role in price level determination (Woodford, 1995, 3). In an **NR** set-up, however, where an initial condition for debt, B_0 , is given, the government sets its primary balances first and prices follow. In such a case the IBC is no longer a constraint government must follow, instead, is an *ex-post* equilibrium condition that is eventually met by adjustments in the price level. Note that an **NR** fiscal regime does not mean an unbalanced IBC. In any case, the FTPL assumes the stability of the IBC, but this stability is obtained through the adaptation of the price level. Thus, a stable IBC says nothing if the regime is **R** or **NR** but is still important for the FTPL considerations.

However, Buiter (2002) criticizes this argument and argues that the FTPL confuses budget constraints and equilibrium conditions. He refuses an **NR** setup in which government can exogenously fix “real spending, real taxes, and real seigniorage”. Since the government has to pay its debt obligations, at least one element of these three must be determined endogenously, which points an **R** policy will have to have a degree of freedom (Buiter, 2002, 461). Niepelt (2004), sees FTPL’s basic problem as the presumption of the government will always have positive nominal debt. However, if households foresee that the government cannot meet its obligations, they will not buy government debt (Niepelt, 2004, 298). Additionally, he argues that once the government starts debt issuance, an **R** fiscal policy is needed for the existence of equilibrium (Niepelt, 2004, 279).

³ Begg and Haque (1984), Leeper (1991), Sims (1994, 1999), Woodford (1994, 1995, 1996), Cochrane (1999, 2001).

This study considers the above-mentioned arguments and focuses on the characteristics of the fiscal regime implemented in Türkiye. In order to achieve this, the impulse-response functions were estimated using the VAR technique in the study. By following Canzoneri, Chumby and Diba (2001) the response of the real value of the debt to the positive primary surplus shock has been determined. If the response is found to be negative, it is concluded that the regime is **R**, otherwise, that is, if the response is positive, then the regime is evaluated as an **NR** regime. However, Cochrane (1999) criticizes this approach. He accepts primary surplus as the sum of the cyclical and structural components. While the structural balance reflects the government's policy preferences, cyclical part fluctuates in output and the government has nothing to do with it. Hence, if there is a negative correlation between the cyclical and structural components of the primary balance, and if the government compensates for any negative cyclical shock on revenues by rising structural tax component, then this will result in an observational positive response of the debt stock to a negative shock, which falsely directed to **R** regime result (Cochrane, 1999, 370). This can also be called *Cochrane's critique*.

The main contribution of this paper is to incorporate structural and cyclical balance data, which have not been used in the literature on Türkiye before, into our analysis. We found that incorporating structural and cyclical data into the equation is useful for two reasons. First, in light of Cochrane's critique, we investigate whether the structural and cyclical components of the primary balance data falsely direct us to an **R** regime result. Secondly, since the structural balance reflects the government's preferences more realistically, we will be able to achieve more concrete results. Detailed explanations on how the structural and cyclical balance data are calculated are presented in Section 4.

This paper is organized as follows. The next two sections are devoted to literature review and a brief history of the Turkish economy from the 1990s to the present. Section 4 briefly explains our empirical approach and the dataset. The theoretical background is presented in Section 5. Section 6 is dedicated to empirical results. The last section contains concluding remarks.

2. Literature Review

According to Leeper (1991), an active fiscal authority does not take the state of public debt into account and can freely set the policy variable (Leeper, 1991, 130). Such policy behavior refers to an **NR** regime. To achieve a *unique* price level, at least one authority (monetary or fiscal) must set its policy variable actively, while for a balanced IBC at least one authority must act *passively* (Leeper, 1991, 132).

Since the distinction between **R** and **NR** regime is what the FTPL is mainly based on, empirical studies focus mainly on ascertaining whether the regime is **R** or **NR**. Canzoneri, Chumby and Diba (2001) estimate impulse-response functions by using US annual data for the 1951-1995 period. In their analysis, it is assumed that a negative response of the public real debt stock to a positive shock in the real primary balance means an **R** regime prevailing in the economy. They show that the response of debt stock is negative and statistically significant, thus the **R** regime exists. In addition to applying Canzoneri, Chumby and Diba's (2001) methodology to France, Germany, Italy and the UK, Creel and Le Bihan (2006) examine the validity of *Cochrane's critique* using structural and cyclical primary balance data. They also find no evidence to support the FTPL for the five countries. Méliitz (2000) conducts panel data analysis for 19 OECD countries in his study, in which he asks "how do the financial authorities react to state debt?". The results show that any increase in the debt

stock leads to an increase in tax revenues and a decrease in public spending, that is, the **R** regime prevails.

Following Canzoneri, Chumby and Diba (2001), Semmler and Zhang (2004) carry out a VAR analysis for France (1967-1998) and Germany (1970-1998). However, unlike Canzoneri, Chumby and Diba (2001) they investigate the response of the primary balance in case of a positive debt shock. The primary balance is expected to respond positively to the debt shock in the **R** regime. As they cannot find a positive response, they conclude that the **NR** regime prevails in both countries. Daly and Smida (2014), perform an analysis using Euro area data for the period 1999q1-2013q4 and show that monetary policy is more effective than fiscal policy on economic activity. Panjer, Haan and Jacobs (2017) investigate the regime behavior in the Euro area in the period 1980-2013 using quarterly data. They divide their sample into three periods: The first is the period before imposing the Euro Convergence Criteria (ECC) on the member states, the second is between the ECC and the global financial crisis (GFC), and the last is the post-crisis period. The estimated results of the impulse-response functions show that an **R** regime is more plausible for the second period, while indicating some evidence in favor of the **NR** regime for the post-crisis period.

As for Türkiye, Telatar (2002) shows that the period 1985-1997 was a period, in which fiscal policy was dominant for Türkiye. Yurdakul and Saçkan (2007) apply impulse-response function (hereinafter IRF) analysis for pre-2001 (1988-2001) and post-2001 (2001-2005) periods. They conclude that before 2001 there was an **NR** regime and after 2001 an **R** regime. Oktayer (2013) investigates the plausibility of the FTPL in Türkiye for the period 1988q4—2013q1 with two sub-periods. The results of the study, in which she uses VAR methodology in accordance with Canzoneri, Chumby and Diba (2001), indicate that the 1988-2001 period exhibits **NR** characteristics, while 2001-2013 period has **R** characteristics. Koyuncu (2014) examines the causal relationship between inflation and budget deficit in the 1987q1-2013q4 period. She finds a bi-directional causal relationship between the two variables. According to her, this result reveals the significance of budget deficits in the inflation process and supports the FTPL approach for Türkiye. Dalgıç, İyidoğan and Balıkcıoğlu (2014) investigate the fiscal sustainability in Türkiye in the period 2006-2013. They point out that the “fiscal stance” in Türkiye is weakly sustainable, which implies **NR** policies were in effect throughout the investigation period. Oktayer and Oktayer (2016) subdivide their dataset into two periods as 1989-2001 and 2001-2012 and run ARDL bounds testing procedure. Their results point out an **NR** regime in the pre-crisis period and an **R** regime in the post-crisis period. Bölükbaş and Peker (2017) conduct a cointegration analysis and reveal that the fiscal policy dominant regime prevailed in Türkiye in 2006-2015 period. A recent study by Kuştepeli and Önel (2019) on the fiscal sustainability of Türkiye in 1970-2003 period, points out that the budget deficits weakly sustainable in Türkiye if the structural breaks are taken into consideration. This result implies that the dominant regime in Türkiye is **NR**.

3. A Brief Review of Turkish Economy

Türkiye's economy underwent serious financial crises in the 90s. The most significant of these is the 1994 crisis, which emerged as a result of suppressing the interest rates on government papers while monetizing the public debt, and huge budget deficits (Ozatay, 1997, 662). The crisis was so devastating that the Turkish Lira depreciated 50 percent, the Central Bank lost half of its foreign reserves, and consumer inflation hiked three-digit numbers (120 percent). By the end of the year, the economy had shrunk by 4.6 percent.

However, the story quickly turned positive, and the Turkish economy grew over 7 percent for the next three years, consecutively. But during those three years, inflation averaged 85 percent, which was too high, and public deficits were still unsustainable (5 percent of GDP on average). In 1999, a devastating earthquake occurred in Turkiye and as a result, the economy shrank by 3.4% and the budget deficit reached 8.5% of GDP (Figure 1).

The real strike, however, had not yet come. At the end of 1999, Turkiye entered into a stand-by agreement with the IMF to remedy the chronic inflation and stabilize the economy. With the agreement, public confidence was increased, and interest rates decreased rapidly. Thus, the interbank rates, which were 70 percent in December 1999, dropped to 26.5 percent in July 2000. In accordance with the agreement, a *crawling-peg* regime was implemented, and the Turkish lira was regularly devaluated against an exchange basket at the rates previously announced in the agreement. The hope was that inflation expectations would be brought under control thanks to this exchange rate peg. Unfortunately, this did not come true, and inflation overshot the depreciation rate. This situation, which caused a lack of confidence in the economy, resulted in a rapid capital outflow in November 2000. With the additional support of the IMF, Turkiye was able to overcome the capital outflow and stick to the crawling-peg system. By February 2001, however, the Turkish economy was hit by the biggest financial crisis in its entire history. The capital outflow was so rapid and huge that the central bank could not maintain the currency peg and allowed the lira to float freely. The Turkish lira depreciated almost 40 percent and interbank interest rates rose from 50 percent to 2000 percent (Temiz and Gökmen, 2010, 7). By the end of 2001, the economic growth rate was minus 6 percent. The budget deficit rose to 11.8 percent and public debt to 72.6 percent, as a share of GDP (Table A1).

Right after the crisis, a radical reform movement was initiated in the financial sector. First, the Banking Regulation and Supervision Agency (BRSA) launched a comprehensive banking sector restructuring program. On the other hand, maybe the most important, central bank independence was secured by law. It was declared that the primary objective of the Central Bank of the Republic of Turkiye is to ensure price stability and that it can determine its discretion while executing monetary policy.

Thanks to these reforms, the Turkish economy recovered quickly and grew by an average of 7.1 percent until 2008. During this time, public debt began to decline rapidly, and inflation reached single digits for the first time in decades. The budget deficit reached -0.59 percent and interest rates realized quite low compared to the 90s and the beginning of the new millennium. In 2005, the first "medium-term fiscal plan (MTFP)", which covered the following three years, was prepared and entered into force in 2006. It was aimed to harmonize the budget revenues and expenditures, and to reduce the need for public debt, thanks to the primary surplus to be given. This is an implicit declaration of the **R** fiscal policies and, in our opinion, the turning point of Turkiye's fiscal policies.

Although it was disrupted by the 2008 global financial crisis, starting from the adoption of the first MTFP, Turkiye's public debt kept decreasing rapidly and inflation followed a stable one-digit path. The budget deficit, as well, floated around 1-2 percent of the GDP. However, these **figures** deteriorated after 2016 and inflation hit 20 percent in 2018 and so did interest rates. Growth rates slowed down and the budget deficit increased again.

4. Empirical Approach and Data

Following Creel and Le Bihan (2006), our investigation has two steps. In the first step, we perform a bivariate VAR analysis (bivariate) between primary surplus and debt. In the

second step, we extend our analysis to trivariate VAR analysis by taking structural and cyclical balance instead of primary surplus into account. This allows us to observe the real (structural) fiscal policy behavior of the government. In addition, the three-variable analysis gives an idea whether the “Cochrane critique” is valid for Türkiye.

Unlike Creel and Le Bihan (2006), we add a third step to our analysis and remake the analysis for the sub-period of our sample. As mentioned above, the year 2006 is a turning point in Türkiye’s fiscal policy. As Oktayer (2013) and Oktayer and Oktayer (2016) did, 2001 can be chosen as the starting year of the second sub-period, but we think that 2006 is an important year in Türkiye, especially in terms of **R** fiscal policies. Therefore, we divide our sample into two sub-periods as 1996q1-2005q4 and 2006q1-2019q4. While we do not have any preliminary expectations for the first period, we expect to see strong **R** fiscal policy trends for the second period.

In order to reveal the dominant fiscal policy regime in Türkiye, we use quarterly data covering the period 1996q1-2019q4. Our main variables are primary balance, s , and government debt stock, b . Both data are taken as the ratio of GDP and primary balance is seasonally adjusted. All data are collected from the databases of the Central Bank of Republic of Türkiye and Turkish Statistical Institute. In addition to these two main variables, the structural (s^c) and cyclical (s^s) balance data that we included in our three-variable model were calculated by us. Since the central government budget data date back to 1996 at the earliest, our data range starts from 1996.

In order to derive structural and cyclical balance data, firstly, taxes affected by cyclical movements in the economy are divided into three parts as income tax, corporate tax and indirect taxes. The elasticities of all three tax revenues to the output gap are calculated separately. Following Girouard and Andre (2005) and Çebi and Özlale (2012) we calculate these elasticities for Türkiye. For the calculation of indirect tax elasticity, however, we benefit from Bouthevillain et al. (2001). Our study differs from Çebi and Özlale (2012) in some points. First of all, we use the 2015 data published by the Social Security Institution for the number of compulsory insurance holders and the earning intervals in the calculation of income tax. Second, our calculations are based on the revised GDP series released in 2016. Also, unlike Bayar (2015), since automatic stabilizers do not have an important place in budget expenditures in Türkiye, the cyclical adjustments were not carried out for expenses⁴.

In order to calculate the structural and cyclical balance, we use quarterly data for the period 1996-2019. Structural and cyclical balance data are taken as the ratio of potential GDP. We calculate the potential GDP using the Hodrick-Prescott filter (H-P) (Hodrick and Prescott, 1997). The main reason to opt for H-P is its simplicity. In addition, this methodology is mainly used by international institutions such as the IMF or the EU (Tlidi, 2013, 933). Our calculations show that the elasticities for income tax, corporate tax, and indirect taxes are 1.12, 1.07, and 0.94, respectively.

5. Theoretical Background

The government budget constraint at time t is:

$$\frac{B_{t,t+1}}{R_t} + T_t = G_t + B_{t-1,t} \quad (2)$$

⁴ Kaya and Yilmaz (2013) made this calculation and found -0.003.

Nominal government spending (G_t) and debt service ($B_{t-1,t}$) discounted at the gross nominal interest rate (R_t) are financed by nominal tax revenues (T_t) and debt issuance ($B_{t,t+1}$). Rearranging (2) for the primary balance, $S_t = T_t - G_t$, yields:

$$\frac{B_{t,t+1}}{R_t} + S_t = B_{t-1,t} \quad (3)$$

When $E_t \pi_{t+1} = \pi_{t+1}$ Fisher equation will be:

$$\frac{1}{R_t} = \frac{1}{r\pi_{t+1}} = \beta \frac{P_t}{P_{t+1}} \quad (4)$$

where $\beta = (1/r)$ is the discount rate, r is the constant gross real interest rate, and π_{t+1} is the gross expected inflation rate.

Substituting (4) into (3) yields:

$$\beta \frac{B_{t,t+1}}{R_t} (P_t/P_{t-1}) + S_t = B_{t-1,t} \quad (5)$$

(5) can be expressed in real terms by dividing both sides with nominal GDP ($P_t Y_t$):

$$\beta b_{t,t+1} + s_t = \frac{B_{t-1,t}}{P_t Y_t} \quad (6)$$

By iterating (6) we have:

$$\beta^k b_{t+k-1,t+k} + \beta^j \sum_{j=0}^k s_{t+j} = \frac{B_{t-1,t}}{P_t Y_t} \quad (7)$$

Hypothetically, households do not borrow, thus B_t is positive, and lending, unlike tax-paying, is a voluntary action, so households cannot be forced to borrow. Therefore it can be assumed that if the government finances its debt permanently by issuing new debt, householders quit lending to the government and all liabilities have to be financed with primary surpluses.

Taking the “transversality condition”⁵ into account, the budget constraint can be rewritten as: $\frac{B_{t-1,t}}{P_t Y_t} = \beta^j \sum_{j=0}^k s_{t+j}$ (8)

It states that government finances its debt service in period t with current and future primary surpluses. Even if the primary deficit occurs at any time, it will not be permanent, and the government will compensate for this deficit by surpluses in other periods.

In this study, in accordance with Canzoneri, Chumby and Diba (2001), we run a VAR analysis first and estimate impulse-response functions to observe the response of the debt stock (b_{t+1}) at $t+1$ to a positive shock in primary surplus (s_t) at t .

$$s_t = c_1 + \sum_{i=1}^k \alpha_{1i} b_{t-i} + \sum_{i=1}^k \beta_{1i} s_{t-i} + \Gamma_1 D_k + \varepsilon_{1t} \quad (9a)$$

$$b_t = c_2 + \sum_{i=1}^k \alpha_{2i} b_{t-i} + \sum_{i=1}^k \beta_{2i} s_{t-i} + \Gamma_2 D_k + \varepsilon_{2t}$$

$$s_t^c = \alpha_1 + \sum_{i=1}^k \rho_{1i} b_{t-i} + \sum_{i=1}^k \mu_{1i} s_{t-i}^s + \sum_{i=1}^k \gamma_{1i} s_{t-i}^c + \Gamma_1 D_k + v_{1t}$$

$$s_t^s = \alpha_2 + \sum_{i=1}^k \rho_{2i} b_{t-i} + \sum_{i=1}^k \mu_{2i} s_{t-i}^s + \sum_{i=1}^k \gamma_{2i} s_{t-i}^c + \Gamma_2 D_k + v_{2t} \quad (9b)$$

$$b_t = \alpha_3 + \sum_{i=1}^k \rho_{3i} b_{t-i} + \sum_{i=1}^k \mu_{3i} s_{t-i}^s + \sum_{i=1}^k \gamma_{3i} s_{t-i}^c + \Gamma_3 D_k + v_{3t}$$

The bivariate VAR model to be estimated is given in (9a) and trivariate VAR model is given in (9a). In an R regime, *the surplus pays off the debt, and b_{t+1} falls* (Canzoneri, Chumby and Diba, 2001, 1227). The other two alternative results which are “ b_{t+1} is not affected” or

⁵ $\lim_{k \rightarrow \infty} (\beta^k b_{t+k-1,t+k}) = 0$

“ b_{t+1} rises” mean that we have an NR regime. In addition to this bivariate VAR analysis, we also carry out a trivariate VAR analysis, in which the primary surplus is divided into two components such as the structural balance (s_t^s) and cyclical balance (s_t^c). This enables us to catch the real political response of the government.

6. Empirical Results: Is Fiscal Regime in Türkiye Ricardian or Non-Ricardian?

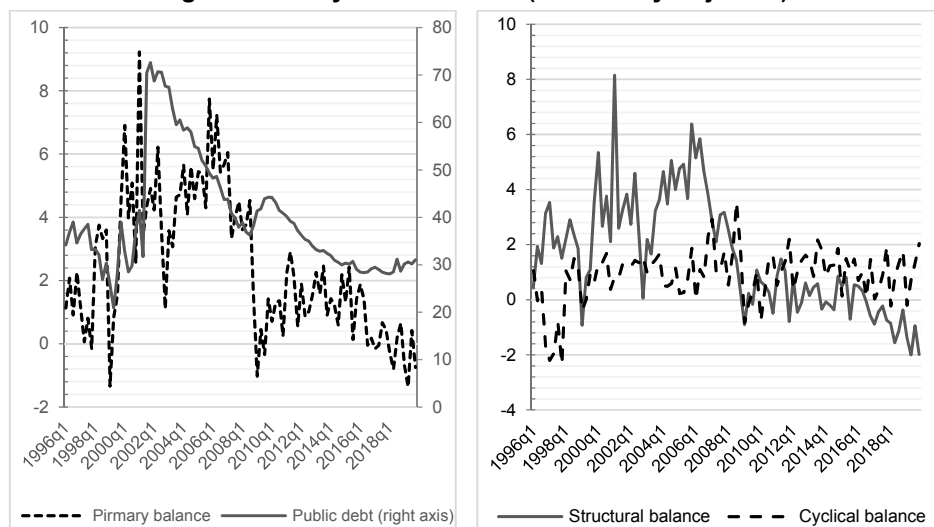
Unit root test results are presented in Table 1. The results show that while debt/GDP (b_t), structural balance (s_t^s) and primary surplus/GDP (s_t) are stationary at first difference, $I(1)$, cyclical balance (s_t^c) is stationary at level, $I(0)$. The results of Zivot and Andrews (1992) tests, which allows for a single break in the intercept and the trend of the series, show that debt/GDP is $I(0)$ when a structural break (2001q3) is taken into account, while primary surplus/GDP (2008q4) and structural balance/GDP (2008q3) are $I(1)$. Lee and Strazicich’s (2003) minimum Lagrange Multiplier unit root test, which allows to test the stationarity for two structural breaks, points to similar break points with the Zivot-Andrews test. Türkiye’s fiscal data, as plotted in Figure 1, reveal possible structural breaks.

Table 1. Unit Root Tests and Summary Statistics

	Public debt	Primary balance	Structural Primary Balance	Cyclical Primary Balance
Sample mean	39,744	2,440	1,569	0,884
Standard deviation	12,208	2,253	2,922	0,967
Max.	72,599	9,233	9,709	3,530
Min.	20,906	-1,359	-4,930	-2,330
Skewness	1,200	0,555	0,051	-0,948
Kurtosis	3,580	2,721	2,877	5,214
ADF t-statistics	-1,915	-1,157	-0,678	-6,014**
Standard error	(-2,892)	(-2,893)	(-2,893)	(-2,892)
PP t-statistics	-1,915	-6,743**	-7,208**	-5,991**
Standard error	(-2,892)	(-2,893)	(-2,893)	(-2,892)
KPSS t-statistics	0,173*	0,739**	0,883**	0,355
Standard error	(0,146)	(0,463)	(0,463)	(0,463)
Zivot-Andrews t-statistics	-7,121**	-3,245	-3,036	
Critical value	(-5,080)	(-4,930)	(-4,930)	
Break point	2001Q3	2008Q4	2008Q3	
Lee-Strazicich t- statistics	-7,506**	-5,752	-4,828**	
Critical value	(-6,108)	(-6,446)	(-3,563)	
Break point I	2001Q3	2000Q3	2002Q1	
Break point II	2005Q2	2008Q4	2008Q2	

Note: Values in parentheses are standard errors and (*) and (**) show that the results are significant at 5% and %1, respectively. Optimum lag length is determined by AIC. Null hypothesis for ADF and PP test: “series has a unit root”; for KPSS test: “series is stationary”; for Zivot-Andrews test: “series has a unit root with a structural break both in intercept and trend”; for Lee-Strazicich LM test: “series has a unit root with two breaks”.

Figure 1. Türkiye's Fiscal Data (Seasonally Adjusted)



Source: 'Primary balance' is calculated by authors with data taken from www.tcmb.gov.tr (Central Bank of Türkiye). 'Public debt' is taken from www.hmb.gov.tr (Ministry of Treasury and Finance). Structural and Cyclical balance data is calculated by authors.

D_k , in the bivariate and trivariate VAR models stands for the structural breaks and take the value "zero" before the break point and "one" after it⁶. If all variables in a VAR model are integrated in the same order there will be gain from estimating VECM (Gospodinov, Herrera, Pesavento, 2013, 15). However, Sims, Stock and Watson (1990) suggest that it is not necessary to transform the model to stationary for impulse-response functions, even if the data are integrated (Sims, Stock, Watson, 1990, 136). Based on this reference information, we first estimate unrestricted VAR models without performing any transformations on the data. After estimating with data at level, we perform VAR IRF analysis also with the first-difference data for both bi- and trivariate models in order to ensure that our estimation results with level data are robust. Additionally, we run the impulse-response analysis by taking into consideration the cointegrated relationship, if any, between the variables⁷. Regarding the ordering of the VAR model, primary surplus comes first in the bivariate model. This ordering is consistent with the existence of an NR regime since it allows the contemporaneous effect of a positive shock on debt/GDP.

The estimated impulse-response functions for the whole period derived from VAR(1) models for (9a) and (9a) using level data are presented in Figure 2. The results of the bivariate model

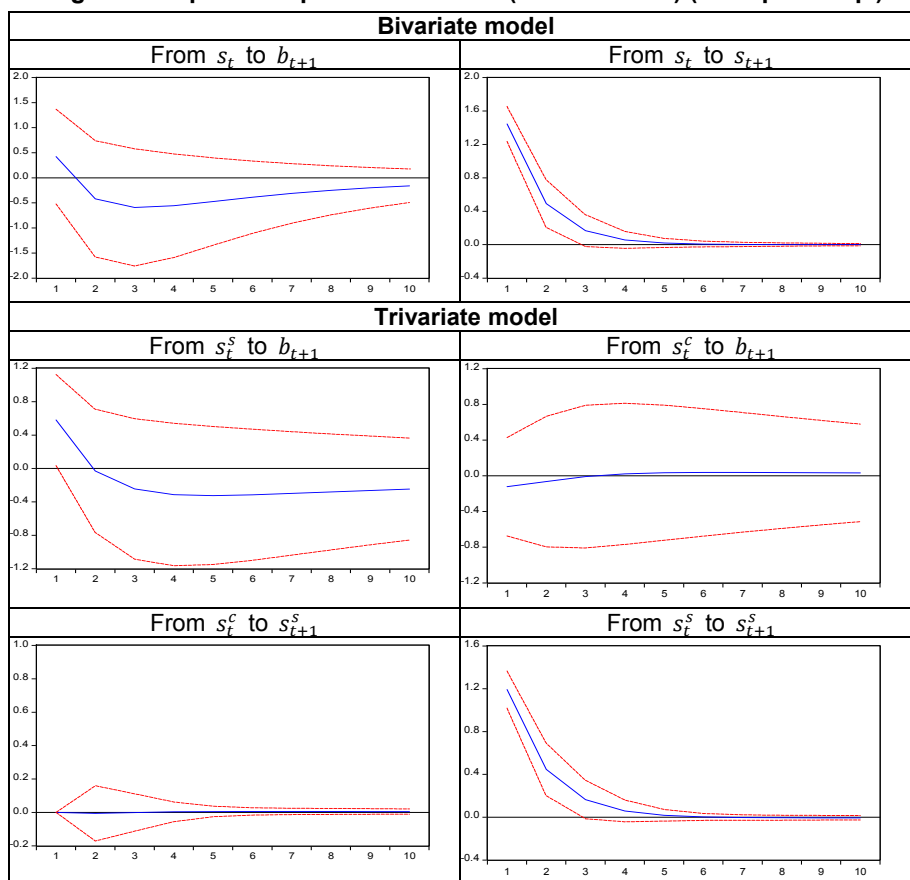
⁶ $D_{1q3} = 0$ if $t < 2001q3$ and $D_{8q3} = 0$ if $t < 2008q3$ and $D_{8q4} = 0$ if $t < 2008q4$

$D_{1q3} = 1$ if $t \geq 2001q3$ $D_{8q3} = 1$ if $t \geq 2008q3$ $D_{8q4} = 0$ if $t < 2008q4$

⁷ It has been examined whether there is any cointegrated relationship between the first differenced variables in the considered periods. The cointegration analysis performed gives us the result that there is a cointegrating relationship between the variables in the whole period (1996q1-2019q4) and in the second sub-period (2006q1-2019q4).

in Figure 2, plot insignificant response of debt stock which can be interpreted as if there would be an **NR** regime for the entire period. The impulse-response functions for the trivariate model show that the debt stock has a positive and significant response to a shock to the structural balance. This finding is coherent with the finding that the **NR** regime prevails in the entire period. Moreover, the insignificant response of debt stock to a positive shock in the cyclical balance (s_t^c) may mean that the government does not use unexpected revenues to pay off its debt, which can again be interpreted as the **NR** regime.

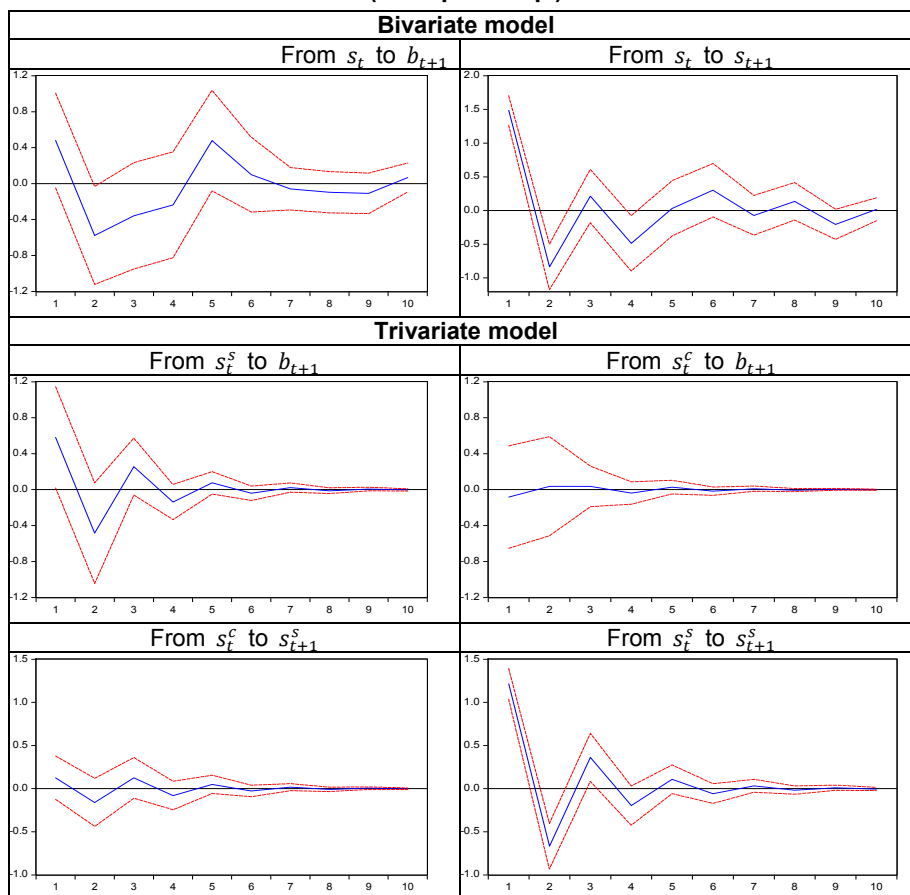
Figure 2. Impulse-response Functions (VAR in levels) (1996q1-2019q4)



In Figure 3, the impulse-response functions obtained with the first difference data for the whole period (1996q1-2019q4) are presented. The findings for the bivariate model show that a positive impulse to primary surplus has an insignificant response, which is similar to the result we have in our main analysis. A period later, however, the debt's response turns to negative and significant, which may imply that we have an **R** regime. In fact this finding contradicts our main findings. However, when we look at the response of primary surplus at $t+2$, it is seen that it is negative and significant. This can be interpreted as the government's

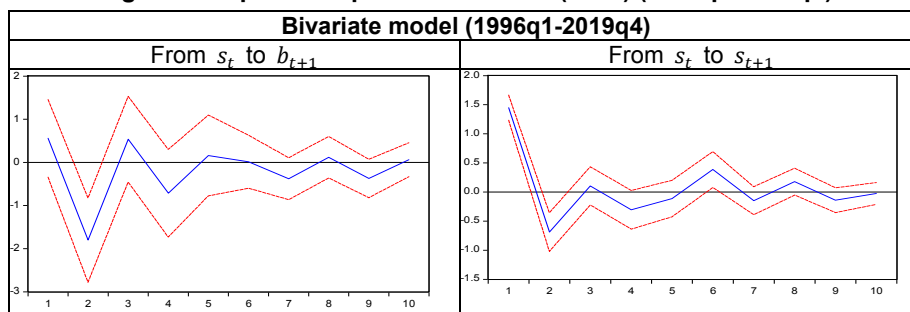
response to a positive shock in the primary surplus by reducing the primary surplus, which again indicates that we have an **NR** regime.

**Figure 3. Impulse-response Functions (VAR in first differences)
(1996q1-2019q4)**



Long story short, the finding obtained in the analysis using first-difference data does not contradict our main analysis, which concludes that the **NR** regime prevails for the whole period. In Figure 4, graphs of the impulse-response functions obtained from the error correction analysis performed with the same variables and for the same period are given. The graphs illustrate that the analysis performed with the first difference data yields almost the same findings, so the interpretation of the findings is the same. We perform the analysis with the first difference data for also the trivariate model. Comparing our findings presented in the lower panel of Figure 3 with those in Figure 2, we see quite similar findings that do not change the final interpretation that the NR regime was the dominant regime for the entire period.

Figure 4. Impulse-response Functions (ECM) (1996q1-2019q4)



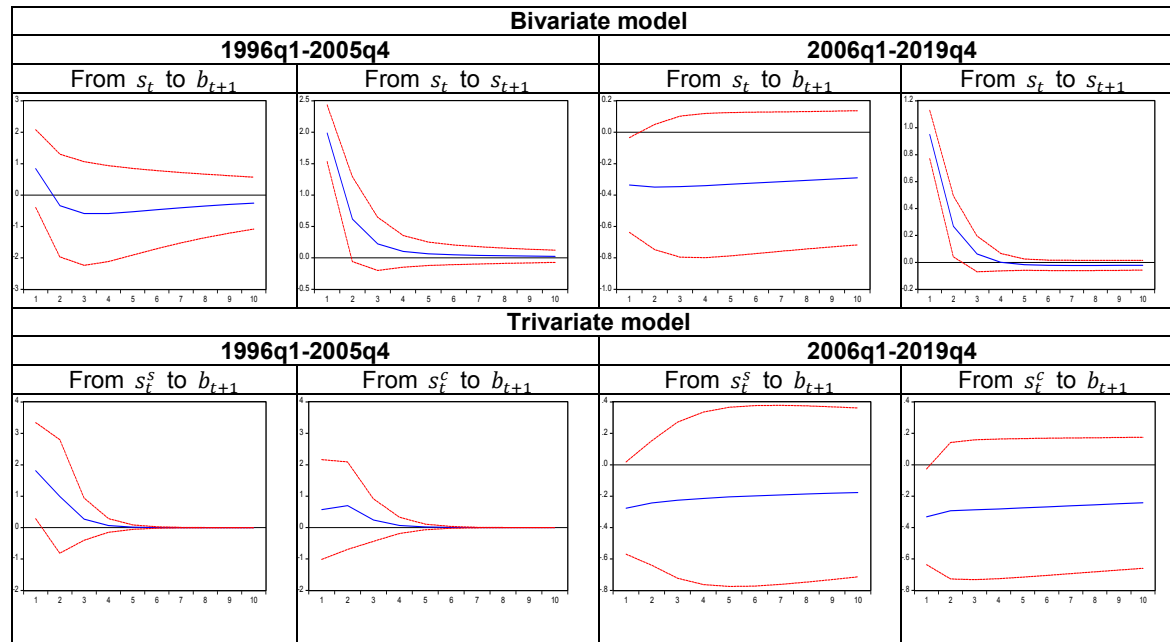
As stated in section three, the MTFP, which for us is an implicit declaration of the transition to **R** fiscal policies, came into force in 2006. For this reason, we think that it would be useful to separate the sample into pre-2006 and post-2006 sub-periods. The results we obtained with the level data by dividing the sample into two sub-periods (1996q1-2005q4 and 2006q1-2019q4) are presented in Figure 5.

Long story short, the finding obtained in the analysis using first-difference data does not contradict our main analysis, which concludes that the **NR** regime prevails for the whole period. In Figure 4, graphs of the impulse-response functions obtained from the error correction analysis performed with the same variables and for the same period are given. The graphs illustrate that the analysis performed with the first difference data yields almost the same findings, so the interpretation of the findings is the same. We perform the analysis with the first difference data for also the trivariate model. Comparing our findings presented in the lower panel of Figure 3 with those in Figure 2, we see quite similar findings that do not change the final interpretation that the NR regime was the dominant regime for the entire period..

Note that the aforementioned Cochrane's critique claims that if there is a negative and significant correlation between cyclical and structural balance, this may lead us falsely to an R regime result, while the fiscal regime is actually NR. The trivariate model results enable us to see if this is the fact. The response of the structural balance to the cyclical balance (the IRF at the bottom of the third column of Figure 5) reveals no significant result, which means Cochrane's critique is not valid.

When the results of the trivariate model are examined, it shows that the results support the findings of the bivariate model for the first sub-period. A positive shock in the structural balance (s_t^s) elicits a positive and significant response in the debt stock, which means, again, a result points to an NR regime. In the second period, the debt's response to the structural balance is negative but statistically insignificant. However, the debt stock's response to the cyclical balance is negative and statistically significant. This may explain the seemingly R regime in the second period. So, even if the government does not follow R policies structurally, using unexpected revenues to pay off debt, keeps fiscal policies stable.

Figure 5. Impulse-response functions (VAR in levels)
 (1996q1-2005q4 and 2006q1-2019q4)



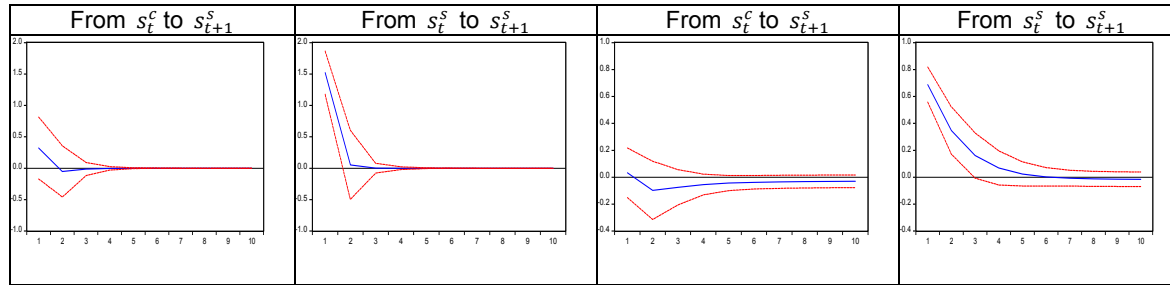
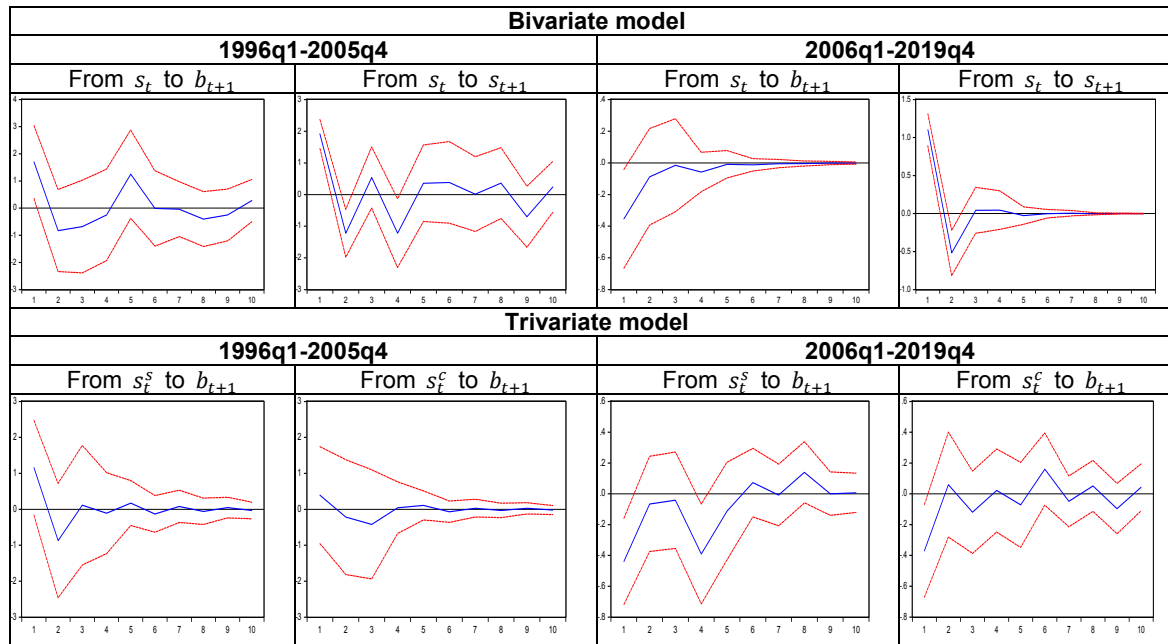
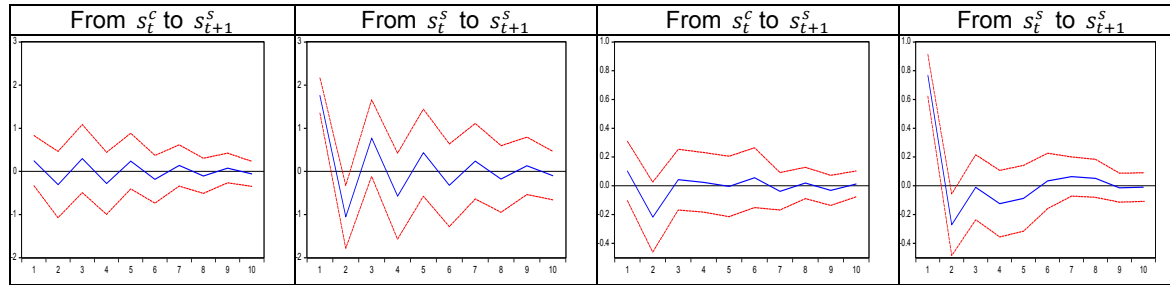


Figure 6 shows the graphs of impulse-response functions generated using first-difference data for the two sub-periods separately. The impulse-response functions for both bivariate and trivariate models for the 1996-2005 period are quite similar to the graphs presented in the left panel of Figure 5. However, the results for the period 2006-2019 differ in some points from the results of the impulse response functions in the right panel of Figure 5, which needs to be elaborated. First of all, the negative and significant response of debt stock to primary surplus in the results of the bivariate model is the same as the results in Figure 5. As mentioned before, this implies that the R regime prevails for the second period. Primary surplus' future response, however, is negative and significant, which arouse suspicion if there is an NR regime in the second period.

As for the trivariate model, in addition to the negative and significant response (as it is in our main analysis in Figure 5) of debt stock to cyclical balance, response to a positive shock in structural balance is also negative and significant. This finding strengthens our result showing that an R regime prevails in the second period. However, the negative and significant reaction of future structural balance casts suspicion on our R finding. Here, we argue that even though the second period is a basically R-dominant period, the actual regime after 2017 can turn to an NR regime. Since we do not have a longer time series data set yet, we cannot show this in an econometric analysis. This change in the government's behavior can result in this seemingly contradictory results. However, all in all, the main interpretation does not change and for the first period NR regime prevails, while R regime prevails in the second period.

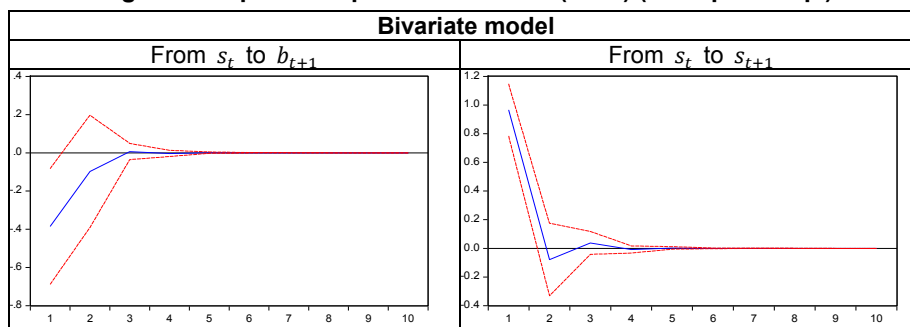
**Figure 6. Impulse-response Functions (VAR in first differences)
(1996q1-2005q4 and 2006q1-2019q4)**





Finally, Figure 7 depicts the impulse response functions for the whole period (1996-2019), and second sub-period (2006-2019). Since we did not find any cointegrating relationship between primary surplus and debt stock for the first period (1996-2005) we did not estimate error correction model (see Table A1), and hence impulse response functions. We have mentioned the ECM impulse responses above. For the second period, the impulse-response functions from ECM show exact similarity with the ones in Figure 5's upper-right panel. So, there is no contradiction with our main analysis, either.

Figure 7. Impulse-response Functions (ECM) (2006q1-2019q4)



7. Conclusion

In this study, we test the validity of the FTPL in Turkey for the period 1996q1-2019q4. While doing this, we paid much attention to two basic issues. First, since the FTPL is basically grounded on the distinction between R and NR fiscal regimes, we focus on the determination of the dominant regime during the review period. Secondly, we include the structural balance in our research, as we believe that the structural primary balance should be taken into account in order to observe the government's actual policy preferences. Basically, following the methodology proposed by Girouard and Andre (2005), we subdivide primary balance into structural and cyclical balance. Once we make this calculation and obtain the structural balance, we have a chance to compare the findings of the VAR analyzes with the primary balance and the structural balance.

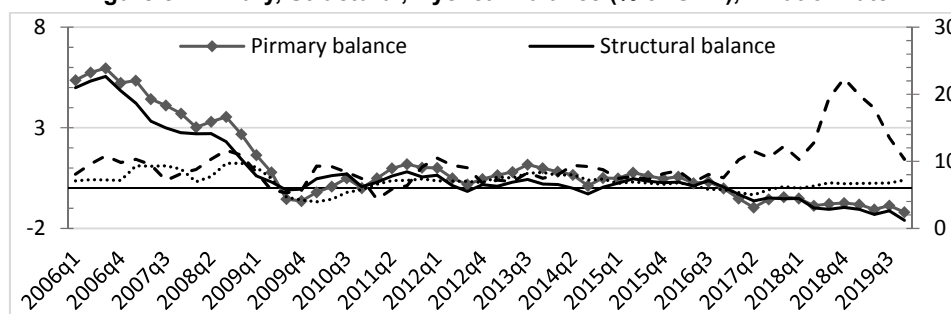
First, we establish bivariate and trivariate VAR models for the entire research period. Having done this, we do the similar analyses with ECM models. For the whole period of 1996q1-2019q4 the impulse-response functions we obtained (Figure 2) for both the bivariate and trivariate models show that the NR regime is dominant throughout the investigation period.

In the pre-2006 period, the estimated IRFs (Figure 5) of the bivariate model show that the debt stock's response to a positive shock in the primary balance is insignificant, and the trivariate IRF results exhibit positive and statistically significant responses of the debt stock to positive shocks in structural balance. These findings are considered to be a strong sign of an NR regime for the 1996q1-2005q4 period. As for the post-2006 period, however, results tell us another story. According to the estimation results of the IRFs of the bivariate model in this period, the response of the debt stock is negative and statistically significant, which is an expected result for an R regime. When we look at the trivariate model, we see that the calculated IRFs exhibit an insignificant response of the debt stock to a positive structural balance shock. On the other hand, a positive shock to the cyclical balance produces a negative and significant response of the debt stock, from the second term on. This result is

interpreted as when the government generates an extra or unexpected surplus (cyclical), it uses this money to pay back its debt. But structurally, however, nominal debt stock is not a fiscal priority for the government. Above all, if we combine the results of the two models, we can say that the government still pursues a stable IBC in the post-2006 period, although it structurally follows NR policies. This result implies that if there is no extra surplus, the government will give less attention to nominal debt stock, as debt stock is around 30 percent.

Figure 8 displays that the primary and structural balances are quite higher than the cyclical balance until the first quarter of 2009. From this point on, the three lines in the Figure converge, but the structural balance is still positive. However, by 2017 (when the inflation rate started to rise), both primary and structural balances turn negative. Even though the cyclical balance helps to return the primary balance to the positive area, this is not enough to create fiscal room for the government. As we have already mentioned, the government keeps IBC steady by generating cyclical revenues and using them in debt repayment. As long as the government has fiscal room, this policy can work properly. However, if there is not sufficient fiscal room, as is the case now in Turkey, this policy will fail.

Figure 8. Primary, Structural, Cyclical Balance (% of GDP), Inflation rate



Source: 'Primary balance' and 'Inflation rate' data is calculated by authors with data taken from www.tcmb.gov.tr (Central Bank of Turkey). Structural and Cyclical balance data is calculated by authors.

Consequently, thanks to the measures taken in the financial sector in the aftermath of the 2001 financial crisis, and to the first MTFP prepared in 2006, Turkey stepped into an R policy phase. We witnessed sharp declines in inflation in this period, and thus it can be said that R policies succeeded. However, since the beginning of 2009, Turkey has started to use fiscal policies, since it has a large fiscal room, and the global financial crisis necessitates fiscal policy to be used actively. As a result, NR policies have led the decline in inflation to stop even after the effects of the global crisis have been overcome. Since the fiscal room has narrowed from 2017 onwards, inflation has started to increase sharply.

As a result, the division of primary balance into two parts as structural and cyclical balance data enables us to observe the real policy behavior of the government. Thus, our bivariate model results indicate that the R regime prevailed in the post-2006 period. However, thanks to the subdivision of primary balance data, we have concluded that the real policy behavior of the government is NR. Note that the FTPL does not favor either R or NR policies, and says nothing about which is better for an economy. Instead, it argues that NR regimes are more possible to encounter, and if this is the case, central banks follow a passive monetary policy for a stable price level.

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APPENDIX

Table A1

Macroeconomic indicators

Year	Public debt	Budget deficit	Primary balance	Growth	Inflation	Money market rate
1996	34.60	-6.41	1.37	7.45	78.25	73.99
1997	33.20	-5.80	0.11	7.54	95.19	78.04
1998	30.33	-5.29	3.30	3.23	72.83	78.97
1999	38.93	-8.54	1.46	-3.39	66.30	69.97
2000	37.36	-7.77	4.20	6.64	42.14	183.20
2001	72.60	-11.83	4.90	-5.96	66.87	59.00
2002	67.65	-11.10	3.33	6.43	31.02	44.00
2003	60.52	-8.59	3.93	5.61	18.94	26.00
2004	54.93	-5.25	4.54	9.64	9.42	18.69
2005	49.27	-1.45	5.33	9.01	7.62	13.57
2006	43.78	-0.59	5.24	7.11	9.83	17.50
2007	37.92	-1.83	3.70	5.03	8.16	15.96
2008	38.28	-2.41	2.68	0.85	10.93	15.63
2009	44.24	-5.97	-0.64	-4.70	5.71	6.50
2010	40.87	-4.16	0.00	8.49	7.43	1.63
2011	37.22	-2.01	1.02	11.11	9.20	5.00
2012	33.95	-2.63	0.45	4.79	6.77	5.00
2013	32.39	-1.77	0.99	8.49	7.48	3.50
2014	29.96	-1.94	0.51	5.17	8.76	7.50
2015	29.00	-1.80	0.47	6.09	8.16	7.25
2016	29.13	-1.94	-0.01	3.18	7.57	7.25
2017	28.18	-2.27	-0.44	7.47	12.27	7.25
2018	28.65	-2.72	-0.73	2.83	22.37	22.50
2019	31.04	-3.53	-1.20	0.88	10.31	10.50

Source: Debt, budget, growth and Inflation data taken from Turkish Central Bank (www.tcmb.gov.tr); Money market rate is retrieved from Fred Economic Data (<https://fred.stlouisfed.org/series/IRSTCI01TRA156N>) [05.05.2020]