TÜRKİYE CUMHURİYET MERKEZ BANKASI

WORKING PAPER NO: 16/19

# Cyclical Variation of Fiscal Multiplier in Turkey

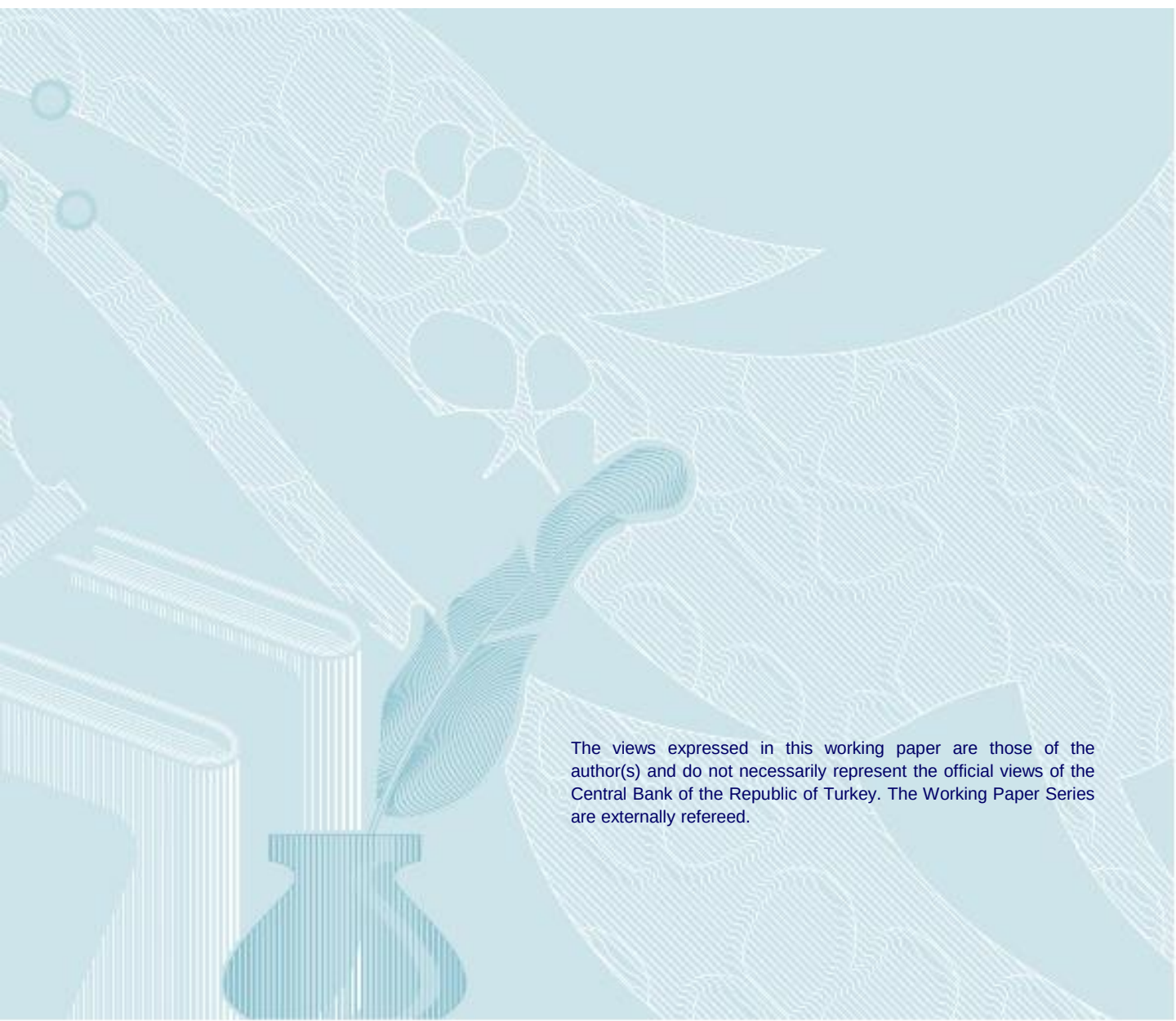
September 2016

Cem ÇEBİ
K. Azim ÖZDEMİR

Address:
Central Bank of the Republic of Turkey
Head Office
Structural Economic Research Department
İstiklal Caddesi No: 10
Ulus, 06050 Ankara, Turkey

Phone:
+90 312 507 80 04

Facsimile:
+90 312 507 57 33



# Cyclical Variation of Fiscal Multiplier in Turkey*

Cem Çebi†
Central Bank of the Republic of Turkey

K.Azim Özdemir‡
Central Bank of the Republic of Turkey

**Abstract**

This paper aims to investigate cyclical variation of government spending multiplier for Turkey over the period of 1990:q1-2015:q4. We use a time series model, namely local projection method, to estimate the variation in the fiscal multiplier under two different regimes: low and high growth regimes with respect to long-term economic growth. In line with the literature our results confirm that the effectiveness of fiscal policy enhances at times of low growth compared with times of high growth. Turning to the components of government spending, we find that the magnitude of government investment multiplier is larger than that of government consumption multiplier in both regimes. This evidence supports the view that an expansionary fiscal policy via public investment has a profound effect on output compared to public consumption. However, we find an evidence that the influence of government consumption on GDP increases substantially at times of low growth. All in all, we suggest policymakers to use public investment rather than public consumption in order to stimulate the economy during economic expansion and prefer to increase public consumption at the times of economic slow down.

**JEL Classification:** E62, H30

**Keywords:** Fiscal Policy**,** State-dependent Fiscal Multipliers, Local Projection

*We would like to thank Ümit Özlale, Zafer Yükseler and the anonymous referee for valuable comments and suggestions and Çağlar Yüncüler for data support. The paper represents the views and analysis of the authors only and does not represent those of the Central Bank of the Republic of Turkey. Thus, any error is ours.

†Address: Central Bank of the Republic of Turkey, Head Office, Istiklal Caddesi, No:10, Ankara/TURKEY; e-mail: cem.cebi@tcmb.gov.tr

‡Address: Central Bank of the Republic of Turkey, Head Office, Istiklal Caddesi, No:10, Ankara/TURKEY; e-mail: azim.ozdemir@tcmb.gov.tr

# 1 Introduction

State-dependent features of fiscal multiplier has been the focus of the fiscal studies since the onset of the global financial crisis in 2007-2008. This is because there is no consensus on size and even sign of fiscal multiplier and there are various factors that affect the output responses of fiscal policy shocks. As a result there is a growing body of literature that investigate the effect of country, time and episode-specific characteristics on the magnitude and direction of fiscal multipliers[1]. This paper contributes to this literature by investigating the cyclical variation of fiscal multiplier in Turkey.

The fiscal studies regarding with fiscal multipliers utulize three main methodologies to measure the size of the fiscal multiplier, namely macroeconometric forecast models, time series models and DSGE models[2]. Previous studies based on linear VAR and linearized DSGE models remain insufficient to account for state-specific features of fiscal multipliers[3]. Therefore, the recent studies in the field of fiscal multiplier consider the possibility of a non-linear relationship between the size of the fiscal multiplier and the state of the business cycles. Many authors, among others, Baum and Koester (2011), Auerbach and Gorodnichenko (2012, 2013, 2014), Arin, Koray and Spagnolo (2015) argue that the size of the fiscal multiplier varies with the state of the business cycle and they find that the size of fiscal multiplier is high at times of recession compared to the periods of expansion. On the other hand, in contrast to these findings, Ramey and Zubairy (2014) and Alloza (2014) claim that size of the fiscal multiplier diminishes during the periods of recession. Within the non-linear VAR framework (regime-switching VARs), three main tools are being used in the literature, namely threshold VAR (TVAR), smooth transition VAR (STVAR) and Markov Switching VAR (MSVAR) to take into account state-dependent effects of fiscal policy[4]. Besides, we observe that local projection method has recently gained great attention in the field of fiscal multiplier, following the studies of Auerbach and Gorodnichenko (2013) and Ramey and Zubairy (2014).

The size of fiscal multiplier is not only determined by the state of the business cycles but also by other factors such as the nature of fiscal shock, the type of exchange rate regime, degree of trade openness, the size of automatic stabilizers, the state of public finance, health of the financial sector and the implementation of monetary policy[5]. Hence, it might be important to investigate the sensitivity

[1] See Blanchard and Leigh (2013) about this issue.

[2] One may find detailed information about these models and comparison of their advantages and inadvantages in Whalen and Reichling (2015).

[3] In the VAR context there are several papers which solve the identification problem of fiscal policy shocks in a different manner. These are SVAR approach (Blanchard and Perotti (2002)), sign restriction approach (Mountford and Uhlig (2008)), recursive approach (Fatas and Mihov (2001) and Favero (2003)) and narrative approach (Ramey and Shapiro (1998), Edelberg et al. (1999) and Burnside et al. (2004)). Within the DSGE framework, see Coenen et al. (2012) for the model-based estimations of fiscal multipliers.

[4] While Baum and Koester (2011), Batini et al. (2012) and Baum et al. (2012) use threshold VAR, Auerbach and Gorodnichenko (2012), Hernandez de Cos and Moral-Benito (2013) and Herbert (2014) use STVAR technique for estimating fiscal multiplier. On the other hand, Ko and Morita (2013) and Arin, Koray and Spagnolo (2015) can be given as examples of MSVAR technique.

[5] See Batini et al. (2014) for more information about the determinants of fiscal multiplier.

of fiscal multiplier to these parameters as in Corsetti et al. (2012) and Ilzetzki et al. (2011). While Corsetti et al. (2012) measure the sensitivity of fiscal multiplier in three dimensions, namely, exchange rate regime, health of the financial sector and state of the public finance, Ilzetzki et al. (2011) examine the effects of fiscal policy on output by categorizing countries based on their development level, their debt level, degree of trade openness and the type of exchange rate regime. Moreover, Christiano et al. (2011) analyze the effectiveness of fiscal policy when monetary policy at zero lower bound and Alloza (2014) explores state dependent features of fiscal multiplier under periods of low and high uncertainity as well as periods of booms and recessions.

This paper aims to estimate cyclical variation of government spending multiplier for Turkey based on time-series data over the period of 1990:q1 - 2015:q4. We use local projection method to measure the effectiveness of fiscal policy under two different regimes: low growth and high growth regimes. The motivations behind this paper can be explained as follows: First of all, an upward trend in the government spending to GDP ratio and its contribution to the growth rate make the transmission mechanism of fiscal policy an interesting topic to analyze. Secondly, it is argued that an expansionary effect of government spending may vary with different growth regimes (high & low growth regimes). Therefore, it is crucial to know when fiscal policy is an effective tool to stimulate the economic activity. Finally, gauging the size of government consumption and government investment multiplier enables to evaluate the role of components of government spending. We are particularly interested in assessing the role of public consumption and public investment during the high-growth period and the low-growth period.

There are few studies which tend to estimate the size of the fiscal multiplier in Turkey. Çebi (2010, 2016), Şen and Kaya (2015) calculated the magnitude of the fiscal multiplier using a linear-model. To the best of our knowledge our paper is the first one that contemplates a non-linear model which assumes that size of the fiscal multiplier may differ under different growth regimes in Turkey[6]. Moreover, we apply the local projection method which is a technique recently used for measuring size of the fiscal multiplier in the literature. What is more, we use quarterly data covering the period 1990:q1 through 2015:q4, which is longer than other fiscal studies on the Turkish economy.

The main findings of the study can be summarised in the following manner: Timing of fiscal shocks matters for size of fiscal multiplier with the finding of higher (lower) government spending multipliers at times of low (high) growth. Put another way, in line with most of the studies in the literature, we find that an increase in government spending at the times of low growth has a profound impact on output compared to an increase in government spending at time of high growth. Turning to the components of government spending, we get similar results for the strengh of public consumption and

[6]Berument and Doğan (2004) examines the asymmetric effects of government spending shocks on the macroeconomic variables for Turkey. However, the aim of their study, the definition of government spending they used and the methodology they applied differ from our approach. They are particularly interested in whether the effects of expansionary and contractionary fiscal policy on economic outcome will be asymmetric.

public investment multiplier in a low growth period. A comparison of two components of government expenditures reveals the fact that government investment expenditures are more effective than government consumption expenditures in boosting output in the high growth regime. Moreover, government investment has a stronger impact effect than consumption expenditures in the low growth regime and this strong impact continues until the end of the first year.

This paper is structured as follows. Section 2 provides an overview of fiscal policy in Turkey. Section 3 describes the data; Section 4 outlines the local projection methodology; Section 5 presents estimation results of the study: impulse response analysis and size of government spending multipliers; Section 6 devoted to robustness analysis; Section 7 concludes the study.

## 2 Fiscal Policy in Turkey

The Turkish economy has undergone major changes in fiscal policy, in line with the economy, since 1990. Most importantly, the period between 1990 and 2015 can be divided into two sub-periods marked by the banking crisis in 2001. Before the crisis the Turkish economy was relatively fragile in terms of growth and suffered from high inflation and worsening debt dynamics. It was widely accepted that the high budget deficit was the main source of economic problems in this fragile period. Following the crisis the Turkish economy exhibited a solid economic performance with improving budget control, sustainable economic growth and lowering inflation rates.

Following the deep financial crisis that occurred at the beginning of 2001, a comprehensive stabilization programme "Strengthening the Turkish Economy" was put into effect in Turkey. It was conducted under a flexible exchange rate and an informal (implicit) inflation targeting regime, underpinned by the coordination between fiscal and monetary policies. With successfull implementation of the programme Turkey entered into a new phase, which is called sound period, due to notable improvements in fiscal stance (high primary budget surpluses and low debt ratios) and lower inflation rates. The only exception when the economy contracted sharply in the sound period was the aftermath of the global financial crisis in 2008. To eliminate the negative effects on the domestic economy, some fiscal and monetary measures were taken. On the fiscal side, in parallel with some countries, Turkey gave more importance to economic stabilization and implemented a countercyclical fiscal policy at the time of the recession by temporarily decreasing taxes and increasing government spending. As a result of expansionary fiscal policy, budget deficit and debt stock markedly increased in 2009. However, the deterioration in the fiscal indicators was short lived due to the quick recovery from the recession (high growth performance in the period of 2010-2011) and removal of the temporary tax reduction measures.

Figure 1 displays the pattern of government spending to GDP ratio and its components during the period of 1990-2015. Government spending consists of government consumption and investment expenditures, which are the focus of this study. We have observed a persistent upward trend in the

government spending to GDP ratio throughout the whole period. While government spending to GDP ratio was 14.3 percent at the beginning of the period, it reached to 20.1 percent at the end of the period (Figure 1). There is also a clear difference between two subperiods in terms of government spending to GDP ratio. While the share of government spending in the GDP was 14.9 percent in the fragile period (1990-2001), it realized 17.4 percent in the solid period (2002-2015). Examining the composition of the government spending reveals the fact that a major part of government spending, public consumption to GDP ratio, increased to 15.7 percent in 2015 by showing an increase of 6.8 percentage points compared to 1990 (Figure 1). However, we do not observe a similar upward trend for public investment to GDP ratio throughout the whole period. It seems more stable compared to public consumption to GDP ratio. Therefore, the upward trend in government spending raises a question regarding with contribution of government spending to GDP growth. Furthermore, large variations in growth rate make interesting to investigate how output responds to an expansionary fiscal policy via an increase in government spending during different phases of the business cycles. Finally, it will be also important for policymakers to know which type of government spending is effective during the times of low growth and the times of high growth.

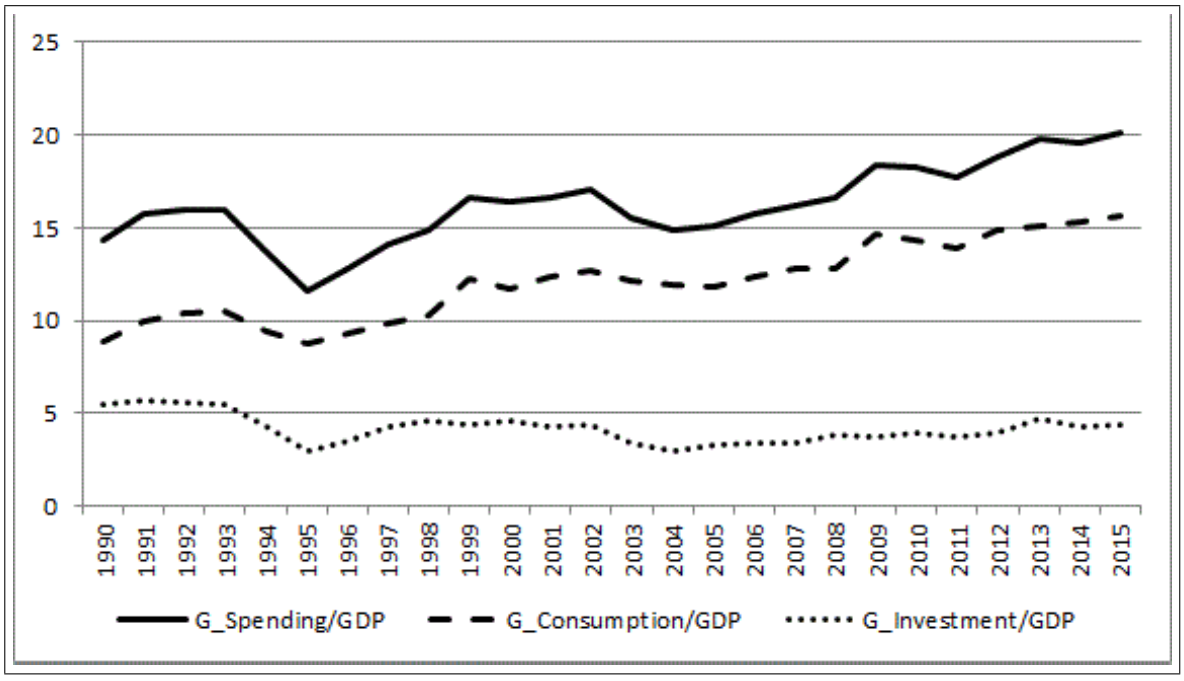


Figure 1: Government Spending as Percentages of GDP: 1990-2015

## 3 Data

As in Blanchard and Perotti (2002) and Auerbach and Gorodnichenko (2012), we include three variables in the baseline model, namely, *government spending* ($g_t$), *tax revenues* ($t_t$) and *output* ($y_t$). We include tax revenues in the model to control for tax policy. The real GDP, real government spending

and its components are collected from National Accounts published by Turkish Statistical Institute. In line with the other studies government spending covers government final consumption expenditures ($gc_t$, compensation of employees and purchases of goods and services) and government investment expenditures ($gi_t$, gross fixed capital formation)[7]. Since our analysis covers the period from 1990:q1 to 2015:q4, we merge two real GDP series (old GDP series is based on 1987=100 and new GDP series based on 1998=100) to obtain a long data set for output and government spending. Tax revenues are obtained from the Ministry of Finance of Turkey[8]. We use GDP deflator to convert nominal tax revenues to real values. Natural log of seasonally adjusted real variables (real GDP, real government spending and real tax revenues) are used in the analysis[9].

# 4 Methodology: Local Projection

In this study, Jorda's (2005) local projection method is used to estimate impulse responses and fiscal multipliers. Local projection method has recently been used in the empirical fiscal policy following Auerbach and Gorodnichenko's (2013) paper, who was to first to apply this method to calculate state dependent fiscal multipliers. The other studies which apply this technique to estimate regime dependent fiscal multipliers are Owyang et al. (2013), Ramey and Zubairy (2014), Dell'Erba et al. (2014), Alloza (2014). As clearly explained in Auerbach and Gorodnichenko (2013) and Ramey and Zubairy (2014), local projection method has some advantages compared to other methods. First, one can easily adapt non-linearity in the model to estimate state dependent fiscal multipliers. Second, it does not constraint the shape of the impulse response function. Third, local projection method allows to use a more parsimonous specification, because there is no need to estimate the equations for dependent variables that are not the focus of the study. Fourth, local projection method enables government spending to change the regime from low growth state to high growth state or viceversa. Fifth, the variables on both sides of the equation do not have to be same form as in a VAR specification.

The model which allows state dependence can be written as follows:

[7] We use government spending data obtained from National Accounts (as a component of real GDP) instead of central government budget expenditure. Since the coverage of the budget and budgetary system of Turkey changed frequently, it would be difficult to obtain consistent quarterly data for government spending for a long period. This is the reason why we choose the former definition of government spending. According to the economic classification the budget expenditures total government spending consists of three main components, namely government consumption, investment and transfer expenditures. In line with the other studies, we describe government spending as a sum of government consumption and investment, which directly affects the output. On the other hand, transfer expenditures affects disposible income of households and so indirectly affects the output.

[8] Ministry of Finance of Turkey has published monthly data on central government budget since January 2006. She also extended the central government budget data back to 2000 on an annual basis. For the earlier periods (1990-1999), tax rebates were substracted from consolidated budget tax revenues and amount of local administrations and fund shares were added to consolidated budget tax revenues in order to obtain a proxy for central government budget tax revenues. To convert annual data to quarterly data we calculate the shares of quarterly tax revenues in total tax revenues for each year by using consolidated budget figures. Then, we apply these quarterly ratios to the corresponding yearly central government budget tax revenues to get quarterly data for the period of 1990-2005.

[9] All series are seasonally adjusted using Tramo/Seats method.

$$x_{t+h} = I_{t-1}\left[\alpha_{A,h} + \psi_{A,h}(L)y_{t-1} + \beta_{A,h}shock_t\right] + (1 - I_{t-1})\left[\alpha_{B,h} + \psi_{B,h}(L)y_{t-1} + \beta_{B,h}shock_t\right] + linear\_trend + \varepsilon_{t+h}$$

where $x$ denotes the variable of interest, y represents a vector of control variables, $\Psi(L)$ is a polynomial of order 4, and shock is the VAR-based government spending shocks. In our study, $x$ contains logs of real government spending and output, $y$ consists of lags of the log values of government spending, output and taxes. $I$ is a dummy variable that shows the state of the economy. The coefficient $\beta_h$ represents response of $x$ at time $t+h$ to the shock at time $t$. Hence, one can construct impulse responses by estimating a set of regressions for each horizon $h$. We include a constant ($\alpha_{A,h}$ and $\alpha_{B,h}$) and a linear trend in the model. The model described above allows to change in the coefficients according to the state of the economy. Following Ramey and Zubairy (2014) we use the Newey-West correction for standard errors to eliminate the possibility of serial correlation in the error terms[10].

One of the issues that need to be clarified is related to defining the state of the economy. Since we investigate cyclical variation of fiscal multiplier the whole period split into two separate periods, namely, the high growth era and low growth era. Various variables such as output gap, growth rate, capacity utilization and the unemployment rate are used as a measure of economic slack in the literature. As in Auerbach and Gorodnichenko (2012) we use 7 quarter centered moving average real GDP growth rate as a threshold variable to determine the state of the business cycle[11]. We assume that if moving average of GDP growth rate exceeds 1 in a particular period, it will be accepted as high growth state[12]. Similarly, if value of moving average of GDP growth rate remains below 1, that period will be accepted as low growth state. Figure 2 shows both regimes based on the selection criteria described above. Shaded areas convey the low growth regime. It appears that the low growth regime captures severe financial crises that the Turkish economy experienced.

[10] See Newey and West (1987).

[11] Considering only a quarter to decide the state of the economy may give wrong messages due to highly volatile nature of quarterly growth rate. Hence, we select 7 quarter moving average growth rate as a threshold variable to obtain more stable parameter to decide low and high growth states.

[12] We implicitly assume that annual potential GDP growth rate is 4 for Turkey. So, we choose 1 as a threshold value for growth rate in a period, which corresponds to 4 for annual growth rate. We have 100 observations. Half of all observations (50 observations) are recorded as low growth state and rest of them are classified as high growth state.

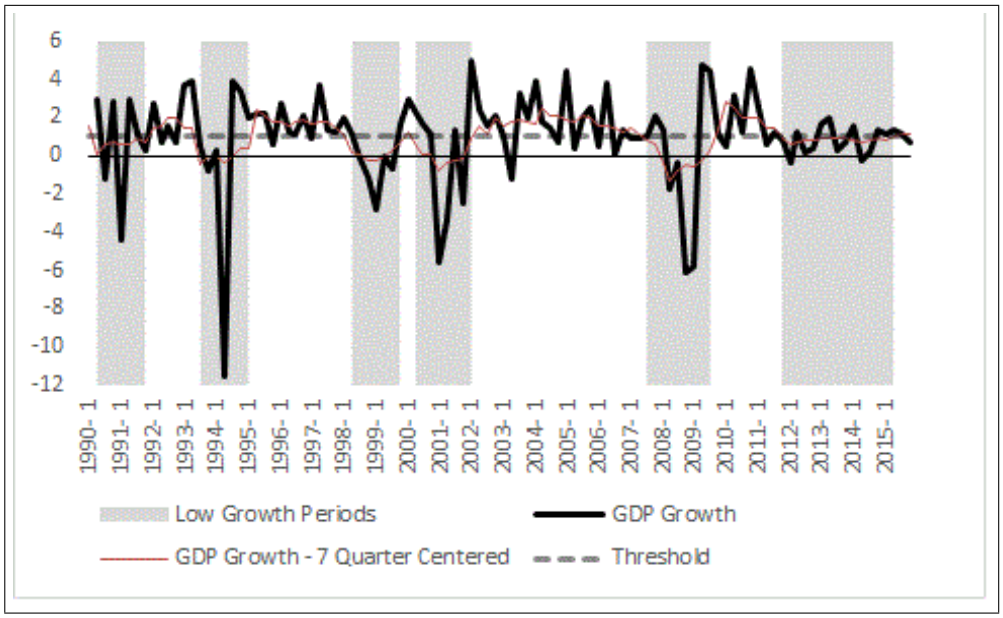



Figure 2: Low/High Growth Periods

Another issue arises from identification of fiscal policy shocks. There are three different frameworks to achieve identification of fiscal policy shocks in the literature. These are VAR-based fiscal shocks, narrative approach based on news about future defense spending and forecast error for growth rate of government spending[13]. To construct fiscal shocks we establish a three variable VAR framework based on a Cholesky decomposition where government spending is oredered first, tax is second and output is third [14].

## 5 State-Dependent Fiscal Multipliers

Fiscal multiplier is used to measure the effectiveness of fiscal policy. As described in Spilimbergo et al. (2009), government spending multiplier is defined as a ratio of a change in output to an exogenous change in government spending. We report cumulative fiscal multipliers over the horizon of up to 8 quarters to analyse short run (one year, $h = 4$) and medium run (two years, $h = 8$) effects of fiscal policy on economic activity. Cumulative fiscal multiplier is calculated as sum of output responses over

[13] Ramey (2011) constructed two news series of government spending shocks. One of them is called "defense news variable" (news about future defense spending) which is computed by taking into account expected present discounted value of changes in government spending. The other one is based on forecast errors of professional forecasters. While Auerbach and Gorodnichenko (2012,2013) use forecast error for growth rate of government spending, Ramey and Zubairy (2014) use news about future defense spending for identification of fiscal policy shocks. Alloza (2014) can be given as an example for both VAR-based approach and narrative approach (news about future defense spending).

[14] Other identification strategies can not be used in Turkey. Narrative approach uses news about future defense spending related to wars as an exogenous fiscal shocks. However, Turkey has not experinced a war during the period under consideration. Moreover, we are not interested in multiplier effect of military expenditures. In this study, we focus on output responses of government consumption and investment shocks. On the other hand, we can not calculate forecast error for government spending because there is no official announcement for quarterly forecast of fiscal variables in Turkey.

any period divided by sum of government spending responses over the same period[15]. As indicated by Ramey and Zubairy (2014) the cumulative multipliers measure the cumulative GDP gain relative to the cumulative cost of government spending.

Impulse responses and confidence intervals (shaded areas - one standard deviation) for both regimes are illustrated in Figure 3. Output and tax respond positively to the expansionary fiscal policy via an increase in government spending. Tax responses to a positive government spending shock mimic those of output due to the presence of automatic stabilizers in the tax system. Output responses to a change in government spending peak around the second quarter and perform a hump-shaped pattern. It seems that an increasing trend in output response lasts a short time before it abates. Output responses to a government spending shock are statistically significant at the first six quarters in the low growth regime, and statistically significant during the first year in the high growth regime.

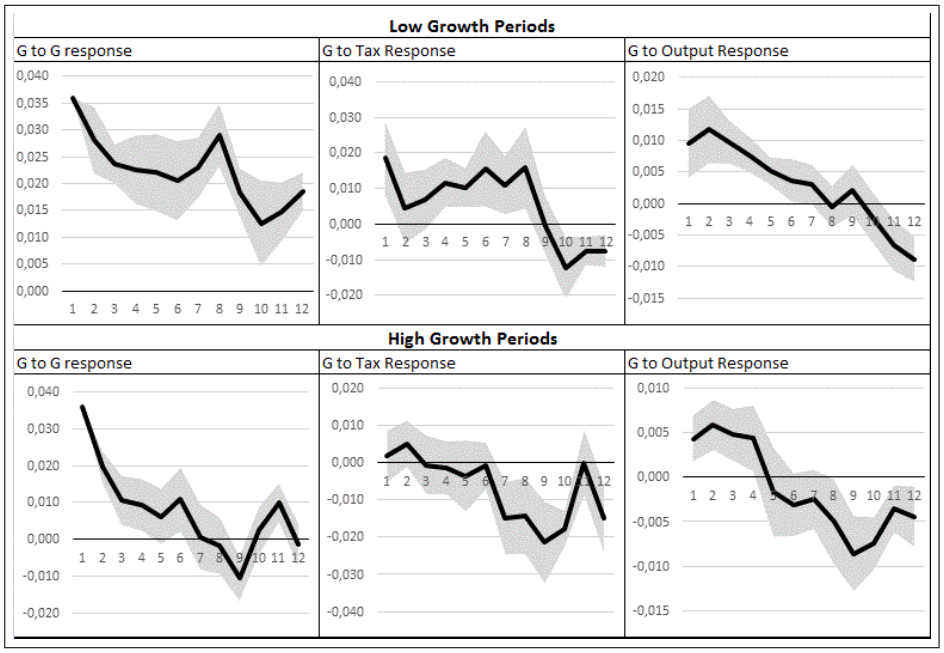



Figure 3: Responses to Government Spending

Fiscal multipliers presented in Table 1 and Figure 4 are based on local projection method[16]. We calculate fiscal multipliers for total government spending as well as its two components, namely government consumption and government investment. While Table 1 demonstrates specific fiscal multipliers, namely impact ($h = 1$), one-year ($h = 4$), two-year ($h = 8$) and peak multipliers, Figure 4 shows cumulative multipliers for the whole period up to 8 quarters for two different regimes (high/low

[15] The cumulative fiscal multiplier for different horizon H can be shown as follows: $\left(\frac{\sum_{j=0}^{H} \Delta Y_{t+j}}{\sum_{j=0}^{H} \Delta G_{t+j}}\right)$

[16] STATA and MATLAB are used for estimation. To convert a percentage change to a unit change we use sample average of government spending to GDP ratio. When we calculate state dependent fiscal multipliers we use respective value of government spending to GDP ratio for each regime.

growth) and the linear model[17]. At first sight we observe that fiscal multipliers in the low growth regime are considerably larger than those in the high growth regime, with the results for the linear model generally centering those for two different regimes (Figure 4)[18]. Our results are consistent with many papers such as Baum and Koester (2011), Auerbach and Gorodnichenko (2012, 2013, 2014), Arin, Koray and Spagnolo (2015), who support the view that size of fiscal multiplier differs considerably if the growth regime change in a country. They find high multiplier effects of fiscal policy during the period of recession compared to the period of expansion. However, in contrast to our findings, Ramey and Zubairy (2014) and Alloza (2014) claim that magnitude of fiscal multiplier alleviates during the period of recession.

| | | **Cumulative Multipliers** | | | **Normal** |
|---|---|---|---|---|---|
| **Regime** | **impact** | **one-year** | **two-year** | **peak** | **peak** |
| Government Spending | | | | | |
| Low | 1.73 | 2.28 | 1.59 | 2.30 | 2.13 |
| High | 0.85 | 1.79 | 0.55 | 1.79 | 1.14 |
| Linear | 1.33 | 2.04 | 0.90 | 2.05 | 1.79 |
| Government Consumption | | | | | |
| Low | 0.77 | 2.02 | 0.78 | 3.13 | 1.52 |
| High | 0.27 | -0.16 | -5.27 | 0.70 | 0.65 |
| Linear | 1.14 | 1.99 | -2.66 | 2.06 | 1.92 |
| Government Investment | | | | | |
| Low | 2.09 | 2.37 | 1.55 | 2.59 | 2.24 |
| High | 0.37 | 1.66 | 1.71 | 1.71 | 1.17 |
| Linear | 1.42 | 2.26 | 1.43 | 2.32 | 1.81 |

Table 1: State Dependent Fiscal Multipliers

Cumulative government spending multiplier substantially exceeds 1 and peaks around a value of 2.30 (peak of normal multiplier is 2.13) at the low growth regime[19]. We find the values of impact, one-year and two-year multipliers are 1.73, 2.28 and 1.59, respectively (Table 1, Figure 4)[20]. However,

[17] Impact multiplier can be shown as $\left(\frac{\Delta Y_t}{\Delta G_t}\right)$ and maximum of normal multiplier over any horizon H is defined as $\left(\max \frac{\Delta Y_{t+H}}{\Delta G_t}\right)$. Maximum of cumulative multiplier is calculated as $\left(\max \frac{\sum_{j=0}^{H} \Delta Y_{t+j}}{\sum_{j=0}^{H} \Delta G_{t+j}}\right)$.

[18] The magnitude of fiscal multiplier estimated by using linear models (one-regime models) may give wrong messages to policymakers, because the linear models rule out state dependent multipliers and calculate fiscal multipliers by taking into account averages of period of boom and contraction. It implies that the average fiscal multiplier obtained from a linear model underestimate the size of the fiscal multiplier in the period of recession, but overestimate it in the period of expansion.

[19] When fiscal multiplier is equal to 2, it means that a unit increase in government spending increases output two units. Note that this argument holds not only for an expansionary fiscal policy but also for a contractionary fiscal policy but with opposite sign. In this section, we assume that multiplier effects of an increase in government spending and a decrease in government spending are same. In other words, there is no asymmetric effects of positive and negative fiscal shocks on output. However, in section 6, we will show that whether the size of the government spending multiplier depends crucially on the sign of the fiscal shock (i.e. expansionary or contractionary fiscal shock).

[20] It is quite common in the literature to find high values for fiscal multipliers which substantially exceeds 1 such as Hernández de Cos and Moral-Benito (2013) for Spain, Herbert (2014) for France, Germany and the USA and Auerbach and Gorodnichenko (2014) for Japan. For example, Hernández de Cos and Moral-Benito (2013) find that impact, peak,

we observe that size of the fiscal multiplier reduces at the high growth regime with the finding of 0.85 for impact multiplier, 1.79 for one-year multiplier and 0.55 for two-year multiplier. These results support a view that an existence of economic slack amplifies the effectiveness of fiscal policy. Turning to the components of government spending we confirm the results mentioned above[21]. For example, while government consumption multipliers take positive values at the times of low growth, they turn to negative values at the times of high growth after one year (Figure 4). On the other hand, the size of government investment for impact, peak of cumulative, one year and two year multipliers are 2.09, 2.59, 2.37 and 1.55, respectively at the low growth state. However, they reduce to 0.37, 1.71, 1.66 and 1.71 at the high growth state[22]. It is also noteworthy to mention that the gap between two regimes change throughout the period under consideration. While the gap gradually shrinks for government investment, it enhances for government consumption from short-term to medium-term (Figure 4). Furthermore, in parallel with other studies, the estimation results obtained from both regimes confirm that public investment has a profound effect on the output compared to public consumption in both regimes (Figure 5)[23]. Only exception is the period between four and seven quarters in the low growth regime where the size of government consumption multiplier surpasses that of investment multiplier. However, this finding does not change our policy recommendation in favor of government investment for stimulating the economy in the low growth regime since the government investment produces higher multiplier values until the end of the first year and has the potential to increase the production capacity in the long-run. We also observe that public investment multipliers tend to have more persistent output effects than public consumption multipliers, especially in high growth regime (Figure 5).

one-year cumulative and two year cumulative multipliers are 0.65, 1.96, 1.26 and 1.25,respectively in recession for Spain. Similarly, Herbert (2014) finds maximum multiplier 1.38 for France, 1.31 for Germany and 2.07 for the USA in recession. The results based on Auerbach and Gorodnichenko (2014) show that maximum and three year cumulative multipliers are 2.51 and 2.73, respectively in recession for Japan.

[21] To compare multiplier effects of public consumption and investment we extend a three-variable model to a four-variable model by replacing government spending with government consumption and investment. Similarly, fiscal shocks are obtained from a four-variable VAR model where government consumption is ordered first and government investment is second.

[22] Çebi (2016) estimates a linear VAR model for the period of 2002q1-2014q4 to calculate fiscal multipliers. Breaking down government spending into consumption and investment he finds high values for fiscal multipliers as in our study. He calculates impact and one-year cumulative multipliers as 1.4 and 1.7 for government consumption and 2.1 and 1.7 for government investment, respectively.

[23] Çebi (2016) yields similar results for Turkey with the finding of large multiplier effects for public investment compared to public consumption. Similarly, Hernández de Cos and Moral-Benito (2013) find some evidence in favor of public investment multiplier in recession for Spain and Auerbach and Gorodnichenko (2012) can be given as an example for large public investment multiplier with respect to public consumption multiplier for the USA. Herbert (2014) finds that output effect of public investment higher than that of public consumption on the long term in recession for France and the USA. However, she finds an opposite result for Germany with the finding of large government consumption multiplier compared to investment multiplier in recession.

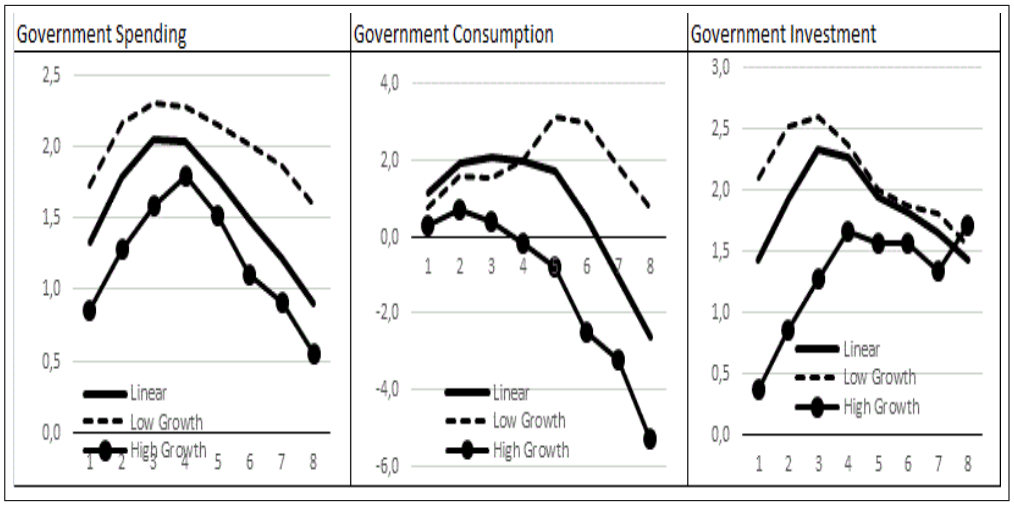


Figure 4: Cumulative Fiscal Multipliers: Across Government Spending Types

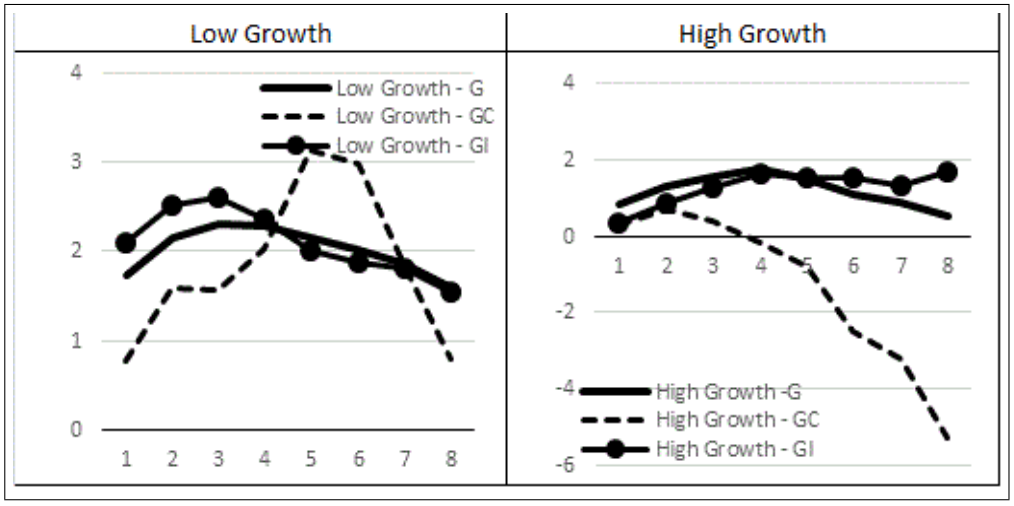


Figure 5: Cumulative Fiscal Multipliers: Across Growth Periods

Based on information given above one can summarize the findings of this study as follows: First, the fiscal multipliers display a hump-shaped pattern and peak around a year. After that, the size of the fiscal multiplier starts to diminish, which implies that fiscal policy is an effective instrument to stimulate the economy in the short run (up to one year) and then it gradually loses its strenght in the medium run except the high growth regime for the government investment multiplier. Second, the fiscal multiplier is greater than 1, which implies that an expansionary fiscal policy through an increase in government spending causes a crowding in effect. Third, the multiplier effect of fiscal policy varies depending on phases of business cycle with the finding of higher (lower) government spending multipliers at the time of low (high) growth. This argument holds not only for total government spending but for government consumption and investment as well. Finally, a type of fiscal shock

matters in terms of output responses. We find an evidence that a multiplier effect of public investment is higher than that of public consumption in both regimes.

# 6 Robustness Analysis

This section provides series of robustness checks to measure sensitivity of our results to alternative specifications. We only focus on government spending multiplier in this section. We perform five different specifications to assess the robustness of our results. First, we include real interest rate in the model to control for monetary policy[24]. Second, we change the form of the left-hand side variables used in the estimation. To be more precise, we use growth rate of variables as described in Ramey and Zubairy (2014) instead of log level of them. In particular, variables of interest, output and government spending, are defined as $(Y_{t+h} - Y_{t-1})/Y_{t-1}$ and $(G_{t+h} - G_{t-1})/Y_{t-1}$[25]. The advantage of using this definition is that one can converts the percent changes to unit changes using the value of $(G/Y)$ ratio for each period in place of sample averages. Third, we estimate the baseline model with 5 lag instead of 4. This allows us to check whether our results are sensitive to different lag length. Fourth, we received fiscal shocks from a non-linear model rather than a linear model. Five, since Turkey is a small open economy and business cycles of Turkey are highly dependent on the international business cycles, we add a new control variable (real GDP growth in the US) in the model that represents international business cycles. We find that all specifications have the same qualitative properties and they produce quantitatively similar results except some specifications. We have particularly observed that output effects of lag 5 specification considerably lower than base model in both regimes, and the model with real interest rate has also smaller multiplier effects compared to other specifications in the low growth regime. However, despite these differences, our findings still confirm the fact that output effects of fiscal policy augment in the low growth period and these effects are higher than those of high growth period for all specifications.

Focusing on the size of the fiscal multiplier for each specification reveals the fact that it is well above 1 throughout the period (up to 8 quarters) at the times of low growth and it generally stays below 1 at the times of high growth. The magnitude of impact multiplier varies between 1.1 and 1.8 at the times of low growth and 0.5 and 0.9 at the times of high growth (Table 2). In the low growth regime, the size of one-year cumulative fiscal multipliers varies between 1.5 and 2.4 (considerably higher than 1) and that of two-year multipliers stays above 1 (1 and 1.8) but it looses its strenght. On the other hand, all specifications yield fiscal multipliers (one-year cumulative) higher than 1 except lag 5 specification, and they remain below 1 at the end of the second year in the high growth regime.

[24] Real interest rates are defined as $r_t = (1 + i_t)/(1 + \pi_t) - 1$, where $r_t$ and $i_t$ represents real and nominal interest rates respectively, $\pi_t$ denotes inflation rate using GDP deflator. Nominal interest rates are obtained from the Turkish Treasury.

[25] Note that $\frac{Y_{t+h}-Y_{t-1}}{Y_{t-1}} \approx (\ln Y_{t+h} - \ln Y_{t-1})$ and $\left(\frac{G_{t+h}-G_{t-1}}{G_{t-1}}\right)*\left(\frac{G_{t-1}}{Y_{t-1}}\right) = \frac{G_{t+h}-G_{t-1}}{Y_{t-1}} \approx (\ln G_{t+h} - \ln G_{t-1})*\left(\frac{G_{t-1}}{Y_{t-1}}\right)$.

| Model | impact | Cumulative Multipliers one-year | two-year | peak | Normal peak |
|---|---|---|---|---|---|
| Low Growth | | | | | |
| Benchmark | 1.73 | 2.28 | 1.59 | 2.30 | 2.13 |
| Real interest rate | 1.09 | 1.70 | 1.34 | 1.78 | 1.92 |
| Ramey definition | 1.66 | 2.23 | 1.56 | 2.23 | 1.23 |
| Lag 5 | 1.27 | 1.51 | 1.04 | 1.56 | 1.67 |
| Shocks from a non-linear model | 1.73 | 2.29 | 1.59 | 2.31 | 2.13 |
| International business cycles | 1.84 | 2.39 | 1.79 | 2.40 | 2.43 |
| High Growth | | | | | |
| Benchmark | 0.85 | 1.79 | 0.55 | 1.79 | 1.14 |
| Real interest rate | 0.83 | 1.78 | 0.85 | 1.78 | 1.11 |
| Ramey definition | 0.84 | 1.78 | 0.53 | 1.78 | 1.36 |
| Lag 5 | 0.49 | 0.91 | -0.06 | 0.91 | 0.66 |
| Shocks from a non-linear model | 0.81 | 1.74 | 0.71 | 1.74 | 1.11 |
| International business cycles | 0.77 | 1.97 | 0.46 | 1.97 | 1.47 |

Table 2: Robustness Checks

Apart from the robustness checks explained above, we also carry out a different specification to reveal whether the sign of the fiscal shock (an increase or a decreas in government spending) matters. Following Riera-Crichton, Vegh and Vuletin (2014) and Barnichon and Matthes (2016), we investigate whether the asymmetry in output responses stems from sign of the fiscal shock (positive or negative) instead of state of the business cycles. To do this, we first only examine the existence of asymmetric effects of positive and negative shocks on the GDP without taking into account state of the business cycles. Interestingly, in line with the study of Barnichon and Matthes (2016) our results support the idea that sign of the fiscal shock matters with the finding of higher contractionary multiplier (a decrease in spending) compared to expansionary multiplier ( an increase in spending) (Table 3).

| Sign | impact | Cumulative Multipliers one-year | two-year | peak | Normal peak |
|---|---|---|---|---|---|
| Negative shocks | 2.36 | 2.89 | 2.16 | 3.06 | 2.36 |
| Positive shocks | 0.42 | 1.77 | 0.71 | 1.77 | 2.10 |

Table 3: Asymmetric Effects of Government Spending Shocks

This finding would require a deep research on the possible interaction between state of the business cycle and sign of the fiscal shock. To allow for both asymmetry (low/high growth and positive/negative fiscal shock) in the same time we need to follow the way that Riera-Crichton, Vegh and Vuletin (2014) did. However, their model requires data for a long period. Since we have only 100 observations and half of them consists of low growth period, splitting the data in terms of positive and negative shocks may prevent to use a time series method due to limitation of data[26]. Therefore, insufficient data for each

[26] We separate the data into four groups, namely, low growth/positive shocks, low growth/negative shocks, high growth/positive shocks, high growth/negative shocks. In terms of low growth period, 26 of 50 observations fall into the

category make it difficult to exploring both asymmetric effects at the same time. However, one can still support the idea that state of the business cycle plays a key role in determining the size of the fiscal multiplier. Since we have four (approximatley) equally sized groups, one can not argue that a high value for the fiscal multuplier in the period of low growth only stems from negative spending shocks. This is because, as we mentioned above, low growth regime contains 26 positive spending shocks (%52) and 24 negative spending shocks (%48), which means that positive shocks slightly dominate negative shocks. On the other hand, the opposite is valid for the high growth regime, which negative shocks slightly dominate positive shocks (%54 versus %46). These results imply that a high/low value for fiscal multiplier at times of low/high growth mainly results from asymmetry across the business cycle instead of asymmetry across the sign of the fiscal shocks.

# 7 Conclusion

This paper provides an analysis of cyclical variation of fiscal multiplier in Turkey. Particularly, we focus on gauging the size of the government spending multiplier under two different regimes (low/high growth regime) for the period of 1990:q1 - 2015:q4. We apply local projection method using quarterly data on log of real government spending, log of real tax and log of real GDP. We follow a two step estimation approach to measure magnitude of the fiscal multiplier. In the first step, we achieve identification of fiscal shocks by estimating a three-variable VAR model. In the second step, we use VAR-based fiscal shocks to estimate state dependent multiplier effects of fiscal policy. We use moving average real GDP growth rate as a threshold variable to decide the state of the business cycles.

The results of this study appear to be broadly in line with the findings of the existing literature. The impulse response analysis shows that a positive shock to government spending is associated with an increase in output and tax, which are found to be statistically significant. Output responses to an increase in government spending follow a hump-shaped behavior and peak around the second quarter. After that the effectiveness of fiscal policy lessens in the medium run. We find that the size of the fiscal multiplier exceeds 2 and this finding underpin the view that government spending is an essential fiscal instrument to stimulate the economy especially in the low growth regime. The most striking results from this study are that timing of fiscal shocks matters and the multiplier effects of government spending in the low growth period are considerably higher than those of government spending in the high growth period. So, our results confirm the view that effectiveness of fiscal policy amplifies when there is slack in the economy. What is more, we use disaggregated data to investigate dynamic effects of government consumption and invetsment on the economic activity in the low growth and high growth periods. The finding of the study points to the importance of the type of government spending. We conclude that the multiplier effect of public invetsment predominants over those of

first group (positive shocks) and 24 of 50 observations remain the second group (negative shocks). Similarly, high growth period can be divided into two groups with 23 of 50 observations fall into third group (positive shocks) and rest of the observations (27 observations) fall into fourth group (negative shocks).

public consumption in both regimes. While size of public consumption multiplier has positive sign and exceeds 3 (maximum of cumulative multiplier) at times of low growth, it goes down below 1 on impact and turn into a negative value at the end of the first year during the high growth regime. This evidence supports the view that public consumption can only be an effective tool to increase output at the times of low growth rather than high growth periods in Turkey. As a result, we advise policymakers to use public investment rather than public consumption in order to stimulate the economy during economic expansion and prefer to increase public consumption at the times of economic slow down.

Since the size and sign of the fiscal multipliers depend on plenty of factors, such as state of public finance, health of financial system, monetary policy stance, it would be useful to check sensitivity of fiscal multipliers to these factors. We left these issues as a future work.

# References


Alloza, M. 2014. "Is fiscal policy more effective in uncertain times or during recessions?" *Working Paper*, University College London.

Arin, K.P.; F. Koray; and N. Spagnolo. 2015. "Fiscal multipliers in good times and bad times." *Journal of Macroeconomics* 44, 303-311.

Auerbach, A.J., and Y. Gorodnichenko. 2012. "Measuring the output responses to fiscal policy." *American Economic Journal: Economic Policy* 4, no. 2: 1-27.

Auerbach, A.J., and Y. Gorodnichenko. 2013. "Fiscal multipliers in recession and expansion." In *Fiscal Policy after the Financial Crisis,* ed. A. Alesina and F. Giavazzi, 63-98. Chicago: University of Chicago Press.

Auerbach, A.J., and Y. Gorodnichenko. 2014. "Fiscal multipliers in Japan." *NBER Working Paper*, no. 19911.

Barnichon, R., and C. Matthes. 2016. "Understanding the size of the government spending multiplier: It's in the sign." *CEPR Discussion Paper*, no. DP11373.

Batini, N.; G. Callegari; and G. Melina. 2012. "Successful austerity in the United States, Europe and Japan." *IMF Working Paper*, no. 12/190.

Batini, N.; L. Eyraud; and A. Weber. 2014. "A simple method to compute fiscal multipliers." *IMF Working Paper*, no. 14/93.

Baum, A., and G.B. Koester. 2011. "The impact of fiscal policy on economic activity over the business cycle - evidence from a threshold VAR analysis." *Deutsche Bundesbank Discussion Paper*, no. 03/2011.

Baum, A.; M. Poplawski-Ribeiro; and A. Weber. 2012. "Fiscal multipliers and the state of the economy." *IMF Working Paper*, no. 12/286.

Berument, H., and B. Doğan. 2004. "The asymmetric effects of government spending shocks: Empirical evidence from Turkey." *Journal of Economic and Social Research* 6, no. 1: 33-51.

Blanchard, O., and R. Perotti. 2002. "An empirical characterization of the dynamic effects of changes in government spending and taxes on output." *The Quarterly Journal of Economics* 117, no. 4: 1329-1368.

Blanchard, O., and D. Leigh. 2013. "Growth forecast errors and fiscal multipliers." *IMF Working Paper*, no. 13/01.

Burnside, A.C.; M. Eichenbaum; and J.D.M. Fisher. 2004. "Fiscal shocks and their consequences." *Journal of Economic Theory* 115, no. 1: 89-117.

Christiano, L.; M. Eichenbaum; and S. Rebelo. 2011. "When is the government spending multiplier Large?" *Journal of Political Economy* 119, no.1: 78-121.

Coenen, G.; C. Erceg; C. Freedman; D. Furceri; M. Kumhof; R. Lalonde; D. Laxton, J. Lindé; A. Mourougane; D. Muir; S. Mursula; C. de Resende; J. Roberts; W. Roeger; S. Snudden; M. Trabandt;

and J. in't Veld. 2012. "Effects of fiscal stimulus in structural models." *American Economic Journal: Macroeconomics* 4, no.1: 22-68.

Corsetti, G.; A. Meier; and G.J. Müller. 2012. "What determines government spending multipliers?" *Economic Policy* 27, no.72: 521-565.

Çebi, C. 2010. "The effects of fiscal policy shocks on output in Turkey: SVAR analysis." *The Journal of Economics, Business and Finance* 25, no.290: 9-34.

Çebi, C. 2016. " The government spending multiplier in Turkey." *Emerging Markets Finance and Trade*, forthcoming.

Dell'Erba, S.; K. Koloskova; and M. Poplawski-Ribeiro. 2014. "Medium-term fiscal multipliers during protracted recessions." *IMF Working Paper*, no. 14/213.

Edelberg, W.; M. Eichenbaum; and J.D.M. Fisher. 1999. "Understanding the effects of a shock to government purchases." *Review of Economic Dynamics* 2, no. 1: 166-206.

Fatas, A., and I. Mihov. 2001. "The effects of fiscal policy on consumption and employment: theory and evidence." *CEPR Discussion Paper*, no. 2760.

Favero, C.A. 2003. "How do european monetary and fiscal authorities behave?" In *Monetary and fiscal policies in EMU*, ed. M. Buti, chapter 7. Cambridge: Cambridge University Press.

Herbert, S. 2014. "Econometric analysis of regime switches and of fiscal multipliers." *OFCE Working Paper*, no. 01/2014.

Hernández de Cos, P., and E. Moral-Benito. 2013. "Fiscal multipliers in turbelent times: The case of Spain." *Banco de España Working Paper*, no. 1309.

Ilzetzki, E.; E.G. Mendoza; and C.A. Végh. 2011. "How big (small?) are fiscal multipliers?" *IMF Working Paper*, no. 11/52.

Jordà, O. 2005. "Estimation and inference of impulse responses by local projections." *The American Economic Review* 95, no.1: 161-182.

Ko, J.H., and H. Morita. 2013. "Regime Switches in Japanese fiscal policy: Markov-Switching VAR Approach." *Hi-Stat Discussion Paper*, no.270.

Mountford, A., and H. Uhlig. 2009. "What are the effects of fiscal policy shocks?" *Journal of Applied Econometrics* 24, no. 6: 960-992.

Newey, W.K.; and K.D. West. 1987. "A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix." *Econometrica* 55, no.3: 703-708.

Owyang, M.T.; V.A. Ramey; and S. Zubairy. 2013. "Are government spending multipliers greater during periods of slack? Evidence from 20th century historical data." *Federal Reserve Bank of St. Louis Working Paper*, no. 2013-004A.

Ramey, V.A., and M.D. Shapiro. 1998. "Costly capital reallocation and the effects of government spending." *Carnegie-Rochester Conference Series on Public Policy* 48, no. 1: 145-194.

Ramey, V.A. 2011. "Identifying government spending shocks: It's all in the timing." *The Quarterly*

*Journal of Economics* 126, no.1: 1-50.

Ramey, V.A., and S. Zubairy. 2014. "Government spending multipliers in good times and in bad: Evidence from U.S. historical data." *NBER Working Paper*, no. 20719.

Riera-Crichton, D.; C.A. Vegh; and G. Vuletin. 2014. "Procyclical and countercyclical fiscal multipliers: Evidence from OECD countries." *NBER Working Paper*, no. 20533.

Spilimbergo, A.; S. Symansky; and M. Schindler. 2009. "Fiscal Multipliers." *IMF Staff Position Note*, no. 09/11.

Şen, H., and A. Kaya. 2015. "Growth enhancing effect of discretionary fiscal policy shocks: Keynesian, weak Keynesian or non-Keynesian?" *MPRA Paper*, no. 65976.

Whalen, C.J., and F. Reichling. 2015. "The fiscal multiplier and economic policy analysis in the United States." *Contemporary Economic Policy* 33, no.4: 735-746.

Central Bank of the Republic of Turkey

Recent Working Papers

The complete list of Working Paper series can be found at Bank's website

(http://www.tcmb.gov.tr)

Unemployment Hysteresis and Structural Change in Europe
(Kurmaş Akdoğan Working Paper No. 16/18 August 2016)

Asymmetric Government Expenditure: A Comparison of Advanced and Developing Countries
(Ali Aşkın Çulha Working Paper No. 16/17 August 2016)

Firmaların Sabit Sermaye Yatırım Kararlarının Analizi: Türkiye İmalat Sanayine Dair Bulgular
(Evren Erdoğan Coşar Çalışma Tebliği No. 16/16 Temmuz 2016)

Cross-Border Capital Flows in Emerging Markets: Demand-Pull or Supply-Push?
(Kurmaş Akdoğan, Neslihan Kaya Ekşi, Ozan Ekşi Working Paper No. 16/15 June 2016)

Minimum Wage Effects on Labor Market Outcomes in Turkey
(H. Burcu Gürcihan Yüncüler, Çağlar Yüncüler Working Paper No. 16/14 June 2016)

On Estimation of the Normalized CES Production Function for Turkey
(Selen Başer Andıç Working Paper No. 16/13 June 2016)

A Dynamic Approach to Analyzing the Effect of the Global Crisis on Non-Performing Loans: Evidence from the Turkish Banking Sector
(Vuslat Us Working Paper No. 16/12 April 2016)

Forecasting Turkish Real GDP Growth in a Data Rich Environment
(Bahar Şen Doğan, Murat Midiliç Working Paper No. 16/11 March 2016)

Does Multiplicity of Equilibria Arise in the Eaton-Gersovitz Model of Sovereign Default?
(Yasin Kürşat Önder Working Paper No. 16/10 March 2016)

Revisiting Capital Structure of Non-financial Public Firms in Turkey
(Ramazan Karaşahin, Doruk Küçüksaraç Working Paper No. 16/09 March 2016)

Faiz Koridoru ve Banka Faizleri: Parasal Aktarım Mekanizmasına Dair Bazı Bulgular
(Mahir Binici, Hakan Kara, Pınar Özlü Çalışma Tebliği No. 16/08 Mart 2016)

Search by Firms and Labor Market Policies
(Gönül Şengül Working Paper No. 16/07 March 2016)

Life Satisfaction and Keeping up with Other Countries
(Ozan Ekşi, Neslihan Kaya Ekşi Working Paper No. 16/06 February 2016)

The Impact of the ECB's Conventional and Unconventional Monetary Policies on Stock Markets
(Reinder Haitsma, Deren Ünalmış, Jakob de Haan Working Paper No. 16/05 February 2016)

Liquidity Management of Non-Financial Firms: Cash Holdings and Lines of Credit Evidence from Turkey
(Yavuz Arslan, Yunus Emrah Bulut, Tayyar Büyükbaşaran, Gazi Kabaş Working Paper No. 16/04 February 2016)

A Hedonic House Price Index for Turkey
(Timur Hülagü, Erdi Kızılkaya, Ali Gencay Özbekler, Pınar Tunar Working Paper No. 16/03 February 2016)

In Pursuit of Understanding Markups in Restaurant Services Prices
(Mustafa Utku Özmen Working Paper No. 16/02 January 2016)

Immigration and Prices: Quasi-Experimental Evidence from Syrian Refugees in Turkey
(Binnur Balkan Konuk, Semih Tümen Working Paper No. 16/01 January 2016)