# Taxes and Private Consumption Expenditure: A Component Based Analysis for Turkey

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# Taxes and Private Consumption Expenditure: A Component Based Analysis for Turkey

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## Abstract

The purpose of this paper is to analyze empirically the short- and long-run effects of tax shocks on private consumption expenditure on component basis in Turkey. To do so, first, we decomposed private consumption expenditure into four major sub-categories, including food, education, and transportation, among others. And then, we employed a Structural VAR (SVAR) model which was calibrated to quarterly data set for the period 2003:Q1–2013:Q3.

Specifically, our empirical findings show that the effects of tax shocks on the components of private consumption expenditure differ in the short- and long-run. In the short-run, all the taxes which we considered have a significant effect on the components of private consumption expenditure, whereas in the long-run only two taxes –the VAT and the personal income tax– affect it. However, it is important to highlight that the components of private consumption expenditure are much more affected by the VAT in the both short- and long-run. In brief, the findings reveal that the effects of tax shocks on private consumption expenditure shows difference, changing according to sorts of taxes, components of the expenditure, and the length of period.

***Key Words:*** Tax Shocks, VAT, Special Consumption Tax, Personal Income Tax, Private Consumption Expenditure, Fiscal Policy, Turkey.

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## 1. Introduction

Perhaps the most important argument behind imposing a tax upon private consumption expenditure is to encourage savings while discouraging consumption and, hence, to achieve a higher rate of economic growth. While income is not changing, it is only possible to increase savings by reducing private consumption expenditure. Apart from stimulating growth, taxes are also an important fiscal policy instrument in terms of a number of aspects, such as macroeconomic stabilization, i.e. smoothing aggregate demand, redistribution of income, and efficiency in resource allocation. In this context, it becomes important to identify how and to what extent tax shocks affect private consumption expenditure.

In this paper, we analyze the effects of three main taxes –the VAT, the special consumption tax and the personal income tax – which account for vast majority of total tax revenue in Turkey from the Keynesian perspective. Of course, we are well aware of that there exist highly respected two more hypotheses related to consumption –that are Friedman's permanent income hypothesis and Modigliani-Brumberg's life-cycle hypothesis– apart from the Keynesian consumption theory. Those theories and/or hypotheses differ in terms of explaining the observed consumer behavior and their predictions in regard to the effects of government policies on it, especially, Keynes's theory from the other two. For instance, an increase in taxes will affect the level of economic agent's consumption and/or their consumption decisions according to the Keynesian consumption theory. However, according to the other two hypotheses, an increase in taxes will not create any effect on economic agent's consumption unless they come as a surprise.

It would be also worth emphasizing here that as stated by Aşırım (1996), empirically testing the last two hypotheses is highly problematic primarily it is because distinguishing permanent and transitory components of income and consumption is a bit hassle[1]. Furthermore, especially, due to lack of available and/or reliable long-run data in case of developing countries like Turkey, it is not feasible to consider in empirical studies on consumption. Therefore, most of empirical studies estimating the effects of government policies, i.e. raising taxes, for developing countries are based on estimations of Keynesian consumption functions (Raut and Virmani, 1990). So, in this paper we prefer to analyze the effects of tax shocks on the components of private consumption expenditure in the context of Keynesian consumption theory, but with a newly developed as well as more suitable econometrical model for fiscal policy related studies, the SVAR.

Our main aim with this paper is to examine their effects one by one on the each component of private consumption expenditure in the both short- and long-run. Other motivations for this paper can be

[1] However, we should mention here that a study by Hall (1978) partly overcomes this problem. By assuming that consumers have rational expectations about the income generating process and then by combining two closely related hypotheses, Friedman's permanent income hypothesis [1957] and Modigliani-Brumberg's life-cycle hypothesis [1954], he developed a new version consumption hypothesis, named as "*the random-walk hypothesis for consumption*". If the Hall's hypothesis is recognized, the forecast of future consumption is an extrapolation of the historical trend, and there is no point in forecasting future income and using that to predict future consumption. See for further details, Raut and Virmani (1990).

put in order as follows: i) to identify short- and long-run effects of different tax shocks on private consumption on the component basis; ii) to reveal that to what extent and how tax shocks affect private consumption expenditure in the case of Turkey; iii) to analyze the effects of tax shocks with a newly developed model, the SVAR model of Blanchard and Perotti (2002), which has a relatively superiority to other existing econometrical models in capturing the effects of fiscal policy shocks; iv) to make a contribution to the extremely scant empirical literature analyzing the effects of tax shocks on private consumption in general, and on its components in particular.

The remaining sections of the paper are structured as follows: The next section reviews the empirical literature as regards the effects of tax shocks on private consumption expenditure, while section 3 describes methodology and data set. Section 4 focuses on empirical investigation and the interpretation of the results. And finally, the last section of the paper provides concluding remarks.

## 2. Review of the Related Empirical Literature

The empirical studies analyzing the effect of tax shocks on private consumption expenditure are quite scant. Moreover, to our best knowledge, most of these studies have not directly focused on the issue. Some of these studies have considered taxes as a part of fiscal policy and accordingly, analyze the effect of taxes on private consumption expenditure along with government expenditure, whereas some others have attempted to examine the effects of tax shocks by separating taxes as discretionary and non-discretionary ones. As for third group of studies, but few, they look into the effects of some certain taxes, as we did, on private consumption expenditure. In the following lines, we will review these empirical studies.

As stated a bit earlier, a large amount of empirical studies, such as Giavazzi and Pagano (1996), Alesina and Ardagna (1998), Giavazzi et al. (2000), Schclarek (2004), Schclarek (2007), Carmignani (2008), among others, consider taxes in the context of Keynesian and/or non-Keynesian effects[2] of fiscal policy and attempt to analyze the effects of taxes on private consumption expenditure, along with public expenditure. However, it is worth nothing here that most of these studies focus on industrialized countries, rather than developing countries. The pioneering study in this regard belongs to Giavazzi and Pagano (1990). They investigated non-Keynesian effects of fiscal policy in Denmark, Ireland and Sweden. They found that under special circumstances, fiscal policy has non-Keynesian effects, referring to contractionary fiscal policy which creates expansionary effects on private consumption expenditure. Another outstanding study by Giavazzi et al. (2000) also found that fiscal policy has a non-Keynesian effect, depicting that an increase in taxes raises private consumption expenditure in the case of fiscal consolidations. Some other studies such as Giavazzi and Pagano (1996), Perotti (1999), and Pozzi (2001) also reached to similar results, reflecting non-Keynesian effects of fiscal policy on private consumption expenditure.

[2] It is explained in the context of Ricardian equivalence theorem, expectations, credibility, and propose positive growth effects of consolidation [See, (Alesina and Ardagna, 1995), (Alesina and Perotti, 1997)].

However, the studies of Giavazzi and Pagano (1996), Perotti (1999), Schclarek (2007) and Carmignani (2008), among others, found mixed results regarding to the effects of tax shocks on private consumption expenditure. For instance, the study of Perotti (1999) showed that tax shocks have Keynesian effects on private consumption expenditure in good times, but non-Keynesian effects in bad times. Another study by Giavazzi and Pagano (1996) reached to almost similar results for 19 OECD countries[3] over the period 1970-1992, showing that fiscal policy has Keynesian effects in normal times (higher taxes reduce private consumption expenditure), but non-Keynesian effects outside normal times. In a similar vein, a recent study by Carmignani (2008) investigated the impact of fiscal policy on private consumption expenditure in Europe and the Commonwealth of Independent States. He found that fiscal policy has Keynesian effects in transition countries, whereas it has non-Keynesian effects in high-income OECD countries. Based on his empirical findings, however, he asserted that the effect of fiscal policy on private consumption expenditure stems mainly from the effects of public expenditure, rather than taxes. With regard to taxes, he claimed that they have an insignificant effect on private consumption expenditure when compared to public expenditure in transition economies both in normal and outside normal times. However, in high-income OECD countries there is evidence of a non-linear response: in normal times the effect of fiscal policy is practically negligible, while outside normal times there is evidence of non-Keynesian effects.

In contrast to those studies mentioned earlier, some other empirical studies, such as Hjelm (2002), van Aarle and Garretsen (2003), Schclarek (2004) and Schclarek (2007), among others, found the Keynesian effect of fiscal policy on private consumption expenditure. For instance, the study of Schclarek (2007) investigated the effect of fiscal policy shocks on private consumption expenditure in good and bad times in 40 countries[4], of which 19 are industrialized and 21 are developing countries, using annual data for the period 1970-2000. Especially in the context of taxes, his empirical findings revealed that tax shocks do not have any effects on private consumption expenditure in industrial countries either in good or bad times. However, they have Keynesian effects in developing countries.

Empirical literature highlights also some country specific studies, but not many, which investigate the individual effect of taxes on private consumption expenditure. Among these types of studies, the studies of Hubbard et al. (1986), Poterba (1988), Andrikopoulos et al. (1993), Steindel (2001), Kattai et al. (2004), Kniesner and Ziliak (2005), Miki (2011), Mertens and Ravn (2012), and Alm and El-Ganainy (2012) stand out at first glance. Some of these studies [Hubbard et al. (1986), Poterba (1988), Steindel (2001), and Kniesner and Ziliak (2005)] looked into the effects of personal income taxes and changes on it, whereas the others [Andrikopoulos et al. (1993), Miki (2011), Mertens and

[3] Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, the UK, and the USA.

[4] The industrialized countries consist of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, the UK, and the USA, whereas the developing countries are composed of Chile, Colombia, Costa Rica, Dominican Republic, Fiji, India, Malaysia, Malta, Mexico, Morocco, Pakistan, Panama, Paraguay, Philippines, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, Uruguay, and Venezuela.

Ravn (2012), and Alm and El-Ganainy (2012)] deal with VAT and/or special consumption tax and their effects on private consumption expenditure.

An influential study by Steindel (2001) analyzed the effects of permanent and transitory changes in personal income tax, along with other two taxes –payroll taxes, and social security benefits–, on private consumer expenditure in the USA by combining the life-cycle and permanent income hypotheses as a single theory. Based on his study's outcomes, he stands out two conclusions: First, consumers would be more likely to increase their expenditure if the changes in tax liabilities were permanent. Second, consumers would delay their expenditure until a tax change affected their take–home pay.

Tondl (2004) asserted that in common macroeconomic theory, an increase in personal income tax reduces the disposable income for consumption expenditure. To support her argument, she carried out a comparatively study on the macroeconomic effects of fiscal policy in the acceding countries. According to her findings, the panel estimates for the EU-4 countries[5] indicated equally that private consumption expenditure is significantly negatively related to income taxation. This is obviously only true for Portugal and Ireland. However, for Spain there is a significantly positive relationship between taxes and private consumption expenditure.

In the literature, there have been also some other empirical studies examining the effects of VAT and/or special consumption tax on private consumption expenditure either on aggregate level or on individual or household level. However, these sorts of studies are relatively limited to those studies that examine other measures of taxes. The examples of these sorts of studies are Andrikopoulos et al. (1993), Miki (2011), Mertens and Ravn (2012), and Alm and El-Ganainy (2012). Andrikopoulos et al. (1993), for instance, analyzed the short-run effects of VAT on consumption in Greece. Their empirical findings indicate that VAT affects individual commodity prices, the consumer price index, and the allocation patterns of consumptions among groups of commodities. Another study by Miki (2011) explored the effect of a change in a country's VAT rate on its aggregate consumption in 14 developed countries[6] by using panel data models for a data set covering the period 1980:q2-2010:q3 and picking up 53 cases of the change in the VAT rate. His/her empirical findings revealed that aggregate consumption indicates three different trends against the VAT rate changes. The first, aggregate consumption increases just before the rise in the VAT rate, or vice versa. The second, they decrease/ increase relatively dramatically as soon as the rise/reduction is implemented. The final, after the dramatic decrease/increase they increase /decrease gradually.

A similar but more recent study by Alm and El-Ganainy (2012) investigated the relationship between the VAT and consumption behavior, using actual data of EU-15 countries[7] over the period 1961-2005. Their empirical findings showed that the effective VAT tax rate negatively affects the level of

[5] Spain, Portugal, Greece, and Ireland.
[6] Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, and the UK.
[7] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the UK.

aggregate consumption. Accordingly, one percentage point increase in the VAT rate leads to roughly a one percent reduction in the level of aggregate consumption in the short-run and to a somewhat larger reduction in the long-run.

What we see from the literature review above is that first, there has not been a consensus on the effects of fiscal policy, in particular, of tax shocks, among academia and other circles. And also the empirical studies have revealed mixed results. While some studies found Keynesian effect of tax shocks on private consumption expenditure, the other studies concluded either non-Keynesian effects and/or no effects. It seems that the discussions in this regard have not been ceased so far and look like to continue. Specifically, the studies analyzing the effects of tax shocks separately on private consumption expenditure are scant. Moreover, to our best knowledge, there has been no empirical study analyzing the effects of tax shocks on the components of it. All these indicate that there is a need for much more studies in this area.

## 3. Methodology and Data Set

In this section, firstly, we present a structural VAR model, and then produce short- and long-run impulse-response functions. Secondly, we forecast error variance decomposition. And finally, we describe the data set.

### 3.1. Methodology: A Structural VAR (SVAR) Model

In this paper, we have employed a SVAR model instead of using any other econometric models, such as classical regression analysis, computable general equilibrium [CGE] model, and VAR model. First of all, the SVAR model is a newly developed econometric model. And then, as a number of scholars have argued, it is more suitable empirical approach in capturing and analyzing the effects of fiscal policy shocks in general, tax shocks in particular, compared with the other models due to the fact that fiscal policy does not accurately response to economic activities because of lag problem. According to advocators, therefore, the impact of fiscal shocks could be better understood with the implementation of this model. In other words, the SVAR model is a more suitable approach for searching out the effect of tax shocks owing to lags in fiscal policy. The SVAR model assists to identify fiscal shocks in the data together with other shocks by imposing sign restrictions for the identification of each shock. Besides, as emphasized by the Blanchard and Perotti (2002) who are the pioneer of analyzing the effects of fiscal policy with the SVAR model, it assists to capture much better results compared with large-scale econometric models or reduced-form approach. Therefore, we employed the SVAR model for identifying tax shocks and tracing their dynamic effects on private consumption expenditure is to employ the SVAR model.

To identify the structural shocks, we began with a reduced form of VAR model:

$$Y_t = AY_{t-1} + \ldots + A_pY_{t-p} + \Psi Y_{t-p} + \Psi D_t + \mu_t \qquad [1]$$

The structural representation of the VAR model of order (p) takes the following general form:

$$AY_t = A_1^* Y_{t-1} + \ldots + A_p^* Y_{t-p} + \mathrm{B}\varepsilon_t \quad [2]$$

where;

$Y_t$ is a 7x1 vector of endogenous variables, i.e. $Y_t = [pc1_t, pc2_t, pc3_t, pc4_t, vat_t, sct_t, pit_t]$. A represents the 7x7 contemporaneous matrixes, whereas the matrix B contains structural form parameters of the model. $A_p^*$ is 7x7 autoregressive coefficient matrices, $\varepsilon_t$ is a 7x1 vector of structural disturbances, assumed to have zero covariance and be serially uncorrelated. The covariance matrix of the structural disturbances takes the following form:

$\mathrm{E}[\varepsilon_t \varepsilon_t'] = \mathrm{D} = [\sigma_1^2 \sigma_2^2 \sigma_3^2 \sigma_4^2 \sigma_5^2 \sigma_6^2 \sigma_7^2]$ x I. In order to get the reduced form of our structural model [2] we multiply both sides by $A^{-1}$ such as that:

$$Y_t = \alpha_0 + \sum_{i=1}^{p} B_i Y_{t-i} + \mu_t \quad [3]$$

where,

$\alpha_0 = A^{-1} c_0$, $B_i = A^{-1} A_p$ and $\mu_t = A^{-1} \varepsilon_t$, i.e. $\varepsilon_t = A\mu_t$.

The reduced form errors $\mu_t$ are linear combinations of the structural errors $\varepsilon_t$, with a covariance matrix of the form. $\mathrm{E}[\mu_t \mu_t'] = A^{-1} \mathrm{D} A^{-1'}$.

We propose that the seven variables are driven by the following seven structural shocks: private consumption expenditure (1) shock (pc1_shock); private consumption expenditure (2) shock (pc2_shock); private consumption expenditure (3) shock (pc3_shock); private consumption expenditure (4) shock (pc4_shock); value added tax shock (vat_shock); special consumption tax shock (sct_shocks); personal income tax shock (pit_shock).

Though it is well known, it would be important to emphasize here that the impulse response functions depends on the order of the variables in the VAR model. For this purpose, we have ordered the variables from the most exogenous to the least ones to get much better results in all cases.

To identify the short- and long-run structural innovations from the VAR model, 70 and 21 identifying restrictions are required, respectively. The long-run restrictions applied in the model are as follows: i) the first group of private consumption expenditure shocks are assumed to be affected by all the other variables except its own shocks; ii) the second group of private consumption expenditure shocks are assumed to be affected by all the other variables chosen except its own shocks and the first group of private consumption expenditure shocks; iii) the third group of private consumption expenditure shocks are assumed to be affected by all the other variables chosen except its own shocks and the first and second group of private consumption expenditure shocks; iv) the last group of private consumption expenditure shocks are assumed to

be affected by all the other variables chosen except its own shocks and the first, second and third group of private consumption expenditure shocks; v) VAT shocks are assumed to be affected by special consumption tax shocks and personal income tax shocks; vi) and finally, special consumption tax shocks are assumed to be affected by personal income tax shocks.

From the Keynesian point of view, current consumption goes up, ceteris paribus, if disposable income rises, and vice versa. In other words, consumption is a positive function of disposable income. Taxes may affect private consumption expenditure either directly or indirectly, subject to the sorts of taxes. Theoretically, it is expected that taxes on income –personal income tax, and corporate income tax– affect private consumption expenditure directly, while taxes on goods and services –VAT, and special consumption tax– indirectly influence it.

As noted later that the first group of private consumption expenditure consists of following components: Food, beverages and tobacco, clothing and footwear. Theoretically, it is expected that consumption expenditure on these goods will be affected by all taxes which we considered. All these goods are subject to the VAT, whereas some of them subject to the special consumption tax in the case of Turkey. In addition, private consumption expenditure is the positive function of disposable income which is equal to the difference between an individual's gross income and taxes paid by him/her from Keynesian perspective. In such a case, it is expected that all the taxes will affect the first group of private consumption expenditure. Similarly, it is expected that other components of private expenditure are affected by the all taxes we considered in this paper.

The short-run restrictions can be presented in the matrix form as follow:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ C_1 & 1 & 0 & 0 & 0 & 0 & 0 \\ C_2 & C_7 & 1 & 0 & 0 & 0 & 0 \\ C_3 & C_8 & C_{12} & 1 & 0 & 0 & 0 \\ C_4 & C_9 & C_{13} & C_{16} & 1 & 0 & 0 \\ C_5 & C_{10} & C_{14} & C_{17} & C_{19} & 1 & 0 \\ C_6 & C_{11} & C_{15} & C_{18} & C_{20} & C_{21} & 1 \end{pmatrix} \begin{pmatrix} e_t^{pc1} \\ e_t^{pc2} \\ e_t^{pc3} \\ e_t^{pc4} \\ e_t^{vat} \\ e_t^{sct} \\ e_t^{pit} \end{pmatrix} = \begin{pmatrix} C_{22} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & C_{23} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & C_{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & C_{25} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & C_{26} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & C_{27} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & C_{28} \end{pmatrix} \begin{pmatrix} \varepsilon_t^{pc1\_shock} \\ \varepsilon_t^{pc2\_shock} \\ \varepsilon_t^{pc3\_shock} \\ \varepsilon_t^{pc4\_shock} \\ \varepsilon_t^{vat\_shock} \\ \varepsilon_t^{sct\_shock} \\ \varepsilon_t^{pit\_shock} \end{pmatrix}$$

The long-run restrictions can be presented in the matrix form as follow:

$$\varepsilon_t \equiv \begin{pmatrix} e_t^{pc1} \\ e_t^{pc2} \\ e_t^{pc3} \\ e_t^{pc4} \\ e_t^{vat} \\ e_t^{sct} \\ e_t^{pit} \end{pmatrix} = \begin{pmatrix} C_1 & 0 & 0 & 0 & 0 & 0 & 0 \\ C_2 & C_8 & 0 & 0 & 0 & 0 & 0 \\ C_3 & C_9 & C_{14} & 0 & 0 & 0 & 0 \\ C_4 & C_{10} & C_{15} & C_{19} & 0 & 0 & 0 \\ C_5 & C_{11} & C_{16} & C_{20} & C_{23} & 0 & 0 \\ C_6 & C_{12} & C_{17} & C_{21} & C_{24} & C_{26} & 0 \\ C_7 & C_{13} & C_{18} & C_{22} & C_{25} & C_{27} & C_{28} \end{pmatrix} \begin{pmatrix} \varepsilon_t^{pc1\_shock} \\ \varepsilon_t^{pc2\_shock} \\ \varepsilon_t^{pc3\_shock} \\ \varepsilon_t^{pc4\_shock} \\ \varepsilon_t^{vat\_shock} \\ \varepsilon_t^{sct\_shock} \\ \varepsilon_t^{pit\_shock} \end{pmatrix}$$

### 3.2. Data Set

In this paper, we employed the SVAR model to quarterly data for Turkey over the period 2003:Q1–2013:Q3. The reason for starting data from 2003 onwards is that the special consumption tax has been put into practice in Turkey in August 2002. In connection with the inaccessibility of data for the special consumption tax, we faced with another serious problem. Due to lack of some observations in the early part of the year 2003, we had to use data for August 2003 onwards. Sources of data come from two main governmental organizations: The Ministry of Finance and the Turkish Statistical Institute, as presented in Table 1. The data related to private consumption expenditure was collected from the Turkish Statistical Institute, whereas the data for taxes obtained from the Ministry of Finance.

In this paper, we considered three important taxes which accounts for more than 80 % of central government's total tax revenue. These taxes are the personal income tax, the VAT, and the special consumption tax. To identify their effects on the components of private consumption expenditure, we categorized it into four. In categorizing, we followed the classification of the Turkish Statistical Institute with a slide amendment. To be able to obtain more meaningful results, however, we reclassified the Turkish Statistical Institute's classification by reducing the number of classification from nine to four [pc1, pc2, pc3, and pc4] as shown in Table 1. Meanwhile, it would be worth mentioning here that all variables are seasonally adjusted and expressed as a proportion of GDP.

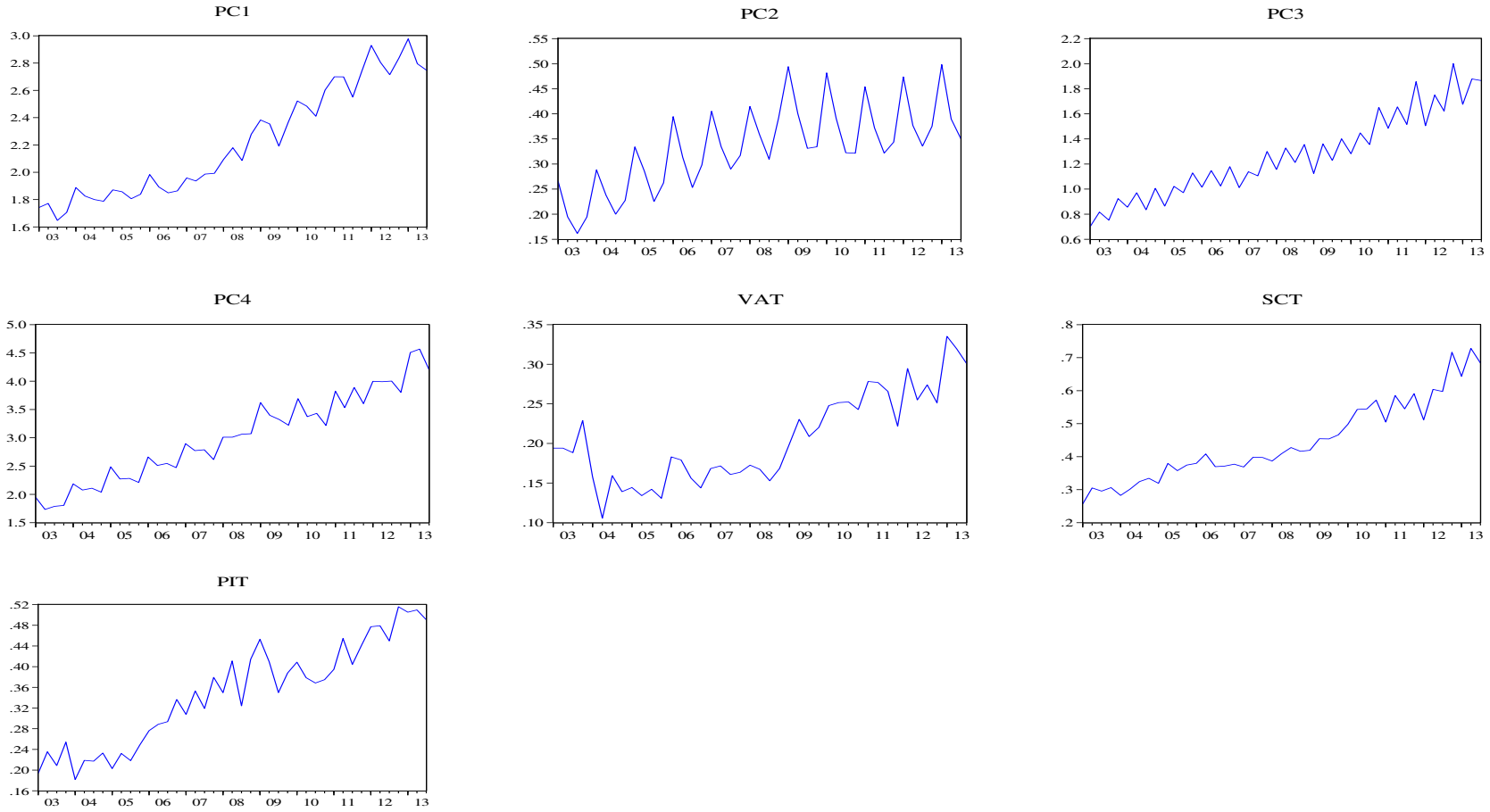
A visual presentation of the series is displayed in Figure 1. As shown from the figure, the time series for all variables are not stationary as well as all of the variables have a clear trend from the beginning through the end of the sample period. So, we added time trend to our models to get better results.

We believe in that our paper contains an innovative feature. To our best knowledge, for the first time in the literature, effects of tax shocks on private consumption expenditure were analyzed on the component base. Doing like that, we aimed to identify that how shocks to taxes affect each component of private consumption expenditure.

**Table 1:** Variables and Data Sources

| **Variables** | | **Data Source** |
|---|---|---|
| **pc1** | Denotes the first group of private consumption expenditure. It includes food, beverages and tobacco, clothing and footwear. | : Turkish Statistical Institute |
| **pc2** | Denotes the second group of private consumption expenditure. It includes education and health. | : Turkish Statistical Institute |
| **pc3** | Denotes the third group of private consumption expenditure. It includes transport and communication. | : Turkish Statistical Institute |
| **pc4** | Denotes the last group of private consumption expenditure. It includes housing, water, electricity, gas and other fuels, furnishing, household equipment and routine maintenance of the house, recreation and culture, restaurants and hotels, miscellaneous goods and services. | : Turkish Statistical Institute |
| **vat** | Denotes value added tax | : Republic of Turkey Ministry of Finance |
| **sct** | Denotes special consumption tax | : Republic of Turkey Ministry of Finance |
| **pit** | Denotes personal income tax | : Republic of Turkey Ministry of Finance |

**Figure 1:** A Visual Presentation of the Series, 2003:Q1−2013:Q3



## 4. Empirical Investigation and Results

To proceed to the estimation of the reduced form of model [1], first of all, it is necessary to establish the stationarity of the variables. As shown in Table 2, the ADF test results confirm that all variables are *I*(1).

**Table 2:** Augmented Dickey-Fuller (ADF) Test and Stationarity Results, 2003:Q1–2013:Q3

| Series | First Difference Constant & Trend | Critical Value (% 1) |
|---|---|---|
| pc1 | -11.12793 (1)* | -4.205004 |
| pc2 | -11.70491 (1)* | -4.205004 |
| pc3 | -28.27355 (1)* | -4.198503 |
| pc4 | -6.669907 (1)* | -4.205004 |
| vat | -2.780034 (1)* | -4.205004 |
| sct | -15.69752 (1)* | -4.198503 |
| pit | -11.40860 (1)* | -4.198503 |

**Note:** The numbers in parentheses indicate the selected lag order of the ADF models. The critical values are obtained from MacKinnon (1991) for the ADF test. The ADF tests examine the null hypothesis of a unit root against the stationary alternative. Asterisk (*) denotes statistical significance at 1%. E-Views 6.1 is used for all computations.

We identified the order of the VAR model using the Akaike Information Criterion (AIC), Schwarz Information Criteria (SC), and Hannan-Quinn Information Criteria (HQ). They all suggest a VAR model of order one. The optimal lag length criteria were presented in Table 3.

**Table 3:** Selection of Lag Length

| Number of Lags | Log Likelihood Function | Final Prediction Error (FPE) | Akaike Information Criteria (AIC) | Schwarz Information Criteria (SC) | Hannan-Quinn Information Criteria (HQ) |
|---|---|---|---|---|---|
| 1 | 633.4149 | 1.15e-20 | -26.16262 | -22.68728 | -24.88877 |

**Note:** E-Views 6.1 was used for computation.

The model has no autocorrelation and/or heteroskedasticity problem, as suggested by the serial autocorrelation LM test, portmanteau joint test and White heteroskedasticity test[8].

### 4.1. Accumulated Lagged Responses (Impulse-Responses)

The short- and long-run responses of the private consumption expenditure to tax shocks are shown in Figure 2 and 3, respectively. As evident by the impulse responses, the first group of private consumption expenditure [pc1], covering food, beverages and tobacco, and clothing and footwear, reacted negatively to VAT shocks. In a similar vein, the second group of private consumption expenditure [pc2] –that are education and health– responded negatively to the same tax shock from the beginning to the eighth month, however, then it became stationary as seen from Figure 2.

[8] Results are available from the authors upon request.

A positive shock to the VAT is creating a positive effect on the third group of private consumption expenditure [pc3], covering transport and communication. As far as special consumption tax shocks are concerned, a positive tax shocks have a positive effect on the third private consumption expenditure groups, as suggested by the impulse responses. Finally, personal income tax shocks have a positive influence on the fourth group of private consumption expenditure from the beginning to the fourth month.

Practically, the statements above imply that all the taxes we considered –the VAT, the special consumption tax, and the personal income tax– can be used as a leading indicator for all the components of the private consumption expenditure. Thus, a change in any of these taxes will be immediately incorporated into the private consumption expenditure.

Figure 3 presents the responses of each group of private consumption expenditure to various tax shocks from the first month to 10 months for the long-run. VAT shocks lead to a reduction in the first group and this reduction is statistically significant from the second to fifth months. Similarly, the same tax has a negative impact on the second and the last group in the long-run. And finally, the third group of private consumption expenditure gives a diminishing response to VAT shocks.

It can also be seen from Figure 3 that the effect of shock to the special consumption tax on the first and third group of consumption expenditure is largely stationary. However, the same figure of the impulse responses of the last group of private consumption expenditure shows that one standard deviation shock to special consumption tax tends to reduce private consumption expenditure significantly, and special consumption tax shocks put downward pressure on the second group of private consumption expenditure from second to fourth months. In addition, we observed that personal income tax shocks have a negative effect on the first and second group of private consumption expenditure.

To sum up, we observed that in the short-run, personal income tax shocks have negative effects on the first and the second group of private consumption expenditure. Similarly, the VAT and the special consumption tax shocks reacted negatively to the especially second and last groups of private consumption expenditure. Here, it would be worth emphasizing that VAT and special consumption tax shocks have a positive effect on the third group of private consumption expenditure. Additionally, personal income tax shocks have a positive impact on the last group of private consumption expenditure. However, it became stationary after the fourth period. Here, it would be useful drawing attention the third and fourth group of private consumption expenditure. We know that price elasticity of demand for those sorts of consumption expenditure is considerably low. Therefore, one percentage point shock may induce an increase in private consumption expenditure, aside from lowering it.

In the long-run, almost all tax shocks which we considered have a negative effect on all components of private consumption expenditure. However, VAT shocks have an effect on the third group of private consumption expenditure from the second to seventh months, and then it became stationary.

The same result can be asserted for personal income tax which induces a reduction in the last group of private consumption expenditure from the second month to fourth month.

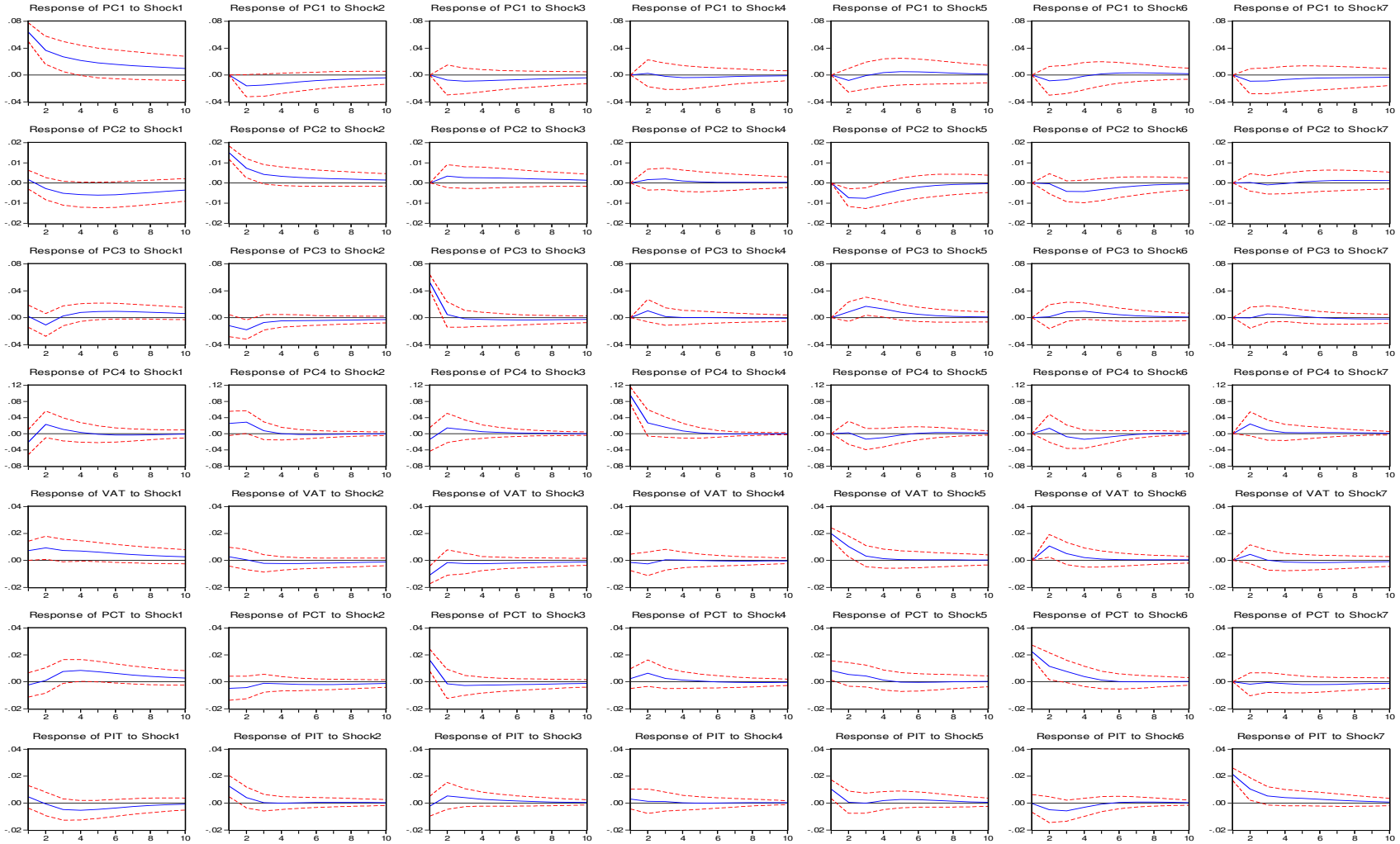
Table 4 presents a summary of our empirical findings related to the effects of tax shocks on private consumption expenditure.

**Table 4:** The Effects of Tax Shocks on Private Consumption Expenditure, 2003:Q1−2013:Q3

| | | Short-run | | | | Long-run | | | |
|---|---|---|---|---|---|---|---|---|---|
| Components of Private Consumption Expenditure | | Pc1 | Pc2 | Pc3 | Pc4 | Pc1 | Pc2 | Pc3 | Pc4 |
| Tax Type | The VAT + | + | - | + | - | - | - | + | - |
| | The Personal Income Tax + | - | + | - | + | - | - | + | + |
| | The Special Consumption Tax + | - | - | + | - | - | - | - | - |

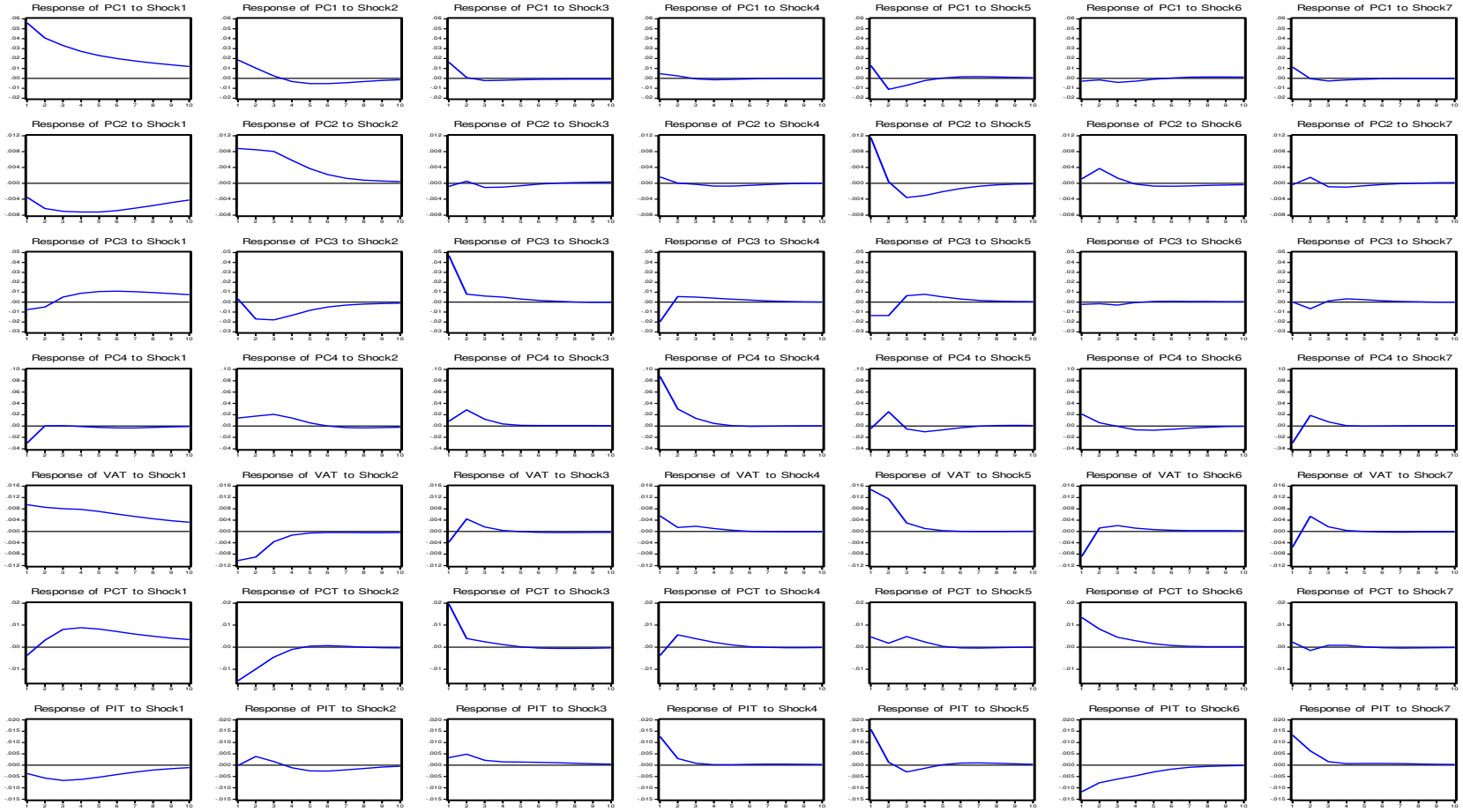
Not: (+) donates increase, (-) donates decrease.

**Figure 2:** Short-Run Accumulated Impulse-Response Analysis, 2003:Q1–2013:Q3




**Note:** The lines represent a private consumption expenditure (1) shock (Shock 1), private consumption expenditure (2) shock (Shock 2), private consumption expenditure (3) shock (Shock 3), private consumption expenditure (4) shock (Shock 4), value added tax shock (Shock 5), special consumption tax shock (Shock 6), personal income tax shock (Shock 7), respectively.

**Figure 3:** Long-Run Accumulated Impulse-Response Analysis, 2003:Q1–2013:Q3




**Note:** The lines represent a private consumption expenditure (1) shock (Shock 1), private consumption expenditure (2) shock (Shock 2), private consumption expenditure (3) shock (Shock 3), private consumption expenditure (4) shock (Shock 4), value added tax shock (Shock 5), special consumption tax shock (Shock 6), personal income tax shock (Shock 7), respectively.

### 4.2. Forecast Error Variance Decomposition

We are interested in how important shocks to various taxes in explaining the component of private consumption expenditure. This question can be addressed by computing forecast error variance decomposition based on estimated the short- and long-run SVAR model. Variance decomposition analysis allocates each variable's forecast error variance to the individual shocks. These statistics measure the quantitative effects of the shocks that have on the variables.

Tables 5, 6, 7, and 8 report the short-run percentage of the variance of the error made in forecasting fourth groups of private consumption expenditure due to a specific tax shocks at a specific time horizon. These estimates show the relative importance of each shock in explaining the changes in private consumption expenditure. Our empirical findings highlight that 1.42% of variation in the first group of private consumption expenditure is accounted for by personal income tax shocks for the second period of the sample. It is followed by special consumption tax and VAT shocks which are accounted for 1.20% and 1.05%, respectively.

However, in the last period of the sample, percentages of taxes have changed but the order of in explaining the fluctuation in private consumption expenditure has not changed. Our findings suggest that in the short-run, shocks to the personal income tax are relatively more important in explaining the changes in the first group of private consumption expenditure at the end of the period, accounting for 3.08% of the changes in it. Special consumption tax and VAT shocks come the second and third, accounting for 1.66% and 1.57%, respectively.

We also found that VAT shocks are relatively more important than the other tax shocks in explaining the changes in the second and third group of private consumption expenditure for the first and last period of the sample. These tax shocks are followed by the other two tax shocks, special consumption tax and personal income tax shocks. For the last period of the sample, the effects of these three tax shocks on the second and third group of private consumption expenditure are accounted for 18.86%, 6.51%, 1.05% and 12.60%, 5.03%, 1.26%, respectively.

Another implication of our empirical findings is that personal income tax shocks account for 4.83% of the variation, special consumption tax shocks account for 3.80%, and VAT shocks account for 2.12% on the last group of private consumption expenditure for the last sample period.

**Table 5:** Short-Run Forecast Error Variance Decomposition of Private Consumption (1), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.063681 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.077080 | 90.99578 | 4.269777 | 0.950197 | 0.106365 | 1.056042 | 1.200532 | 1.421307 |
| 3 | 0.084395 | 86.37645 | 6.714847 | 1.948556 | 0.142999 | 0.891996 | 1.659669 | 2.265485 |
| 4 | 0.088846 | 83.88398 | 8.058564 | 2.658718 | 0.315644 | 0.969436 | 1.533352 | 2.580303 |
| 5 | 0.091933 | 82.19297 | 8.783809 | 3.178466 | 0.452960 | 1.204237 | 1.465320 | 2.722241 |
| 6 | 0.094221 | 81.03895 | 9.149236 | 3.558325 | 0.528821 | 1.407917 | 1.506815 | 2.809940 |
| 7 | 0.095950 | 80.28581 | 9.329828 | 3.833947 | 0.565156 | 1.523526 | 1.577743 | 2.883986 |
| 8 | 0.097258 | 79.80445 | 9.423153 | 4.033858 | 0.582082 | 1.570283 | 1.630596 | 2.955582 |
| 9 | 0.098241 | 79.49105 | 9.476190 | 4.179096 | 0.590743 | 1.580724 | 1.658184 | 3.024016 |
| 10 | 0.098976 | 79.27808 | 9.509931 | 4.284799 | 0.596133 | 1.576746 | 1.668679 | 3.085633 |

**Note:** E-Views 6.1 is used for computations.

**Table 6:** Short-Run Forecast Error Variance Decomposition of Private Consumption (2), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.015095 | 1.165399 | 98.83460 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.018881 | 2.942987 | 77.95944 | 3.227898 | 0.777970 | 15.02859 | 0.040336 | 0.022783 |
| 3 | 0.022070 | 7.490669 | 60.79564 | 3.869941 | 1.386180 | 22.66986 | 3.587962 | 0.199751 |
| 4 | 0.024181 | 11.89095 | 52.54051 | 4.372768 | 1.344759 | 23.65892 | 6.016314 | 0.175781 |
| 5 | 0.025620 | 16.02787 | 47.97185 | 4.828771 | 1.246110 | 22.80220 | 6.923089 | 0.200107 |
| 6 | 0.026664 | 19.49166 | 45.10552 | 5.190592 | 1.173355 | 21.63472 | 7.071369 | 0.332797 |
| 7 | 0.027444 | 22.11542 | 43.19587 | 5.464839 | 1.127071 | 20.61883 | 6.949692 | 0.528282 |
| 8 | 0.028028 | 23.98939 | 41.88896 | 5.669865 | 1.101019 | 19.84186 | 6.777147 | 0.731758 |
| 9 | 0.028461 | 25.29350 | 40.98271 | 5.822658 | 1.088599 | 19.27534 | 6.626303 | 0.910883 |
| 10 | 0.028780 | 26.19681 | 40.34766 | 5.936344 | 1.084002 | 18.86909 | 6.510990 | 1.055103 |

**Note:** E-Views 6.1 is used for computations.

**Table 7:** Short-Run Forecast Error Variance Decomposition of Private Consumption (3), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.053660 | 0.149709 | 4.943212 | 94.90708 | 5.39E-31 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.059337 | 3.471233 | 13.08756 | 78.23738 | 3.017117 | 2.129633 | 0.056806 | 0.000264 |
| 3 | 0.063095 | 3.242490 | 12.82752 | 69.25624 | 2.744457 | 9.203961 | 1.974885 | 0.750455 |
| 4 | 0.065987 | 4.324970 | 12.23405 | 63.45958 | 2.510486 | 12.32682 | 3.980893 | 1.163202 |
| 5 | 0.067739 | 5.999619 | 12.01121 | 60.42574 | 2.383960 | 13.14697 | 4.854191 | 1.178313 |
| 6 | 0.068936 | 7.724617 | 11.94298 | 58.57063 | 2.301957 | 13.20765 | 5.114270 | 1.137887 |
| 7 | 0.069837 | 9.200341 | 11.93287 | 57.27894 | 2.244337 | 13.05994 | 5.147526 | 1.136053 |
| 8 | 0.070532 | 10.34736 | 11.94379 | 56.33545 | 2.205219 | 12.88407 | 5.115323 | 1.168788 |
| 9 | 0.071067 | 11.20060 | 11.95913 | 55.64007 | 2.179913 | 12.73111 | 5.073157 | 1.216018 |
| 10 | 0.071473 | 11.82542 | 11.97206 | 55.12819 | 2.163828 | 12.60982 | 5.036672 | 1.264009 |

**Note:** E-Views 6.1 is used for computations.

**Table 8:** Short-Run Forecast Error Variance Decomposition of Private Consumption (4), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.101232 | 4.234301 | 6.320066 | 1.853995 | 87.59164 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.115361 | 7.261553 | 11.11211 | 2.953031 | 72.81521 | 0.038917 | 1.375208 | 4.443970 |
| 3 | 0.118956 | 7.656406 | 10.83281 | 3.429623 | 70.36263 | 1.274153 | 1.685699 | 4.758678 |
| 4 | 0.120563 | 7.521903 | 10.54621 | 3.535655 | 68.86141 | 1.891781 | 2.945053 | 4.697988 |
| 5 | 0.121140 | 7.459748 | 10.46458 | 3.579940 | 68.22809 | 1.947426 | 3.624276 | 4.695936 |
| 6 | 0.121358 | 7.496913 | 10.44699 | 3.599431 | 67.98455 | 1.947023 | 3.794815 | 4.730281 |
| 7 | 0.121489 | 7.549015 | 10.43342 | 3.604688 | 67.84035 | 1.998740 | 3.802770 | 4.771019 |
| 8 | 0.121584 | 7.577061 | 10.41964 | 3.604157 | 67.73637 | 2.062237 | 3.798059 | 4.802477 |
| 9 | 0.121642 | 7.584923 | 10.41015 | 3.602541 | 67.67216 | 2.106024 | 3.802993 | 4.821213 |
| 10 | 0.121670 | 7.584812 | 10.40529 | 3.601388 | 67.64023 | 2.128176 | 3.809823 | 4.830285 |

**Note:** E-Views 6.1 is used for computations.

Tables 9, 10, 11 and 12 report the results of the long-run forecast error variance decomposition. Looking at the contributions of the different tax shocks to the first period forecast error variance, VAT shocks account for about 4.11% of the first group of private consumption expenditure. These tax shocks are followed by the other two shocks, personal income tax shocks by 3.11% and special consumption tax shocks by 0.20%, respectively. The result for the last period is quite similar to VAT shocks which account for more than 3% of the first group of private consumption expenditure.

However, these results have changed for the second group of private consumption expenditure. At the end of the sample period, the most effective tax shock comes from VAT, and it is followed by another indirect tax shock, special consumption tax shock. As also shown from the results, the third group of private consumption expenditure was explained by shocks to VAT for the end of the period. It explained almost 10.03% of the variation in private consumption expenditure at the end of the period. Shocks to the personal income tax explain nearly 1.29% of the variation in private consumption expenditure, whereas shocks to the special consumption tax account for only 0.39% of it.

However, the last group private consumption expenditure implies that especially personal income tax shocks were the most effective impact on private consumption in the long-run for the last period. The variance decomposition analysis in the last period for the last group of private consumption expenditure revealed that shocks to personal income tax, except the own shocks of private consumption expenditure, became more important variable compared to the whole the remaining period. These tax shocks explain roughly 8.69% of the variation in private consumption expenditure after ten months. What also shown from our empirical findings, the importance of VAT and special consumption tax shocks increased clearly in the last period.

**Table 9:** Long-Run Forecast Error Variance Decomposition of Private Consumption (1), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.063682 | 77.14601 | 8.456492 | 6.432752 | 0.539007 | 4.111075 | 0.204007 | 3.110651 |
| 2 | 0.077081 | 80.37176 | 7.552646 | 4.403239 | 0.461995 | 4.892038 | 0.190717 | 2.127608 |
| 3 | 0.084395 | 82.39000 | 6.381971 | 3.757605 | 0.391838 | 4.804499 | 0.391738 | 1.882353 |
| 4 | 0.088846 | 83.69294 | 5.886928 | 3.445044 | 0.384988 | 4.401607 | 0.454630 | 1.733867 |
| 5 | 0.091933 | 84.36627 | 5.835337 | 3.244205 | 0.376518 | 4.112072 | 0.436660 | 1.628939 |
| 6 | 0.094221 | 84.75117 | 5.875966 | 3.101896 | 0.363203 | 3.937520 | 0.416841 | 1.553407 |
| 7 | 0.095951 | 85.03572 | 5.875338 | 2.999497 | 0.351114 | 3.825295 | 0.414034 | 1.499000 |
| 8 | 0.097258 | 85.27703 | 5.830182 | 2.926416 | 0.341114 | 3.742672 | 0.421882 | 1.459910 |
| 9 | 0.098242 | 85.47973 | 5.767902 | 2.874953 | 0.335213 | 3.677988 | 0.432192 | 1.432018 |
| 10 | 0.098976 | 85.64124 | 5.708031 | 2.839199 | 0.330457 | 3.627738 | 0.441010 | 1.412327 |

**Note:** E-Views 6.1 is used for computations.

**Table 10:** Long-Run Forecast Error Variance Decomposition of Private Consumption (2), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.015095 | 5.402204 | 33.92888 | 0.272309 | 1.187539 | 58.64137 | 0.514454 | 0.053241 |
| 2 | 0.018881 | 14.74409 | 41.82637 | 0.248732 | 0.760069 | 37.52520 | 4.228282 | 0.667259 |
| 3 | 0.022070 | 21.01194 | 43.78979 | 0.416432 | 0.568341 | 30.12782 | 3.442697 | 0.642976 |
| 4 | 0.024181 | 26.45941 | 42.21037 | 0.510666 | 0.555451 | 26.70143 | 2.876093 | 0.686579 |
| 5 | 0.025620 | 31.49404 | 39.65175 | 0.507559 | 0.573247 | 24.46942 | 2.637370 | 0.666615 |
| 6 | 0.026664 | 35.70760 | 37.27576 | 0.476127 | 0.567881 | 22.82969 | 2.515018 | 0.627913 |
| 7 | 0.027444 | 38.95116 | 35.40599 | 0.449607 | 0.547986 | 21.62031 | 2.431509 | 0.593449 |
| 8 | 0.028028 | 41.32506 | 34.02736 | 0.436120 | 0.527236 | 20.74700 | 2.367690 | 0.569528 |
| 9 | 0.028461 | 43.02034 | 33.03694 | 0.432548 | 0.511308 | 20.12481 | 2.319488 | 0.554561 |
| 10 | 0.028780 | 44.22129 | 32.33139 | 0.434029 | 0.500460 | 19.68301 | 2.284437 | 0.545381 |

**Note:** E-Views 6.1 is used for computations.

**Table 11:** Long-Run Forecast Error Variance Decomposition of Private Consumption (3), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.053660 | 2.018435 | 0.359450 | 77.08323 | 13.84487 | 6.500244 | 0.193285 | 0.000482 |
| 2 | 0.059337 | 2.374495 | 8.580292 | 64.81270 | 12.16964 | 10.50896 | 0.241278 | 1.312636 |
| 3 | 0.063095 | 2.710735 | 15.71357 | 58.22648 | 11.37800 | 10.32565 | 0.453756 | 1.191812 |
| 4 | 0.065987 | 4.308880 | 18.50817 | 53.81594 | 10.74749 | 10.85720 | 0.420961 | 1.341363 |
| 5 | 0.067739 | 6.541340 | 19.10187 | 51.28365 | 10.38900 | 10.88397 | 0.406325 | 1.393845 |
| 6 | 0.068936 | 8.854799 | 18.96729 | 49.57805 | 10.11217 | 10.70201 | 0.403413 | 1.382260 |
| 7 | 0.069837 | 10.89228 | 18.66882 | 48.31783 | 9.879486 | 10.48535 | 0.401750 | 1.354488 |
| 8 | 0.070533 | 12.53152 | 18.38160 | 47.36964 | 9.692110 | 10.29645 | 0.400075 | 1.328605 |
| 9 | 0.071067 | 13.78891 | 18.14728 | 46.66039 | 9.547895 | 10.14784 | 0.398963 | 1.308726 |
| 10 | 0.071473 | 14.73114 | 17.96673 | 46.13391 | 9.439774 | 10.03538 | 0.398753 | 1.294314 |

**Note:** E-Views 6.1 is used for computations.

**Table 12:** Long-Run Forecast Error Variance Decomposition of Private Consumption (4), 2003:Q1–2013:Q3.

| Period | S.E. | pc1 shocks | pc2 shocks | pc3 shocks | pc4 shocks | vat shocks | sct shocks | pit shocks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.101232 | 8.832026 | 1.981251 | 0.704251 | 75.22805 | 0.213205 | 4.420313 | 8.620906 |
| 2 | 0.115362 | 6.802295 | 3.838624 | 6.747062 | 64.77788 | 4.906274 | 3.673623 | 9.254237 |
| 3 | 0.118957 | 6.399564 | 6.619201 | 7.390676 | 62.24094 | 4.812381 | 3.457373 | 9.079869 |
| 4 | 0.120564 | 6.233601 | 7.840202 | 7.286359 | 60.74327 | 5.392152 | 3.661532 | 8.842887 |
| 5 | 0.121141 | 6.214076 | 7.989678 | 7.228180 | 60.16823 | 5.649793 | 3.990639 | 8.759405 |
| 6 | 0.121358 | 6.265727 | 7.961113 | 7.207469 | 59.95410 | 5.689277 | 4.194250 | 8.728067 |
| 7 | 0.121490 | 6.319780 | 7.993700 | 7.198193 | 59.82471 | 5.677986 | 4.275248 | 8.710384 |
| 8 | 0.121584 | 6.350089 | 8.052921 | 7.194374 | 59.73194 | 5.674385 | 4.296485 | 8.699808 |
| 9 | 0.121642 | 6.360694 | 8.096575 | 7.193920 | 59.67621 | 5.678953 | 4.298930 | 8.694715 |
| 10 | 0.121671 | 6.362233 | 8.118598 | 7.194770 | 59.64950 | 5.683997 | 4.298029 | 8.692868 |

**Note:** E-Views 6.1 is used for computations.

## 5. Concluding Remarks

In this paper, we empirically analyzed the short- and long-run effects of the shocks to taxes on private consumption expenditure in the case of Turkey over the period 2003:Q1–2013:Q3 by employing a SVAR model. Specifically, we considered three main taxes –the personal income tax, the VAT, the special consumption tax – which is the case in the Turkish tax system. These taxes accounts for very large share of central government's tax revenue. To identify the effects of individual tax shock in detail, we decompose private consumption expenditure into four basic categories, including food, education, and transportation, among others.

Our empirical findings show that: i) In the short-run, the first [pc1: food, beverages and tobacco, clothing and footwear] and last [p4: housing, water, electricity, gas and other fuels, furnishing, household equipment and routine maintenance of the house, recreation and culture, restaurants and hotels, miscellaneous goods and services] group of private consumption expenditure were most affected by personal income tax shocks and special consumption tax shocks, while the second [pc2: education and health] and third [pc3: transport and communication] group of private consumption expenditure were affected by VAT and personal income tax shocks. ii) In the long-run, the first and third groups of private consumption expenditure were particularly affected by VAT and personal income tax shocks. On the other hand, the second group of private consumption expenditure was mostly affected by VAT and special consumption tax shocks. And the last group of private consumption expenditure was mostly affected by personal income tax shocks and VAT shocks.

Our empirical findings also show that in the short-run, the only tax which positively effects the fourth group consumption is personal income tax. This may be attributed to late collection technique of this tax. In the case of Turkey, this year's the payments of personal income tax is done within next year with an equal instalment of three. In the short-run, the third group of private consumption -transport and communication- is also positively affected by the all three tax shocks, with a difference degree. However, compared to the special consumption and personal income tax shocks, the size of VAT shock is much higher. It gradually increases the third group of private consumption expenditure in the first three months and then starts to decline, but does

not turn to negative. The positive effect of taxes on transport and communication expenditure may be attributed to their low price elasticity of demand and to that there is no close substitute product of them. As for in the long-run, the tax which positively influences private consumption expenditure is the personal income tax which shows its effect on the fourth group of private consumption expenditure.

In general, it can thus be concluded that the effects of tax shocks on the components of private consumption expenditure differ in both short- and long-run. In the short-run, private consumption expenditure is influenced by the VAT and personal income tax as well as special consumption tax, while in the long-run both the VAT and personal income tax have a significant impact on it. However, it is important to highlight here that the VAT plays a more important role in determining private consumption expenditure in both short- and long-run. All in all, it can be argued that the effects of tax shocks on private consumption expenditure shows difference, subject to sorts of taxes, the components of private consumption expenditure as well as the length of the period.

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