

Şen, Hüseyin; Kaya, Ayşe

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# How large are fiscal multipliers in Turkey?

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## Abstract

Using the augmented version of the Blanchard–Perotti’s SVAR technique, this paper seeks to empirically estimate the size of fiscal multipliers in Turkey over the period 2002:q3-2016:q2. In contrast to many previous papers that concentrate on fiscal policy instruments –taxes and government spending– at the aggregate level, in the paper we consider these instruments at the sub-component level. We examine output responses to discretionary changes in five fiscal variables (value-added tax, special consumption tax, personal income tax, real government spending, and transfer payments), and then we estimate the size of fiscal multipliers for taxes and government spending. Overall, our empirical findings indicate that the size of multipliers for taxes is different from that of government spending. Depending on the sub-components, the size of the multiplier ranges from -0.83 to -0.27 for taxes, and from 0.02 to 0.98 for government spending respectively. Overall, these findings corroborate the idea that a shock to government spending creates a (weak) Keynesian effect on GDP in the short run, while a shock to taxes brings about a non-Keynesian effect.

**Key Words:** Fiscal Multipliers, Fiscal Policy, Discretionary Fiscal Policy, SVAR, Turkey.

**JEL Codes:** E6, E62, H2, H30

## 1. Introduction

Fiscal policy has long been a neglected stabilization tool of macroeconomic policy. It is the case that for a long time, a great deal of emphasis has been given to monetary policy in achieving as well as maintaining macroeconomic stabilization. However, with the Great Recession of 2007/2009, the pre-crisis consensus over the role of monetary policy has been downgraded, although it remains a major concern in macroeconomic policy debates. In an economic environment in which the avenue for monetary policy is limited by interest rates, which is close to the zero lower bound in developed economies, and even to negative bound, amid a weakened transmission mechanism stemming from an impaired financial system, attention has shifted towards fiscal policy as a macroeconomic stabilization instrument for smoothing business cycles fluctuations. The renewed interest in fiscal policy, however, has raised two main questions: i) how output responds to fiscal stimulus packages, and ii) how to measure their effectiveness.

Against this background, recent empirical discussions have paid much attention to the effectiveness of fiscal stimulus packages with the expectation of stimulating economic recovery and easing recession-induced economic difficulties for the economies. Intrinsically, these packages are typically discretionary fiscal policy actions by which governments are deliberately involved in the economy through changes in taxes and/or government spending. Although how to measure the effectiveness of such packages properly is an important issue and remains an open question (Riera-Crichton *et al.*, 2014), the effectiveness of fiscal stimulus packages is widely seen as a proxy for the effectiveness of expansionary changes in discretionary fiscal policy; and then their effectiveness is typically measured through fiscal multipliers –that is, the

amount of change in change in output level of the economy triggered by a unit/percentage point change in taxes and/or government spending.<sup>1</sup>

This paper proposes to empirically measure the size of multipliers in Turkey. Unlike many previous studies, in the present paper, we consider discretionary fiscal policy instruments at their sub-components' level rather than at the aggregate level in capturing the size of fiscal multipliers. To this end, we employ the augmented version of the SVAR technique proposed by Blanchard and Perotti (2002) –in short the B-P SVAR– with five fiscal shock variables.

The motivation for producing such a paper is grounded on several reasons. First, fiscal policy is a heavily disputed topic, and its effectiveness is highly controversial. Second, there have been quite a few empirical studies available that estimate the size of fiscal multipliers at sub-component levels of fiscal policy, specifically in the context of developing countries. Third, the size of fiscal multipliers, although there is still no consensus over it, is critically important for both designing discretionary fiscal policy as well as evaluating its effectiveness. For instance, under- or over-estimating the size of fiscal multipliers may impair the credibility of fiscal programs. Fourth, we extend the limited literature on developing/emerging countries to a case study of Turkey together with the B-P SVAR technique. Lastly, perhaps most importantly, a proper estimation of fiscal multipliers has a pivotal role for the policy makers in properly identifying the size as well as the timing of discretionary fiscal actions.

With this contribution, we propose to add to the existing literature by estimating the size of fiscal multipliers at the sub-components of discretionary fiscal policy instruments in Turkey. Indeed, this is highly important for the reliability of the estimation of fiscal multipliers but has been a largely bypassed issue in the current literature as suggested by Venturini (2016). More importantly, and to the best of our knowledge, there has been no case study on Turkey to study this issue at the sub-component levels of taxes and government spending. There are very few studies, which examine the issue either at the aggregate level or tackle the issue from the relatively narrower perspective (see, however, Çebi (2010, 2016)).

In other words, in the present paper, we intend to make some additional contributions to the existing empirical literature by taking into account different perspectives of the issue, which have not been dealt with adequately hitherto. First, we consider the breakdown of taxes and government spending and then decompose them into their main components by the standard Keynesian multiplier analysis. Second, we add a monetary variable (broad money supply –that is M2) as an explanatory variable and openness to trade as an exogenous variable to our model, which are most likely to influence both the sign and size of the fiscal multiplier in an open economy like many countries including Turkey. Third, we use the augmented version of the B-P SVAR with five fiscal variables, namely value-added tax, special consumption tax, personal income tax, real government spending, and transfer payments.

The rest of the paper is structured as follows: The next section presents the theoretical and empirical backgrounds with a particular emphasis on developing countries in its empirical subsection, while Section 3 looks at the empirical framework, explaining the relevant estimation technique together with the dataset and the relevant variables. Section 4 reports estimation results and then provides an in-depth analysis of them. Section 5 provides the robustness check. And finally, Section 6 summarizes and concludes.

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<sup>1</sup> The effects of fiscal multipliers on output are usually defined in terms of either its level or growth in the literature. Although there is no difference between the two for the first period, in the subsequent periods they are substantially different. We consider the former in this paper.

## 2. Theoretical and Empirical Background

### 2.1. Theoretical Background

From the theoretical perspective, the extent to which discretionary fiscal policy is effective has been a much-disputed subject within the field. Some economists argue that it creates a Keynesian effect. Others, on the other hand, claim that it yields a weak or non-Keynesian effect even in the short run. Put it differently, the focal point of discretionary fiscal policy-related discussions focuses on how discretionary fiscal policy is effective and thus whether its effect is Keynesian, non-Keynesian or weak Keynesian.

Theoretically, changes in discretionary fiscal policy may affect either the demand-side or the supply-side of an economy, or both. In this context, the standard Keynesian view advocates that discretionary fiscal policy changes solely affect the demand-side of the economy, whereas opponents claim that their impact is on the supply-side of the economy. The disagreement between the two rival views arises largely from the theoretical models and their assumptions upon which fiscal policy relies (Arestis and Sawyer, 1998; Briotti, 2005; Arestis, 2011, 2012).

The standard Keynesian view, first spelled out by J. Maynard Keynes, argues that government should actively be involved in the economy through discretionary fiscal policy to stimulate aggregate demand and thus output. He asserted that expansionary changes in discretionary fiscal policy would boost aggregate demand and thus the output level in an economy through the fiscal mechanism under certain assumptions, such as price-wage rigidity, slack in productive capacity and economic agents under liquidity constraint. More clearly, the standard Keynesian view essentially concentrates on the demand-side of the economy and postulates that changes in discretionary fiscal policy influence economic activity in the short run. According to this conventional view, an expansionary change in discretionary fiscal policy creates a multiplier effect on the aggregate demand and thus on the output level of the economy, depending on the marginal propensity to consume as well as on some other determinants.

The standard Keynesian thought goes further in that when the economy is in recession or depression with slack resources, expansionary changes in discretionary fiscal policy, such as a deliberate increase in government spending, would not create a serious crowding-out effect, and thus the fiscal multiplier would work well and be larger than unity. However, fiscal multipliers for taxes substantially differ from that of government spending. More specifically, the multiplier effect of an increase in government spending on output level is larger than that of a reduction in taxes. This is because, according to the basic Keynesian theory, tax cuts on par with an increase in government spending is less effective than that of government spending in stimulating output since economic agents may save an important share of their after-tax income, rather than consume. On the other hand, if an increase in government spending is fully financed by tax hikes, clearly the fiscal multiplier turns out to be a “balanced budget multiplier”, which is clearly equal to unity.

However, the Keynesian view was challenged by the new classical view that brought the adverse effects of fiscal policy to the top of the agenda. In contrast to the traditional wisdom that suggests Keynesian effects of fiscal policy, the new classical view has drawn attention to the possible adverse effects of discretionary fiscal policy –so-called “non-Keynesian effects of fiscal policy” (see Hemming *et al.*, 2002; Siwińska and Bujak, 2006).<sup>2</sup>

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<sup>2</sup> Non-Keynesian effect of fiscal policy is widely referred to in the literature as “expansionary fiscal contraction hypothesis”.

The Ricardian equivalence theorem is usually associated with new classical macroeconomics, which became a dominant economic view in the 1970s. The Ricardian equivalence theorem, which is crucially important in evaluating the effects of fiscal policy in the recent classical literature, would be relevant to highlight. The Ricardian equivalence argues that economic agents are forward-looking as well as fully aware of the government's intertemporal budget constraints. If these assumptions hold, rational economic agents would be indifferent between taxes and debt because today's debt burden means a future tax payment under the validity of current tax system for economic agents. Put it differently, an increase in budget deficit due to government spending would be fully balanced by an increase in private saving. Rational economic agents would foresee that higher spending of the government (or tax cuts), would result in future tax increases. Economic agents who are well-aware of this fact would increase their saving, rather than consumption, to be able to pay future tax increases. Ultimately, higher government spending would result in no change in aggregate demand; the size of the fiscal multiplier would thereby be zero.

It is important, however, to highlight that the validity of the Ricardian equivalence is subject to several highly strict assumptions, such as perfect capital mobility, the absence of liquidity constraint, perfect foreseeing, along with the validity of other two hypotheses: lifetime income and rational expectations for economic agents. That is why its validity has been frequently questioned in academic circles. Blinder (2006), for instance, advocates that most of the Ricardian equivalence's assumptions are unrealistic. Referring to the unrealistic assumptions set by Blinder (2006), in their several contributions Arestis (2011, 2012) and Arestis and Sawyer (2003, 2004, 2010) emphasize that if they are ignored, the effectiveness of fiscal policy that has been downgraded substantially by the Ricardian equivalence theorem would be re-affirmed and thus fiscal policy would regain its reputation as an active tool of macroeconomic policy.<sup>3</sup>

Another key element of the new classical macroeconomics, which is also important in assessing the effectiveness of fiscal policy, is the rational expectations hypothesis. According to this view, if economic agents were rational, they would anticipate any expansionary/contractionary economic policy action by policymakers to affect the economy and to adjust their actions accordingly. In a nutshell, accepting the validity of rational expectations along with the Ricardian equivalence theorem, implicitly means that the expectational effects of fiscal policy are more dominant than the effects of which created by the Keynesian-style fiscal multiplier.

From the 1980s onwards a new paradigm shift occurred in macroeconomic policy-related discussions, which is closely linked with what has been called "New Consensus Macroeconomics". Using the tools of new classical macroeconomics, in particular, the rational expectations hypothesis, this paradigm has significantly downgraded in general the role of fiscal policy, notably its discretionary dimension, and upgraded that of monetary policy.<sup>4</sup> More specifically, this proposition explains its anti-fiscal policy arguments by grounding on the following three household-based assumptions: i) households optimize their budgets intertemporally; ii) households are not subject to any liquidity constraints, iii) households are able to anticipate intertemporal budget constraints.<sup>5</sup> And then, based on these assumptions, the

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<sup>3</sup> In addition with these pro-fiscal policy arguments, Christiano *et al.* (2011) make the point that even under the validity of the Ricardian equivalence, fiscal policy can be effective as long as the economy is stuck at the zero lower bound to nominal interest rate.

<sup>4</sup> Based on the Ricardian equivalence, the New Consensus Macroeconomics tends to give further role to the automatic stabilizers, rather than discretionary fiscal policy. In general terms, however, fiscal policy in the eyes of the New Consensus Macroeconomists is a policy tool that should focus very much on balancing government spending and tax revenues. For further information regarding the New Consensus Macroeconomics, see Arestis (2011, 2012) and his other contributions.

<sup>5</sup> For more details, see Hemming *et al.* (2002) and Arestis (2011).

advocates of New Consensus Macroeconomics claim that fiscal policy is not an effective tool of macroeconomic policy. As a result, greater emphasis is given to monetary policy, namely inflation targeting, rather than to fiscal policy in macroeconomic policy.

The 1990s witnessed a great challenge to the Keynesian view starting with the seminal contribution of Giavazzi and Pagano (1990). This seminal work was followed by some other influential studies, such as Alesina and Perotti (1997), and Alesina and Ardagna (1998, 2010). In all these papers it is claimed that contractionary changes in discretionary fiscal policy, even in the short run, could create an expansionary effect on economic activity. It is clear that this challenging view contrasts with the Keynesian view as well as traditional wisdom. This view relies on a number of factors, such as the Ricardian equivalence theorem, rational expectations, credibility, distortionary effects of government interventions to the economy through fiscal policy, and positive growth effects of fiscal consolidation (see, e.g., Alesina and Perotti, 1997; Alesina and Ardagna, 1998, 2010; Siwińska and Bujak, 2006).

## 2.2. Empirical Background

In reviewing the literature comprehensively, we observe that there has been a rapidly expanding body of empirical literature on fiscal multipliers especially since the onset of the Great Recession of 2007/2009. However, a vast amount of these studies has paid attention to developed countries rather than developing/emerging countries. Particularly, the US has received great attention in this regard. Concerning fiscal multipliers, other similar countries, like the EU or OECD member countries, have been included in these studies.

From the crisis onwards, not only fiscal policy itself, but also its potential role in stimulating economic activity, has received a renewed attention among academics and policy makers. The attention has been notably given to the effectiveness of fiscal stimulus packages. To examine this empirically, several empirical studies have been conducted. The empirical papers by Mountford and Uhlig (2009), Romer and Romer (2010), Auerbach *et al.* (2010), Barro and Redlick (2011), Candelon and Lieb (2013), Auerbach and Gorodnichenko (2012), Ilzetzki *et al.* (2013), Mertens and Ravn (2014), and Caggiano *et al.* (2015) are just some of them, which attract attention at first glance. Virtually, all of these contributions have centered extensively on the sign, size, and sensitivity of fiscal multipliers for developed countries, notably for the US. This is because fiscal multipliers are widely accepted as a proxy for gauging the effectiveness of fiscal stimulus packages.

Although a voluminous body of the literature concludes that fiscal multipliers substantially vary, depending on the countries included in the relevant samples, the period of study, and circumstances, a considerable consensus over fiscal multipliers emerges from the empirical findings of these studies. Especially, a distinguished paper by Ilzetzki *et al.* (2013) examines the macroeconomic effects of fiscal stimulus packages in 44 countries by using panel SVAR techniques deserves to be mentioned in this regard. This classic work confirms, among others, that i) the fiscal multipliers for open economies are smaller in comparison to closed economies; ii) the fiscal multipliers in high-debt countries tend to be smaller or even negative; iii) the fiscal multiplier is relatively larger in economies operating under pre-determined exchange rates but it is zero in economies operating under flexible exchange rates. Two other distinguished works by Barro and Redlick (2011) and Auerbach and Gorodnichenko (2012) also reach almost similar results, showing that the impact of government spending shocks depend importantly on country-specific conditions, such as the level of development, exchange rate regime, openness to trade, and the level of public indebtedness, among others.

Even though the current empirical literature contains ample studies investigating the effect of discretionary fiscal policy changes through fiscal multipliers, the vast majority of these studies rely on developed countries rather than developing/emerging ones. However, especially the post-crisis period has experienced a rapidly expanding literature that examines the issue in the context of developing/emerging countries. The typical examples of this style of studies are the contributions by Cerda *et al.* (2006), Restrepo and Rincón (2006), Ben-Sliamne *et al.* (2011), Ilzetzki (2011), Tang *et al.* (2013), Çebi (2010, 2016), and Matheson and Pereira (2016).

In line with the purpose of our paper, the rest of this sub-section will concentrate on reviewing the developing country-related empirical literature on fiscal multipliers. In an early work, Cerda *et al.* (2006) examined the effects of fiscal policy shocks in Chile by using SVAR technique. Their evidence supported the non-Keynesian effects. In a VAR-based analysis, de Castro (2006) reached almost similar findings for Spain, confirming that fiscal policy shocks had significant non-Keynesian effects on GDP. Along the same line, Restrepo and Rincón (2006) investigated fiscal policy shocks in Latin American Countries by using structural VAR and structural VEC techniques. According to their findings, a one-dollar increase in tax revenues triggered a negative, but transitory, the effect on GDP by less than a dollar, as a one-dollar increase in government spending had a transitory positive effect of 1.9 dollars on real GDP in Chile. As for Colombia, a tax hike, a different case from Chile, did not have any impact on GDP and the impact of a spending shock was significant, but very small (0.12). They attributed all these disorienting findings to the estimation model that was employed.

Unlike Cerda *et al.* (2006) and others, Ben-Sliamne *et al.* (2011) in their SVAR-based analysis found largely weak Keynesian effects on the economic activity in Tunisia. Based on their findings, they argued that fiscal policy shocks in Tunisia reflected the general characteristic of fiscal multiplier in developing countries, referred to as very low ones. Similar work on India by Yadav *et al.* (2012) concluded that the tax variable shock had a larger impact on GDP than the government spending shock. Nonetheless, they pointed out that in the short run the impact of fiscal shocks was Keynesian, yet in the long run the findings appeared to be mixed.

Similarly, in a more recent contribution, Tang *et al.* (2013) analyzed the effectiveness of fiscal policy in ASEAN5 countries employing SVAR approach, and found that the government spending multiplier was not only highly small ( $< 1$ ), but also statistically insignificant for all countries under consideration. However, they drew attention to the fiscal multiplier for taxes, which was only statistically significant for Indonesia and Thailand. A subsequent study by Jha *et al.* (2014), produced evidence that tax cuts had a greater counter-cyclical impact on output than government spending for 10 Asian emerging economies. Interestingly, in contrast to these studies, a very recent study by Matheson and Pereira (2016) estimate the first-year fiscal multipliers for both government spending and taxes as around 0.5 for Brazil by also using the SVAR model. Based on their findings, Matheson and Pereira (2016) have argued that the estimated multipliers for Brazil are larger than the existing literature, which is typically identified for the average emerging market economies. However, they justify their findings on the ground that the spending multipliers declined almost to zero since the global financial crisis, while the revenue multipliers remained almost stable.

Using a panel of 28 developing countries, Ilzetzki (2011) found that short-term government spending and revenue multipliers were in a range of 0.1–0.3 and 0.2–0.4, respectively. Accordingly, lowering the personal income tax rate by one percentage point or cutting revenues increases gross domestic product by 0.3–0.4 percent in the short run. Based on these findings, they concluded that cuts in personal income tax were more effective in stimulating growth than

cuts in corporate or valued added tax rates. These findings confirmed the existence of weak Keynesian effects of fiscal policy in the case of the Czech Republic.

Turning to the case of Turkey, there have been very few empirical studies that aim to measure the size of the fiscal multipliers. To the best of our knowledge, these are only the studies by Çebi (2010, 2016). Çebi (2010) looks at the dynamic effects of fiscal policy on output in Turkey with three variable SVAR models at the aggregate level, whereas Çebi (2016) focuses solely on the estimation of the government spending multiplier by using the same model. The first study demonstrates that a positive shock to spending raises output, while a positive shock to revenue reduces it. The latter, on the other hand, concludes that a positive shock to government expenditure tends to increase output. Çebi (2016) confirms that the government spending multiplier reaches its peak level of 1.5 in the second quarter and then tends to decline. His results show that government investment spending, rather than consumption spending, has a significant effect on output at the first few quarters.

Overall, we observe from the existing empirical literature that the studies that propose to estimate the magnitude of fiscal multipliers have been substantially growing in numbers especially since the onset of the Great Recession of 2007/2009. Although a large part of these studies has given attention to the issue from the viewpoint of developed countries, recent years have seen a significant increase in the number of studies that attempt to gauge the size of fiscal multipliers for non-developed countries.

Broadly speaking, existing empirical literature has produced large differences with regard to the size of fiscal multipliers ranging from less than zero to larger than 4.<sup>6</sup> The literature explains these differences on the basis of a number of factors. Some of these factors are country-specific factors that are associated with current economic conditions as well as structural factors that characterize the economy; others are methodology as well as sample coverage-associated factors. The country-specific factors include the development stage of the country concerned, the size of the government, the underlying phase of the business cycle, fiscal policy instrument used, the exchange rate regime pursued, the degree of openness of the economy, occurrence of crowding-out/-in and fiscal drag, expectations, accessing opportunities to national and international markets for liquidity, and the response of monetary policy to discretionary fiscal policy changes.

Moving to the methodology-related factors, they include: model specification ones, the sample covered, and the assumptions identified.<sup>7</sup> In this regard, Arestis (2011) highlights particularly the role of the theoretical model considered and its assumptions made; namely, “the effect of fiscal policy on aggregate demand and economic activity depends heavily on the theoretical model and its assumptions about the real world where the policy is implemented” (Arestis, 2011:144). Beyond all these, a very recent paper by Venturini (2016) draws less attention to the aspects of fiscal multipliers in the literature so far. He highlights the importance of the institutional context, that has been less touched upon in the literature so far, in which fiscal policy is conducted. In this respect, he questions the reliability of the size of fiscal multipliers estimated in different studies in the existing literature.

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<sup>6</sup> Among various ranges of estimations, for instance, Krogstrup (2002) predicts the magnitude of government spending multiplier as well-below of -2, whereas Perotti (2004, 2008) and Mountfold and Uhlig (2009) estimate it to be above 4 in very extreme cases. In this regard, Christiano *et al.* (2011) argue that its size could be in the range of 3-5 under the binding zero lower bound on interest rate. In all other cases, the size of government spending multiplier is in a range of between 0.5 and 2.

<sup>7</sup> For the full-coverage of these arguments, see, inter alia, Hemming *et al.* (2002), IMF (2008), Chinn (2013), Ilzetzi *et al.* (2013), Mineshima *et al.* (2014), Batini *et al.* (2014), Whalen and Reichling (2015), Warmedinger *et al.* (2015), and Matheson and Pereira (2016).



Indeed, all these factors result in wide differences in the size of fiscal multipliers, creating a great controversy among economists and policy-makers alike. Nonetheless, there is an agreement, for instance, over the size of fiscal multipliers, in general, for advanced countries, which tend to be larger than those of developing countries. Likewise, for almost all countries the magnitude of government spending multiplier is relatively larger than that of tax multiplier. Furthermore, the size of fiscal multipliers is larger in bad times, i.e. recession, as compared to good times. What is more, the size of fiscal multipliers tends to be smaller for countries pursuing floating exchange regimes compared to those following fixed regimes. Similarly, for closed economies, the size of fiscal multipliers tends to be larger than for open economies. Also, the magnitude of fiscal multipliers tends to be larger in downturns than in expansions.

On the other hand, the estimation technique used in a study also makes the size of fiscal multipliers different. For instance, the B-P SVAR technique-based studies, in contrast to the narrative technique, as is the case with this contribution, in which fiscal interventions are identified by assuming that government spending is predetermined within the quarter, tend to provide relatively strong positive effects. As for narrative technique-based studies, since these types of studies rely very much on the reactions to episodes of extraordinary spending, they have tended to find much weaker, and even negative, relationships for government spending, and finding relatively larger multipliers for taxes.

To sum up, and despite the findings reported above, what is clear is that there is still no consensus with regard to the magnitude of fiscal multipliers among economists. Having considered reaching a higher, but sustainable, GDP growth is one of the major economic priorities for all countries, no matter how developed they are, and for which fiscal policy has critical implications not merely in the short run, but also in the long run. We believe that conducting further studies on the effect of discretionary fiscal policy changes on GDP would not be a time-consuming exercise.

### **3. Empirical Framework**

In this section, we discussed the empirical framework of the paper. To this end, we first deal with the estimation technique used and then describe the dataset of the paper along with the relevant variables.

#### **3.1. Estimation Technique**

In measuring the size of fiscal multipliers, various techniques are used. Among these, vector auto-regressions (VARs), narrative approaches, macroeconomic models, model simulations, and case studies are widely used techniques. By and large, each of these techniques falls into the scope of the following three macroeconomic models: i) dynamic stochastic general equilibrium [DSGE], ii) macroeconomic forecasting, iii) time series models (Whalen and Reichling, 2015).<sup>8</sup> By their nature, however, each of these models has some strengths and weaknesses. Although explaining what their strengths and weaknesses are in detail is far beyond the purpose of this paper, it would be useful to touch briefly on them (see, also, Chinn, 2013; Whalen and Reichling, 2015).

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<sup>8</sup> See, for example, Baxter and King (1993), Christiano *et al.* (2011), Coenen *et al.* (2013) for DSGE models-based studies; Hemming *et al.* (2002) for macroeconomic forecasting models-based studies, and Ramey and Shapiro (1998), Fatas and Mihov (2003), de Castro (2006), Giordano *et al.* (2007), Mountford and Uhlig (2009), Romer and Romer (2010), and Ramey (2011) for time series models-related studies.

To start with DSGE models, they have a superiority notably when the impact of changes in discretionary fiscal policy is intended to assess. However, this type of models suffers from unrealistic assumptions, which do not match with the realities of today's world (Whalen and Reichling, 2015). As regards macroeconomic forecasting models, they require the existence of the historical relationship between variables considered as well as of a sufficient number of exogenous variables. On the other hand, in these models, the reliability of macroeconomic forecasting varies largely with the validity of assumptions made. Furthermore, the estimation of fiscal multipliers based on these models may mislead us especially in times when economic policies and/or economic conditions change substantially over time. The third-type of models are time series models. These models, in contrast to macroeconomic forecasting models, do not impose a priori theory related restrictions on the relationship between variables considered in the model, at least in their basic form. Vector Autoregression (VAR) models are a widely used econometric technique in time series analysis.

These models necessitate historical data as in the case of macroeconomic forecasting models, but different from them, time series models do not require comprehensive economic theories as well as assumptions. Employing these models can be advantageous particularly in times when there is a concern related to economic theories available and their assumptions. In spite of all these advantages of the VAR-type time series models, the absence of sufficient theoretical grounding in these models creates “identification problems”<sup>9</sup> that make it difficult to assess the direction of causation between policies and the economy.<sup>10</sup> To overcome this problem, one of the frequently used econometric models is the B-P SVAR technique. In the literature, the B-P SVAR is a widely applied technique for estimating the effects of discretionary fiscal policy shocks.<sup>11</sup> This may be partly attributed to a discretionary fiscal policy that does not reflect a timely response to the changes in economic activity due to the inside lags associated with the fiscal policy.<sup>12</sup>

In this paper, we opt for the B-P SVAR technique as an estimating technique for the size of fiscal multipliers owing to several reasons. To begin with, based on the estimation of the multivariate autoregressive vector systems, it allows us to capture the impact of fiscal policy under normal times (Ben-Sliamne *et al.*, 2011). Secondly, the B-P SVAR technique allows us to identify discretionary fiscal shocks in the data together with other shocks by imposing sign restrictions for the identification of each shock. Lastly, this technique provides relatively better estimation findings in comparison with large-scale econometric models or reduced-form approaches. As pointed out by Blanchard and Perotti (2002), for instance, large-scale econometric models deal largely with the postulate of an effect of discretionary fiscal policy on economic activity rather than its documentation.

Traditionally, the SVAR is an econometric technique that has been largely used in measuring the effects of monetary policy shocks (Lozano and Rodriguez, 2011; Ben-Sliamne *et al.*, 2011; Arestis, 2011; Jha *et al.*, 2014). However, the last two-three decades have seen a growing literature in which the SVAR technique has been extensively used in examining the effect of discretionary fiscal policy shocks. A vast quantity of these types of studies handles the issue for

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<sup>9</sup> It arises in the case of isolating exogenous movements in government spending and taxes, which becomes difficult.

<sup>10</sup> For further details of these models and their strength and limitations in estimating the size of fiscal multipliers, see Parker (2011), Chinn (2013), and Whalen and Reichling (2015).

<sup>11</sup> What we mean by fiscal policy shocks is unexpected changes induced by government interventions in fiscal policy that is an increase or decrease in taxes or government spending or both.

<sup>12</sup> The inside lags that are very often associated with discretionary fiscal policy are the lags such as information, recognition, implementation, and reaction lags.

advanced countries, with a special focus on the US. This implies that the current literature does not contain many studies on this issue for developing countries.

The SVAR technique cannot be directly used in estimating because the parameters in the matrices are unknown and the variables have contemporaneous effects on each other; that is, there is a correlation between the independent variables and the error term ( $\varepsilon_t$ ) and thus the OLS estimator would produce biased and inconsistent estimates. However, since a standard VAR is utilized as a reduced form of the dynamic structural model, and there are no contemporaneous effects between variables in the reduced form, it is possible to use OLS to estimate the parameters in the reduced form equation.

Starting with a VAR model, which is an  $n$ -variable linear model, each variable of it is explained by its lagged value plus current and past values of the remaining  $n-1$  variables. The structural form of an  $n$ -variable VAR approach can be expressed as follows (Yadav *et al.*, 2012):

$$A_0 X_t = \sum_{i=1}^k A_i X_{t-i} + \beta e_t \quad (1)$$

where  $e_t$  stands for white noise. Denoting the vector of endogenous variables by  $X_t$  and the vector of reduced form residuals by  $U_t$ , the reduced form of the VAR can be expressed as follows:

$$X_t = A(L)X_{t-1} + U_t \quad (2)$$

where  $X_t$  stands for a  $N \times 1$  vector of endogenous variables,  $A(L)$  is a  $N \times N$  matrix lag polynomial, and  $U_t$  is a  $N \times 1$  vector of reduced form innovations, which are assumed to be independently and identically distributed with covariance matrix equal to the identity matrix.

The abbreviated forms of the variables are vat, sct, pit, trpay, realspd, M2, open, dummy, and gdp respectively. Here, in turn, “vat”, “sct”, “pit”, “trpay”, “realspd”, “M2”, “open”, “dummy” and finally “gdp” stand for value added tax, special consumption tax, personal income tax, transfer payments, real government spending, broad money supply, openness to trade, dummy variable for economic and political crises, and gross domestic product variable. In our benchmark specification,  $X_t$  and  $U_t$  consist of the following variables:

$$X_t \equiv (vat_t, sct_t, pit_t, trpay_t, realspd_t, M2_t, gdp_t, dummy_t)'$$

$$U_t \equiv (u_t^{vat}, u_t^{sct}, u_t^{pit}, u_t^{trpay}, u_t^{realspd}, u_t^{M2}, u_t^{gdp}, u_t^{open}, u_t^{dummy})'$$

The relationship between the reduced form residuals and structural innovations can be expressed as the following matrix form:

$$\begin{bmatrix} u_t^{vat} \\ u_t^{sct} \\ u_t^{pit} \\ u_t^{trpay} \\ u_t^{realspd} \\ u_t^{M2} \\ u_t^{gdp} \\ u_t^{open} \\ u_t^{dummy} \end{bmatrix} = \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & 0 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & 0 & 0 & 0 & 0 & 0 \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & 0 & 0 & 0 & 0 \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} & 0 & 0 & 0 \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} & \alpha_{57} & 0 & 0 \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} & \alpha_{67} & \alpha_{68} & 0 \\ \alpha_{71} & \alpha_{72} & \alpha_{73} & \alpha_{74} & \alpha_{75} & \alpha_{76} & \alpha_{77} & \alpha_{78} & \alpha_{79} \\ \alpha_{81} & \alpha_{82} & \alpha_{83} & \alpha_{84} & \alpha_{85} & \alpha_{86} & \alpha_{87} & \alpha_{88} & \alpha_{89} \\ \alpha_{91} & \alpha_{92} & \alpha_{93} & \alpha_{94} & \alpha_{95} & \alpha_{96} & \alpha_{97} & \alpha_{98} & \alpha_{99} \end{bmatrix}^{-1} \begin{bmatrix} \beta_{11} & \beta_{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{21} & \beta_{22} & \beta_{23} & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & 0 & 0 & 0 & 0 & 0 \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & 0 & 0 & 0 & 0 \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} & 0 & 0 & 0 \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} & \beta_{67} & \beta_{68} & 0 \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & \beta_{77} & \beta_{78} & \beta_{79} \\ \beta_{81} & \beta_{82} & \beta_{83} & \beta_{84} & \beta_{85} & \beta_{86} & \beta_{87} & \beta_{88} & \beta_{89} \\ \beta_{91} & \beta_{92} & \beta_{93} & \beta_{94} & \beta_{95} & \beta_{96} & \beta_{97} & \beta_{98} & \beta_{99} \end{bmatrix} \begin{bmatrix} \varepsilon_t^{vat} \\ \varepsilon_t^{sct} \\ \varepsilon_t^{pit} \\ \varepsilon_t^{trpay} \\ \varepsilon_t^{realspd} \\ \varepsilon_t^{M2} \\ \varepsilon_t^{gdp} \\ \varepsilon_t^{open} \\ \varepsilon_t^{dummy} \end{bmatrix}$$

Blanchard and Perotti (2002) pointed out that when quarterly data were used, government expenditure and tax variables were made up of only the automatic responses, since it takes more than a quarter for the systematic discretionary response of policymakers, and to an output shock. When quarterly data is employed, the second component is not consistent with the model.

### 3.2. Data and Variables

As also mentioned above, the objective of this paper is to estimate empirically the size of fiscal multipliers at sub-component levels of discretionary fiscal policy instruments by using the augmented version of the B-P SVAR with eight variables. In line with our purpose, we decompose fiscal variables into their main sub-components. More specifically, we categorize taxes into three: value added tax (vat), special consumption tax (sct), and personal income tax (pit); and government spending into two major groups: real government spending (realspd) and transfer payments (trpay).

In accordance with our objectives, we first augment the number of variables from three to eight (six of them are explanatory variable: five fiscal variables and one monetary variable, the rest two are exogenous variables: openness to trade variable and dummy variable for economic and political crises) to estimate the size of fiscal multipliers for taxes and government spending separately at their sub-component level. To that end, we consider three major taxes built into the Turkish tax system, which accounts for the first three highest shares within the whole central government revenues. These are value-added, special consumption, and personal income taxes respectively. Then, we follow the same pattern for government spending. In the view of the macroeconomic effects of government spending from the standard Keynesian standpoint, the government spending can be decomposed into two major sub-categories as real government spending –that comprises government consumption and investment expenditures– and transfer payments. The primary reasons for doing so are threefold: first, they consist of a relatively larger share of taxes and government spending in the Turkish budgetary system and therefore allow us to see the growth-enhancing effects of each of the taxes and spending under consideration. Second, such categorisation is consistent with the standard Keynesian multiplier analysis and thus makes the findings of the estimation clearer. Third, such decomposition provides a better understanding of how output responds to changes in sub-components of discretionary fiscal policy instruments and thereby may help us design better growth-enhancing fiscal policy.

Our sample period ranges from the third quarter of 2002 to the second quarter of 2016.<sup>13</sup> The selection of the sample period is dictated by the data availability. Special consumption tax in Turkey came into force in August 2002. So, it is impossible to take back the data on this tax. To overcome data constraints and to work with a larger data set that will allow us to obtain more reliable and robust results we prefer to work with quarterly data. The second thing that forces us to work with quarterly data is our reference model developed by Blanchard and Perotti (2002). They suggest that working with quarterly data provides more precise results with regard to the size of fiscal multipliers. In brief, under above constraints and suggestions, we select the period 2002-2016 with quarterly time series data observations of 55, which enable us to estimate the size of fiscal multipliers. Additionally, we add a constant, a trend and three seasonal dummies to the VAR model. All variables are expressed in their log form.

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<sup>13</sup> The discretionary fiscal policy shocks are identified by exploiting decision and implementation lags in fiscal policymaking, which means that the coefficients on output in government expenditure spending and tax equations only reflect the automatic stabilizers' effect. Hence, using quarterly data, which reflects a relatively high frequency, allows us to eliminate the effect of systematic part of discretionary fiscal policy (Yadav *et al.*, 2012; Çebi, 2016).

On the other hand, Turkey is an emerging market economy with relatively well-developed financial markets as far as developing countries are concerned. More importantly, it is a country which has been highly integrated with the world economically. Therefore, it would be worth considering, among many others, money supply and openness to international trade in estimating the size of fiscal multipliers. To this respect, we take into account broad money supply (M2) as an explanatory variable and trade openness (open) as an exogenous variable in our model. What is more, we add a dummy variable for economic and political crises (denoted by a dummy) to the model that takes the value of 1 from 2007:q2 to 2014:q1 and 0 otherwise.<sup>14</sup> We construct the dummy variable in the form of 1 for the crisis inception years and zero for the others.

With the exception of broad money supply, trade openness, and gross domestic product variables, all the other ones come from the database of the Ministry of Finance. The data source for the other three is the Central Bank of the Republic of Turkey.

#### 4. Estimation Results and Discussion

The specification and estimation method of the B-P SVAR depend critically on certain properties of the variables contained in the model. Prior to proceeding with the estimation of the model, therefore, it is essential to determine whether the variables are difference or trend stationary. As shown in Table B1 of Appendix B, the ADF unit root test and stationary findings show that the null hypothesis of unit roots could not be rejected for all the variables in the level form. The null hypothesis is, however, rejected when the ADF test is applied to the first differences of the variables.

A key aspect of empirical research on the specification of VAR models is the determination of the lag order of the autoregressive lag polynomial since all inferences in the VAR model depend on the correct model specification. We, therefore, identify the order of the VAR model using the Akaike Information Criterion (AIC), the Schwarz Information Criteria (SC), and the Hannan-Quinn Information Criteria (HQ). All these criteria suggest a VAR model of order *four*. As for the optimal lag length criteria, they are reported and described in Table B2 of Appendix B.

To identify serial correlation among variables, we utilize from Breusch-Godfrey Lagrange Multiplier (LM) test. The LM test of autocorrelation analyzes how well the lagged residual explain the residual of the original equation. If lagged residuals are statistically significant in explaining times residuals on the basis of chi-square, and then it can be said that there is no serial correlation among variables. In our model, LM test results show that there is no evidence for autocorrelation problem at the chosen lag lengths. Additionally, our estimation results indicate that all of the inverse unit roots lie inside the interior of unit root circle. Thus, one can affirm that the selected VAR technique is stationary. In brief, it can be argued that the model is stable and hence we can move to the next step of the analysis.<sup>15</sup>

It is important to bear in mind that we should not only test whether variables are integrated of the same order, but we also need to find evidence for a cointegration. To do so, we start with applying the Johansen's (1988, 1991) procedure to test for the presence of a cointegration. It reports eigenvalue and trace statistic (likelihood-ratio statistic) to determine the number of cointegration vectors using Johansen's maximum likelihood approach. The presence of cointegration among the

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<sup>14</sup> We attempt to test the impact of our variables on real GDP during bad times, i.e. recessions, and normal times by interacting the monetary and fiscal policy variables with a dummy variable that indicates the state of the economy, "bad" or "normal". For this purpose we use the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMQ) tests to conceive structural changes. For more details, see Figure A of Appendix A.

<sup>15</sup> All diagnostic (misspecification) tests can be obtained from the authors upon request.

variables implies that there is a long-run relationship between variables for the sample period we study. More specifically, Trace and Maximum-eigenvalue tests indicate 4 cointegration and 2 cointegration equation(s) at the 5 per cent significance level respectively. Based on these findings we can infer that all the variables that we considered are cointegrated over the sample period, 2002:q3-2016:q2. As a consequence, since the variables cointegrated, we can employ Vector Error Correction Model (VECM) to find long-run cointegrating vectors without any drawback. The results provided by the Johansen cointegration analyses and cointegration vectors are given in Table B3 and B4 of Appendix B respectively.

Our econometric estimates for GDP functions suggest that vat is one of the most effective discretionary fiscal policy variables in the model we considered (see Table B4 of Appendix B). To put it differently, GDP is affected by vat. Our estimation results also reveal that there is an inverse relationship between GDP and vat. In the same way, the other taxes we considered (sct and pit) adversely affect GDP. All these findings are consistent with the theoretical expectations with regard to the tax-GDP relationship. As for government spending, real government spending and transfer payments, in contrast to taxes, influence GDP positively. Our other variable, broad money supply (M2), has a positive effect on GDP but it is very low. However, trade openness has a negative effect on GDP. The reason why trade openness negatively affects GDP may be attributed to the long-standing persistent trade deficits which Turkey faces with.

To estimate the VAR model, some restrictions need to be imposed on the parameters of the model. The main question here is how fiscal shocks should be identified? All variables used in the baseline specification may influence each other with some lags. To identify the structural shocks, we employ the Cholesky decomposition. This decomposition imposes a recursive causal structure that restricts the contemporaneous impact of each variable on the other variables. First of all, it is assumed that real government spending elasticity with respect to growth is zero, which implies that there is no automatic feedback from economic activity to the real government spending within the same quarter in our VAR model (Blanchard and Perotti, 2002). Secondly, the automatic response of transfer payments and taxes to the broad money supply is disposed to zero. And finally, a restriction can be imposed on  $\beta_{spendingtax}$  or  $\beta_{taxspending}$ . It is assumed that  $\beta_{spendingtax} = 0$   $\beta_{taxspending} = 0$ , which allows government spending shocks (tax shocks) to affect tax (government spending) by means of  $\beta_{taxexp}$  or  $\beta_{exptax}$ .

The B-P SVAR is performed through impulse response functions and variance decomposition analysis. To do so, we firstly deal with the impulse response functions and then we focus exclusively on variance decomposition analysis in the following two sub-sections.

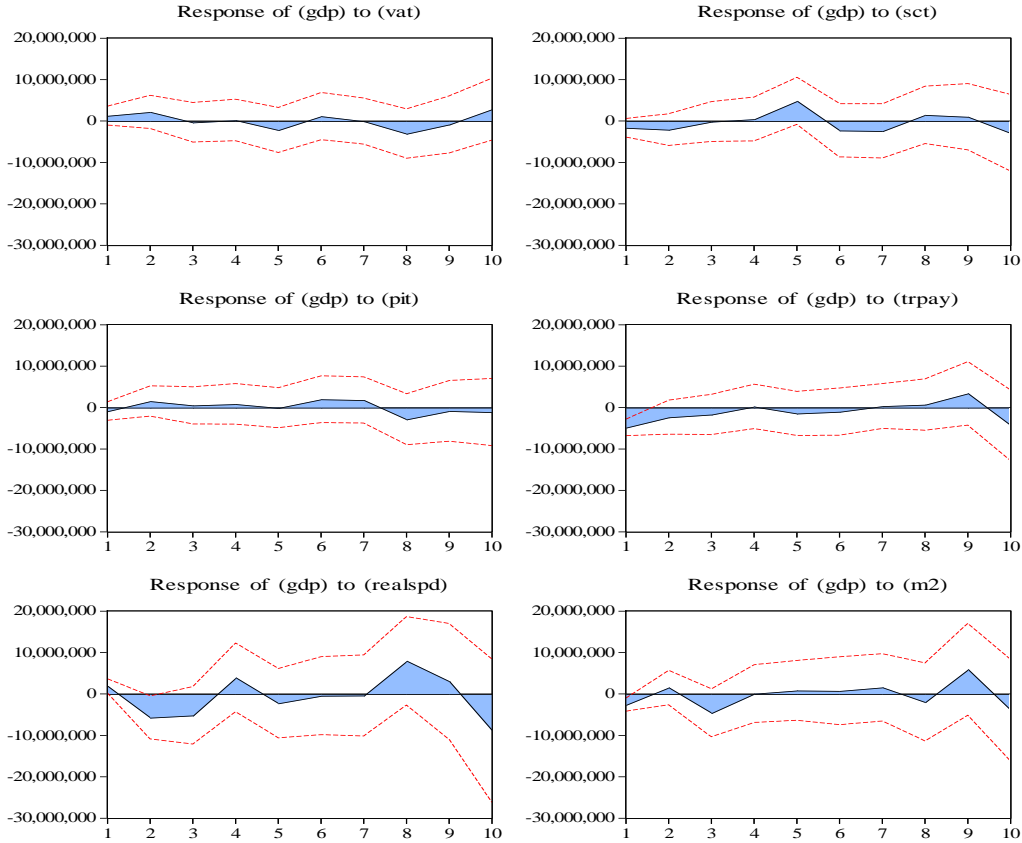
#### **4.1. Impulse Response Functions**

The impulse response functions indicate the estimated response of output to a shock to discretionary fiscal policy variables, i.e. taxes or government spending. It allows us to reveal how output responds to deliberate fiscal policy changes. Having identified the structural shocks, we can then obtain the impulse response of a variable to a one-time shock to any variable included in the model. The impulse response analysis traces the effect on current and future values of the endogenous variables of one standard deviation shock to the variables. To focus on the short-run dynamics, it is also illustrated for the sample up to 10 quarterly years. All the shocks are

standardized to a one-unit and thus the vertical axis indicates the unit of the approximate variation of the variable in responses to a one-unit shock to GDP.<sup>16</sup>

The panels of Figure 1 display how GDP responds to the changes in five fiscal variables (value-added tax, special consumption tax, personal income tax, real government spending, and transfer payments) and a monetary variable (broad money supply) respectively. Each panel illustrates the response of output to a one-unit change in the related variable in 10 quarterly year’s horizon. The figure must be read in the following way: in the first three periods regarding the structuralized shock, it can be observed that the effect of the value-added tax is positive and significant on GDP. After the third period, it tends to be negative. Personal income tax positively affects GDP until the end of the third period, whereas special consumption tax negatively affects GDP till the end of the third period. On the other hand, the impact of real government spending on GDP, as shown from Figure 1, is negative until the end of the third period and since then, however, it tends to be positive. As to transfer payment, it has a significant as well as negative effect on GDP starting from the first period and ending the fourth period. However, its effect on GDP tends to be positive starting the beginning of seventh and end of ninth periods.

**Figure 1:** Impulse response of GDP to the shocks



Note: vat: value-added tax; sct: special consumption tax; pit: personal income tax; trpay: transfer payment; realspd: real government spending; M2: broad money supply; gdp: gross domestic product.  
 The scale of the vertical axis indicates the change of GDP, while the horizontal axis represents the years for the quarterly data.  
 The solid line represents the mean impact. Dotted lines represent two standard deviation impacts from the mean.

<sup>16</sup> The model is estimated 1000 times using boot-strapped data. Following Matheson and Pereira (2016), the bootstrapping process can be summarized as follows: i) estimate the model parameters and obtain the residuals; ii) resample (with replacement) from the estimated residuals and simulate the model using the parameters from i; iii) re-estimate the model, saving the parameters; and (iv) repeat steps ii and iii number of times.

Throughout the present paper, we follow the approach of Matheson and Pereira (2016) to measure the size of fiscal multipliers. Accordingly, the fiscal multiplier measures the output effect in reais of one real increase in discretionary spending or revenue. In particular, the multiplier at horizon  $t$  is:

$\Delta X_t / \Delta Z_0 / S_z$ , where,  $\Delta X_t$  is the change in output in period  $t$ ,  $S$ , real government spending,  $T$  real government revenue  $\Delta Z_0$  is the initial change in the fiscal variable (i.e.  $Z = S, T$ ), and  $S_z$  is the average share of the fiscal variable in output over the sample. The impact multiplier is measured at  $t = 0$ .<sup>17</sup>

Table 1 tabulates the estimated size of the taxes and spending multipliers for Turkey for the period 2002:q3-2016:q2. As shown from the table, a one-unit shock to taxes and government spending leads to diverse effects on real GDP, ranging from -0.83 to 0.98 at the unit basis. Broadly speaking, a one-unit shock to taxes results in a lower but contrary change in GDP in the short run. This clearly reflects the non-Keynesian effect of taxes. Conversely, a one-unit shock to government spending is associated with a larger as well as positive change in GDP.

**Table 1:** Sign and size of the multipliers for government spending and taxes

Discretionary fiscal policy variables	A one-unit shock to ...	The impact on GDP
Taxes	Value-added tax	-0.83
	Special consumption tax	-0.54
	Personal income tax	-0.27
Government spending	Real spending	0.98
	Transfer payments	0.02

According to our findings, however, GDP responds to the discretionary fiscal policy shocks in a different manner. For instance, a one-unit shock to value-added tax causes a reduction of 0.83 units in GDP. Likewise, a one-unit shock to personal income tax diminishes GDP by 0.27 units, but less than that of value-added tax. In general, shocks to government spending, in contrast to taxes, yield positive effects on GDP in all cases but shows differences, which are subject to the type of government spending. Accordingly, a one-unit shock to real spending brings about 0.98 units rise in GDP. A one-unit shock to transfer payments, on the other hand, gives rise to a 0.02 units increase in it. As theoretically expected, a one-unit shock to transfer payments induces a substantially lower effect on GDP. This is because transfer payments affect GDP indirectly whereas real government spending influence directly. In addition to these, typically, marginal propensity to consume for those who get benefit from transfer payments is smaller than that of those who get benefit from real government spending. However, the both findings point to the validity of the weak Keynesian effect of the discretionary fiscal policy, exhibiting a low level of the growth-enhancing effect of fiscal policy in the short run.

#### 4.2. Variance Decomposition Analysis

To understand the relative importance of each discretionary fiscal policy shock variable under consideration, we apply the variance decomposition analysis. To this end, we estimate the unit of forecast variance to determine the amount of shocks to the variables.

<sup>17</sup> For the further details, see Matheson and Pereira (2016).



Table 2 indicates the results of our variance decomposition analysis. As seen from the table, GDP is influenced very much by its own shocks during the first period of the sample. However, the relative importance of fiscal shocks to GDP in itself declines considerably in the second sub-period, especially towards the end of the ten-quarterly horizon.

**Table 2:** Forecast error variance decomposition of GDP

period	vat	sct	pit	trpay	realspd	M2	gdp
1	5.841234	0.019595	2.079654	10.33502	13.50813	9.343970	58.87239
2	12.95970	8.902671	11.98556	5.387943	25.15516	5.757755	29.85121
3	10.97289	8.044264	10.55125	7.632417	26.33249	4.549686	31.91700
4	10.42023	8.549749	10.21736	7.217765	27.36746	4.737563	31.48987
5	10.84098	7.538868	9.171752	7.341331	26.31422	5.690932	33.10192
6	12.20132	9.786235	10.19132	6.537196	26.59118	5.428807	29.26394
7	12.09207	9.636289	9.996200	6.396387	26.54706	5.284123	30.04787
8	11.93174	9.671356	9.859592	6.701211	26.09648	5.406374	30.33325
9	12.12363	9.550317	9.668422	7.579981	24.97167	5.636007	30.46997
10	12.28705	9.990099	9.733493	7.716846	24.52335	5.544232	30.20493

Note: vat: value-added tax; sct: special consumption tax; pit: personal income tax; trpay: transfer payment; realspd: real government spending; M2: broad money supply; gdp: gross domestic product.

Table 2 also shows that 12.29 units of variation in GDP are accounted for by value-added tax for the last period of the sample horizon. Special consumption tax follows vat and shocks to this tax explains 9.99 units of the variation in GDP. Strictly speaking, it may be argued that, in terms of the endogenous variables, value-added tax shocks, rather than special consumption tax shocks, is more effective in explaining changes in GDP during the whole sample period. In other words, value-added taxes, among the taxes we consider, appear to be the most effective tax on GDP. The personal income tax is the third important tax after value-added and special consumption tax. These findings comply with theoretical expectations, suggesting that there is a negative relationship between taxes and GDP.

The results of the variance decomposition analysis for the last period indicate that the first most effective type of government spending seems to be real government spending. Accordingly, a shock to real government spending accounts for nearly 24.52 units of changes in variation in GDP. It is, then, followed by transfer payments by 7.72 units of changes for the last period of the sample. A striking finding that arises from the variance decomposition analysis is that the transfer payments have a weak effect in explaining changes in GDP when the whole sub-period is considered. On the whole, our variance decomposition analysis exhibits that in the short run value-added tax and real government spending are the most effective sub-components of discretionary fiscal policy tools on GDP for the last period.

## 5. Robustness Check

In this section, we report the results of the robustness checks that are conducted to test the sensitivity of the results presented in Section 4. In line with the objective of the present paper, we solely report the robustness check results related to fiscal multipliers.<sup>18</sup>

Strictly speaking, there are two options to check robustness for our model. The first option is to use the substitution method. However, to the best of our knowledge, SVAR method has no alternative in this regard. The second option is to use proxy variables instead studied variables.

<sup>18</sup> The full sets of impulse responses are also available on request.

But the fiscal variables used in this paper have no proxy variables as far as the Turkish budget system considered, we decide to change the order of variables as the last resort.

In our model, we assume that tax decision comes first in the baseline VAR specification.<sup>19</sup> Nevertheless, as part of the robustness check analysis, the baseline VAR specification is also re-estimated under the assumption of government spending decision comes first. Test results based on the SVAR model are provided in Table 3. The table shows the results of new specification regarding the order of fiscal variables. The robustness check results demonstrate that the multiplier coefficients are similar when the spending decision comes first. Based on these findings, we can conclude that the qualitative nature of the results remains unaltered. It can be seen that the tax shocks have a smaller and negative impact on GDP during the sample period. The effect of government spending shocks, on the other hand, is higher as well as positive.

**Table 3:** Sign and size of the multipliers for alternative order of government spending and taxes

Discretionary fiscal policy variables	A one-unit shock to ...	The impact on GDP
Taxes	Value-added tax	-0.57
	Special consumption tax	-0.35
	Personal income tax	-0.19
Government spending	Real spending	1.05
	Transfer payments	0.23

## 6. Summary and Conclusions

In this paper, we attempted to estimate the short-run fiscal multipliers for taxes and government spending at their sub-component levels in Turkey. To this end, we employed the augmented version of the B-P SVAR technique with eight variables, five of them are fiscal and one is monetary variable, to quarterly time series data for Turkey over the period 2002:q3-2016:q2.

Our empirical findings show that the size of the multiplier for taxes and government spending exhibit substantial differences. To be more precise, the size of fiscal multipliers varies with the sub-components of discretionary fiscal policy. In all cases, however, the size of the multipliers for all the sub-components of government spending is larger than that of taxes in the studied period. This means that a shock to government spending leads to a larger growth-enhancing effect in comparison to tax cuts. This is also true for each sub-component of government spending and taxes. To exemplify, a shock to real government spending gives rise to the largest impact on GDP with a fiscal multiplier value of 0.98, supporting the validity of the weak Keynesian effect of fiscal policy in the case of Turkey. In the same manner, a shock to transfer payments also results in the growth-enhancing effect of fiscal policy, with a relatively low but positive fiscal multiplier value of 0.02, reflecting the very weak Keynesian effect. As opposed to government spending, GDP adversely responds to the shocks given to the taxes with no exception. More specifically, e.g. a one-unit shock to the value-added tax gives rise to a decrease in GDP by 0.83 as the same shock to the personal income tax brings about a decrease in it by 0.27. In a nutshell, our estimated results reveal that the sign of tax multipliers is negative and their size lies in the range of -0.83 to -0.27, differing types of taxes, while for the real

<sup>19</sup> Some studies, as in the case of Çebi (2016), that attempt to estimate fiscal multiplier use to change the order of fiscal variables as part of the robustness check in the baseline VAR specification. We follow the same way in this paper.

government spending and transfer payments the sign of multipliers is positive and their size change between 0.02 and 0.98.

As shown, the size of the multiplier for government spending tends to be larger than that of taxes. In all cases, as far as our finding concerned, shocks to government spending create the weak Keynesian effect and the very weak Keynesian effect in the case of transfer payments on GDP. However, shocks to taxes without regard to the type of taxes produce the non-Keynesian effects. These findings imply that government spending, especially real spending, is a relatively more effective fiscal policy instrument than taxes in stimulating economic activity in Turkey. In line with these findings, it may be suggested that policy-makers in Turkey should rely very much on government spending in fiscal policy setting.

Meanwhile, the findings are consistent with the theoretical arguments that are related to fiscal policy. Some of the findings are in agreement with the arguments of the standard Keynesian view in terms of both sign and size, while some others are in line with the arguments of the new classical views. On the other hand, our empirical findings, despite the fact that there is no empirical consensus over the issue, are also broadly compatible with the results of similar studies, typically ranging from close to zero to well-over 2 for government spending and from zero to reaching 1 for taxes; and this is in the case of the existing developing country-related literature.

Based on the findings above, with regard to the size of fiscal multipliers, it can be argued that it may have been affected by a variety of factors. Among many of these factors, the type of discretionary fiscal policy tool is used, the degree of monetary policy accommodation, the level of financial deepening, the share of liquidity-constrained consumers, consumption and import propensities, government debt-related interest rate risk premiums, expectations, the degree of openness of the country, the position in the business cycle, the size of government, the degree of capital mobility and exchange rate regime adopted are just some. Furthermore, the size of the multipliers we have already estimated may be somewhat different than expectations, even though there is no standardization in this regard in part due to the factors mentioned above, in part due to estimation technique and data-related factors.

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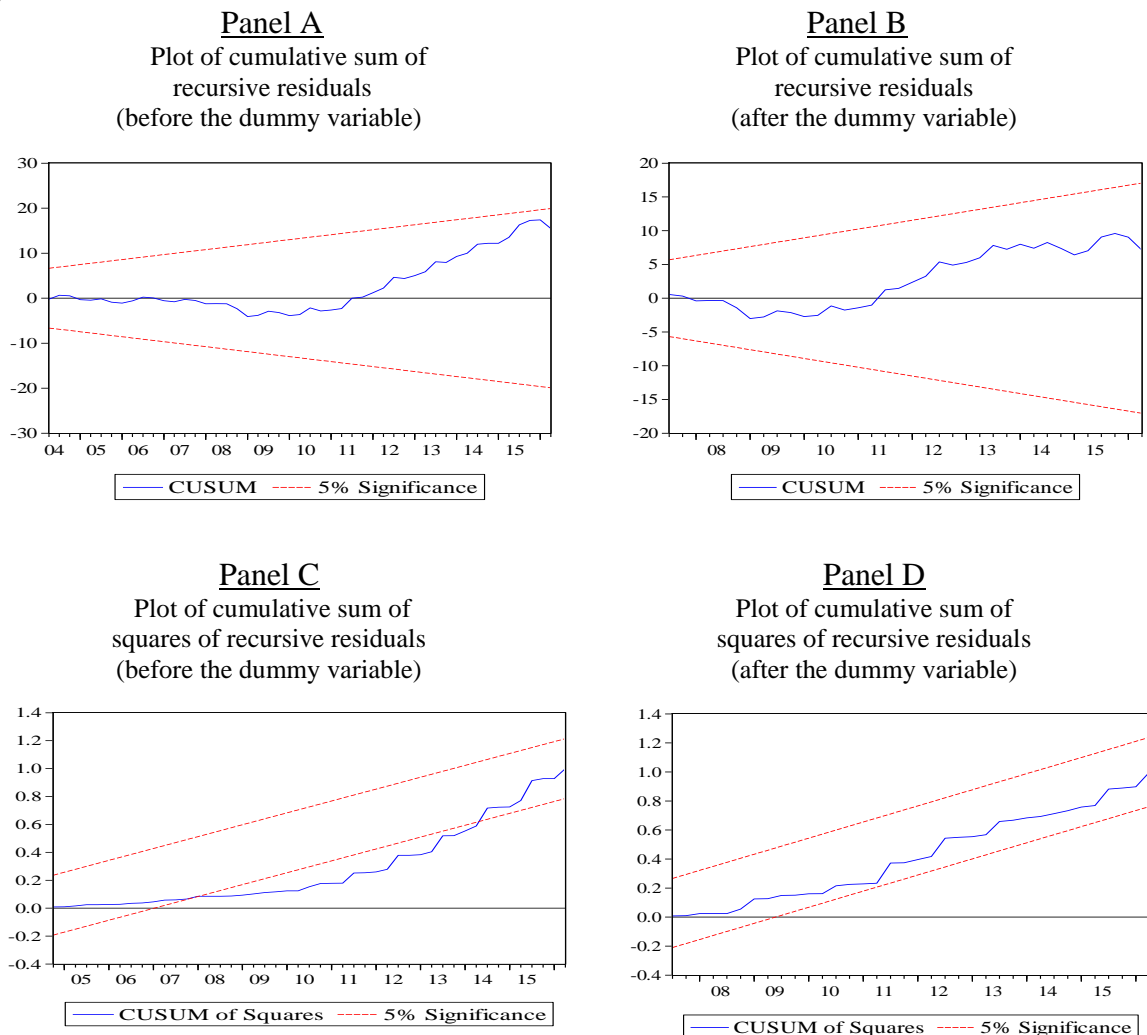
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## Appendix A

We use the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMQ) tests to conceive structural changes. These tests are based on the recursive residuals and squared recursive residuals, respectively, of the evaluated model and are plotted against break points. Additionally, the CUSUM test of the stability over time of the coefficients of a linear regression model, which is usually based on recursive residuals, can also be applied to ordinary least squares residuals (Ploberger and Krämer, 1992). If the plots of CUSUM or CUSUMSQ statistics stay within critical bounds of the 5 percent significance level, the null hypothesis of coefficients' stability in the model cannot be rejected. In our model, the plots of the CUSUM statistic stay within the critical bounds indicating the stability of the estimated coefficients (see Figure A). However, the results of CUSUM squares test are within the critical bounds indicating instability for the period 2007:q2-2014:q1.

**Figure A:**





## Appendix B:

**Table B1:** ADF unit root test and stationary findings

Variables	Level Constant	Critical value		First difference Constant and trend	Critical value	
		1 %	5 %		1 %	5 %
vat	-3.369975	-4.234972	-3.540328	-4.510271 (1)	-4.252879	-3.548490
sct	-1.897864	-4.252879	-3.548490	-5.135787 (1)	-4.252879	-3.548490
pit	0.705221	-4.226815	-3.536601	-8.554613 (1)	-4.226815	-3.536601
trpay	1.021361	-3.621023	-2.943427	-7.058552(1)	-3.621023	-2.943427
realspd	1.704997	-3.621023	-2.943427	-4.177834 (1)	-3.646342	-2.954021
M2	2.973020	-3.555023	-2.985522	-7.795489 (1)	-4.137279	-3.495295
gdp	2.210048	-3.661661	-2.960411	-3.608777 (1)	-3.568379	-3.218382
open	-1.847369	-3.555023	-2.915522	-5.686727 (1)	-4.144584	-3.498692
dummy	-1.414456	-3.555023	-2.915522	-7.364910 (1)	-4.137279	-3.495295

Note: vat: value-added tax; sct: special consumption tax; pit: personal income tax; trpay: transfer payment; realspd: real government spending; M2: broad money supply; gdp: gross domestic product; open: trade openness; dummy: dummy variable for economic and political crises.

The numbers in parenthesis indicate the selected lag order of the ADF models.

Lags are chosen based on Akaike Information Criterion (AIC).

The critical values are obtained from MacKinnon (1991) for the ADF test.

These tests examine the null hypothesis of a unit root against the stationary alternative.

**Table B2:** Selection of lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5835.032	NA	3.89e+91	230.7464	234.6024	231.4556
1	-5737.543	141.4556	6.35e+90	228.8448	234.5569	230.2633
2	-5681.123	66.37634	6.17e+90	228.5538	234.1220	230.6816
3	-5590.816	81.45322*	2.20e+90	226.9340	232.3582	229.7710
4	-5497.476	58.56609	1.30e+90*	225.1951*	232.2755*	228.7414*

Note: (\*) denotes lag order selected by the criterion.

LR: sequentially modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

**Table B3: Johansen Cointegration Tests Results<sup>20</sup>**

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.782413	316.5146	228.2979	0.0001
At most 1 *	0.675723	234.1562	187.4701	0.0000
At most 2 *	0.589557	173.3437	150.5585	0.0013
At most 3 *	0.496453	125.2556	117.7082	0.0152
At most 4	0.389907	88.20740	88.80380	0.0552
At most 5	0.358808	61.52363	63.87610	0.0776
At most 6	0.288477	37.52459	42.91525	0.1559
At most 7	0.182726	19.14581	25.87211	0.2722
At most 8	0.141674	8.249651	12.51798	0.2320
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.782413	82.35844	62.75215	0.0003
At most 1 *	0.675723	60.81253	56.70519	0.0185
At most 2	0.589557	48.08804	50.59985	0.0892
At most 3	0.496453	37.04823	44.49720	0.2562
At most 4	0.389907	26.68377	38.33101	0.5493
At most 5	0.358808	23.99904	32.11832	0.3487
At most 6	0.288477	18.37878	25.82321	0.3489
At most 7	0.182726	10.89616	19.38704	0.5241
At most 8	0.141674	8.249651	12.51798	0.2320
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

<sup>20</sup> Since save the space we have not inserted all the cointegrating equations results. All the other cointegrating equations results can be obtained from the authors upon request.

**Table B4:** Long-run cointegrating vectors (standard error in parentheses)

gdp	vat	sct	pit	realspd	trpay	m2	open	dummy
1.000000	-22.00483 (2.1263)	-10.59262 (1.34269)	-7.88094 (1.13495)	5.605949 (0.82392)	1.314630 (0.03394)	0.544362 (0.38298)	-3.739598 (0.62966)	-1.43E+08 (1.9E+07)

Note: vat: value-added tax; sct: special consumption tax; pit: personal income tax; trpay: transfer payment; realspd: real government spending; M2: broad money supply; gdp: gross domestic product; open: trade openness; dummy: dummy variable for economic and political crises.