



RESEARCH ARTICLE

IMPACT OF BUDGET DEFICITS ON ECONOMIC GROWTH: THE CASE OF TURKEY IN  
THE PERIOD OF 1975-2013

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ABSTRACT

The effects of budget deficits on different units of the economy are one of the topics that are often discussed in the economic literature. One of the most critical discussions in the literature is the effect of budget deficits on economic growth. There are different thoughts among economists regarding the impact of budget deficits on economic growth. According to Keynesian economists, while budget deficits have had a positive impact on economic growth, neo-classical economists have argued that there is a relation between budget deficit and economic growth inversely. On the other hand, there is no relation between budget deficit and economic growth according to Ricardo's point of view. The aim of this study is to econometrically measure the impact of budget deficits on growth in Turkey. The data used in the analysis for the period 1975-2013 were obtained from the International Finance Statistics published by the International Monetary Fund (IMF) and the Electronic Data Distribution System published by the Central Bank of the Republic of Turkey. According to the impulse-response analysis, the 1% positive shock Gross Domestic Product responded negatively to the budget deficit. Response is meaningful statistical and economically. The response continues through out the whole period, but after the fourth year it becomes meaningless. Nevertheless, the size of the response is small. According to the analysis results, exchange rates and inflation also have a negative effect on economic growth. The empirical analysis result confirms the hypothesis that neoclassical economists have negative economic effects on budget deficits.

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INTRODUCTION

Planning is the key to success when an organization comes to the application stage. The planning of financial activities is important for the success or failure of the organization. In this context, financial planning is called budget. The budget can also be considered as a very useful tool for the checks made in terms of companies and it can help to create development policies in terms of countries. The budget includes the revenues and expenditures of an organization. In this study, the budget is called the budget of a country. Planning is useful for this unit when the expenditures are in accordance with planned expenditures. However, planned expenditures and realized expenditures in terms of national economies are generally not equal and it can be budget deficit or surplus. While a country's income is over than expenditures it is defined as budget surplus, the situation where the country can not cover the

expenditures with the tax revenues and revenues from other sources is defined as budget deficit. The budget deficits experienced by the United States of America (USA) and the United Kingdom in the 1980s and Japan during the 2000s have acted many researchers to examine the countries' sustainability of budget deficits and the economic impact of inter-temporal budget constraint (Futagami and Shibata, 2003: 1). There are different opinions among economists regarding the impact of budget deficits on economic growth. According to Keynesian economists, while budget deficits have a positive impact on economic growth, neo-classical economists have argued that there is an inverse relationship between budget deficit and economic growth. On the other hand, according to Ricardian's view there is no relationship between budget deficit and economic growth (Ahmad, 2013:1). The fact that the state can not cover its expenditures with its incomes obligate countries to borrowing. In this way, both domestic and foreign borrowing amounts and debt rates are increase, and countries may move away from providing economic stability. From this point of view, because of the need for outsourcing, the country's economies may come to the point of losing their economic independence. From the point of Turkey; due to the

budget deficits of the public economic enterprises, which have not been privatized for many years in Turkey, the pressure of the defense expenditures due to the fight against terrorism and the tensions with the border neighbors, the Social Security Agency deficits which were too late in the regulation by political concerns resulted in the public sector continuing to disclose a large amount of deficits. And this situation led to an increase in the need for public sector borrowing, which is one of the most important structural problems of the Turkish economy. The aim of this paper is to measure the impact of budget deficits on growth in Turkey econometrically. For his purpose, in the second part of the study, the relationship between budget deficits and economic growth will be explained. In the third part, the literature related to the subject will be examined, in the fourth part, information about the data set and method will be given and the analysis results will be revealed. In the last part, analysis results will be evaluated and recommendations will be presented.

### Budget deficit - economic growth relation

The budget deficit has many effects on the economy, but all the effects follow a single initial effect, which is the budget deficit that reduces national saving. National savings is equal to the sum of private savings, which is the portion of household income that does not consume after-tax income, and public savings, which mean the portion of the state that the tax collected does not spend. With budget deficits, public saving becomes negative and this leads to a decrease in total national savings. With this decrease in national savings, investments and / or net exports are also declined. This decrease in investment and net exports fully tally with the decline in the national economy (Ball and Mankiw, 1995: 3). According to the neoclassical paradigm, farsighted individuals plan their consumption throughout their life cycle. Budget deficits increase total lifetime consumption by shifting taxes to the next generations. In the case of full employment, savings decrease as a result of increased consumption. Because of this reason, interest rates rise to bring capital markets into balance. This leads to a crowding-out effect in private capital accumulation. Ultimately, these effects cause the economic growth to fall (Bernheim, 1989: 55).

In Keynesian view, budget deficits are an important means of reviving total demand on the economy. Because budget deficits bring labor demand in its wake, they assure economies to move towards full employment level in recession. Keynes claimed that the resources would head to the persons and / or institutions holding the bonds from the taxpayers, thereby that resources would not be lost (Adak, 2010: 234). According to the Ricardian equilibrium perspective, budget deficits are seen as neutral in terms of the effect on growth. Budget deficits only reveal the result of tax postponing. This means that even if public expenditure is paid now or in the future, current value of expenditures should be equal to current tax or non-tax revenues (Thirunavukkarasu and Achchuthan, 2013: 168).

### Literature

Bose *et al.* (2007) found a positive relationship between budget deficits and economic growth in 30 emerging economies. Ghali and Al-Shamsi (1997) on the other hand has concluded that Saudi Arabia has a neutral relationship between budget deficit and economic growth. Kormendive McGuire (1985) could not find a relationship between these two

variables. Rahman (2012) searched the relationship between Malaysia's budget deficit and economic growth. In mentioned study, quarterly data are used for the period of 2000-2011 and there is no relation between economic growth and budget deficit in the long run. Huynh (2007) in his study for Vietnam has found that the negative impact of the budget deficit on economic growth. Fatima *et al.* (2012) has also found a negative relationship between budget deficits and economic growth in Pakistan and she has suggested budget balance for economic growth. Keho (2010) reached two different results in the study of seven Western African economies. While the author has found no causality between budget deficit and economic growth for the three countries, mentioned relationship is negative in four countries.

Al-Khedair (1996) has focused on the relationship between selected macroeconomic variables and budget deficits for major industrial countries and in his study he has found that the budget deficit negatively affected the trade balance, but he has found that the budget deficit has a significant positive impact on economic growth. Similarly, Barro (1979) has stated that the relationship between budget deficit and economic growth is positive. Lucas and Sargent (1981), in their study with rational expectations and economic practice approach, have advocated that the economic growth does not accompany large budget deficits and high-rate monetary expansion. Also, according to Prunera (2000), the relationship between growth and budget deficit is significant and negative and countries with large budget deficits exhibit slow and low growth performance. Adak (2010), in his study with the method of least squares, of the period of 1972-2006, he has concluded that annual budget deficits in Turkey had a negative effect on the economic growth at the issue year. He has not reached statistically significant results about budget deficits in one period's effect in economic growth over the following years.

### Data set and model

In the model which assess the impact of budget deficits on economic growth on the Turkish economy, in addition to these variables, exchange rate, inflation and interest rate variables are included. While Fatima *et al.* (2012) study was taken as a reference when the model was created. The variables used in the empirical analysis part of the study are summarized in the following table. While examining the relationship between economic size and budget deficit, gross domestic product is used to measure the size of the economy and is taken from the International Finance Statistics (IFS) published by the International Monetary Fund (IMF). The budget deficit data was obtained from the Electronic Data Delivery System (EVDS) published by the Central Bank of the Republic of Turkey (TCMB). Other variables included in the model, exchange rate, interest rate and price index data were also obtained from IFS published by the IMF. Vector autoregressive (VAR) model was used for the empirical analysis of the generated model and Eviews 8.0 econometrics package program was run.

In order to examine the effect of variables on economic growth, we can write the model as follows:

$$X_t = (gdp_t, bd_t / gdp_t, cpi_t, exc_t, int_t)' \quad (1)$$

Table 1. List of variables

Variable	Definition	Source
GDP	Annual Gross Domestic Product Index (2010=100)	IMF- International Financial Statistics
BD/GDP	General Budget Borrowing Requirement / Gross Domestic Product	TCMB- Electronic Data Delivery System
CPI	Consumer price index	IMF-International Financial Statistics
EXC	US dollar Exchange rate (Period average)	IMF-International Financial Statistics
INT	Deposit Interest Rate (Period average)	IMF-International Financial Statistics

## MATERIALS AND METHODS

According to a critique of large-scale models by Sims (1980a and 1980b), there are a number of descriptive constraints to derive extreme rigidities in models. The modeler can choose the variable he wants as a determinant in each equation and can be found in assumptions that this variable is internal or external. These assumptions depend on one's prior knowledge or knowledge of economic theory. To come from above these problems in the VAR model, the whole variable is considered to be intrinsic so that the data themselves are determinative of whether they are internal or external. In the VAR analysis, which is a system of equations, the same explanatory variables are used for each internal variable in the system. The only task falling into the economic theory here is to determine the variables to be included in the model. Variables included in the model can be written as follows in the form of a concurrent variable system:

$$Ay_t = B(L)y_{t-1} + C\varepsilon_t \quad (2)$$

$y_t$  is the vector of the inner variables, and  $y_{t-1}$  is the vector of their delayed values.  $\varepsilon_t$  represents the white noise vector of the distribution term of each variable. This distribution shows the extrinsic variables of the model. A contains the structural parameters of the model simultaneous intrinsic variables in matrix format and this matrix is  $n \times n$  square matrix. The  $n \times n$  C square matrix contains simultaneous responses of variables in shock or in the case of inversion. B (L) is the delay in the processor p.degree the matrix is polynomial and p is the model delay period.

The delay processor L works as follows:

$$Ly_t = y_{t-1}, L^2 y_t = Ly_{t-1} = y_{t-2}, \dots, L^n y_t = y_{t-n}. \quad (3)$$

When a square matrix is matrix polynomial form as follows:

$$B(L)y_{t-1} = B_0 y_{t-1} + B_1 Ly_{t-1} + \dots + B_p L^p y_{t-1} \quad (4)$$

The representation in equation 2 is the problematic. Because the coefficients in matrices are unknown and it is not possible to determine the coefficients of the simultaneous effects of each variable on each other. The model like this can't defined exactly. However, the standard VAR form is obtained by converting the model to a reduced form.

$$y_t = d(L)y_{t-1} + e_t \quad (5)$$

It is defined as  $D(L) = A^{-1}B(L)$  and  $e_t = A^{-1}C\varepsilon_t$  Error term ( $e_t$ ), is a combination of linear, independent shocks ( $\varepsilon_t$ ). Each error term is serially independent with zero mean and has constant variance.  $\Sigma$  matrix is the variance / covariance matrix of the error terms obtained in the estimation of the VAR model. While  $\sigma^2$  symbolizes variance and  $\sigma_{ij}$  symbolizes covariance. Covariance is obtained as follows:

$$\sigma_{ij} = (1/T) \sum_{t=1}^T e_{it} e_{jt} \quad (6)$$

$$\Sigma = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12} & \dots & \sigma_{1n} \\ \sigma_{21} & \sigma_{22} & \dots & \sigma_{2n} \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \sigma_{n1} & \sigma_{n2} & \dots & \sigma_n^2 \end{bmatrix} \quad (7)$$

As long as it is like  $\sigma_{12} = \sigma_{21}$   $\Sigma$  matrix is symmetrical. Therefore, in order to obtain the coefficients in equation (4)  $(n^2 + n) / 2$  different coefficients should be estimated.  $\Omega$  matrix is the variance / covariance matrix of structural disturbances. The number of structural coefficients to be estimated depends on  $\Omega$  variance / covariance matrix which has  $(n^2 + n) / 2$  components. Finally, each of the A and C matrices contains  $n^2$  components. The total number of coefficients to be estimated is  $2n^2 + (n^2 + n) / 2$ . But there is  $(n^2 + n) / 2$  estimated coefficient derived from  $\Sigma$  matrix. Therefore,  $2n^2$  constraints are required for identification. Based on the assumption that each shock is due to independent events, it is assumed that the structural disturbances are a white noise term with zero covariance, so that  $\Omega$  is diagonal matrix. This provides  $(n^2 - n) / 2$  constraints. In addition, it is assumed that the matrices A and C have equally diagonal entities. This brings  $2n$  more constraints. In many studies, in order to make the C matrix an identical matrix, matrix exclusion constraints are added. This requires an additional  $(n^2 - n)$  constraints. When all these are collected, the number of constraints required is  $(n^2 - n) / 2$ . Otherwise, the system will be undefined. In traditional VAR models, identification constraints based on a recurrent structure known as Cholesky decomposition are proposed. According to this statistical parsing method, Error terms are distributed to the orthogonal shocks using the constraint proposal based on an arbitrary ordering of the variables. Decomposition reveals that the first variable will only respond to its own external shock, and the second variable will respond to both the self and the first variable. In the following system, while  $z_t$  is the Cholesky constraints,  $\omega_t$  represents the vector of orthogonal shocks (McCoy and McMahon, 2000: 10-11).

$$e_1 = \omega_1 \quad (8)$$

$$e_2 = z_1 e_1 + \omega_2 \quad (9)$$

$$e_3 = z_2 e_1 + z_3 e_2 + \omega_3 \quad (10)$$

$$e_4 = z_4 e_1 + z_5 e_2 + z_6 e_3 + \omega_4 \quad (11)$$

There are six constraints in the given four-variant Cholesky decomposition example to describe the system. But this is for the current array of variables. There may be twenty four different sequences for four variables. Therefore, VAR results are highly sensitive to the sequences of variables. Therefore, when the effects on other variables in the system are determined by the Cholesky decomposition approach, the order of the variables in the VAR system is the determinant and this shows a weak side of VAR models. VAR analysis provides two important tools for assessing the implementation of economic policies: impulse-response functions and variance decomposition. Impulse-response functions show the effects on the variables in the system over time, a shock coming from an internal variable in the VAR system. Although the coefficients obtained in the estimation of the VAR model do not reflect their true values due to the non-linearity of the function, the actual values of the impulse-response functions are within certain confidence intervals (Özgen and Güloğlu, 2004: 101). Another analysis to be obtained through the use of the VAR model is variance decomposition. The purpose of this analysis technique is to reveal the effect of each random shock on the error variance of the prediction for future periods. In the method of variance decomposition, the effect of the shock on one of the internal variables is separated one by one for each variable on the other variables. Thus, the decomposition gives information about the dynamic structure of the model. Interpretation of the variance decomposition method is also important. If the shock experienced by one of the variables does not affect the other variable regardless of the length of the forecast period, then that variable is external. On the contrary, if the other variable affects the error variance, the variable shock is considered as internal variable. Finally, Cholesky decomposition is used in the variance decomposition method and the sequence of variables will affect the results of the analysis.

### Empirical Analysis

In the vector autoregressive analysis, the series of variables included in the model should be checked for stability before analysis. Because the explanation capacity of the model increases only after the stability of the variables is reached. If not, it is impossible to access sound results. For this aim, it is advisable to perform a unit root test before starting the analysis. The ADF unit root test was applied, developed by Dickey and Fuller (1979 and 1981), to investigate the stability of the series, in an other saying, whether they carry the unit root or not. The results are as follows:

**Table 2. ADF Unit Root Test Results**

	Level		First Difference	
	Fixed	Fixed+ Trend	Fixed	Fixed+ Trend
GDP	1.946	-1.054	-5.393***	-6.161***
BD/GDP	-2.065	-2.157	-5.953***	-5.902***
CPI	-4.431***	-4.583***	-3.326**	-3.396*
EXC	0.056	-1.912	-3.635***	-3.838**
INT	-1.331	-1.116	-7.394***	-7.914***

The values at \* % 10, \*\* % 5 and \*\*\* % 1 shows that they are meaningful in the table.

According to the results of unit root analysis, all variables have unit root in level values except CPI. When first differences are taken, unit root disappears and series become stable. For this

reason, in the empirical analysis, the level of the CPI variable is included, while the first differences of the other variables are taken into account. Another important point in the VAR analysis is to decide the optimal delay length. The most general and simple way is to predict the VAR model again until you find the lowest Akaike information criterion (AIC) value. The autocorrelation problem is encountered while the lowest AIC value is in the VAR model in which 4 delays are taken into consideration. Because of this, the model needs to be re-estimated at the length of the delay without autocorrelation. When autocorrelation is taken into consideration, 3 delay lengths are fitted. Autocorrelation test results are given in the table below.

**Table 3. Autocorrelation Test Results**

Delay	LM-Stat	Prob
1	26.82246	0.3648
2	35.79694	0.0747
3	16.40861	0.9021
4	22.11876	0.6289
5	29.69399	0.2360
6	21.24645	0.6788
7	38.27876	0.0434
8	34.38696	0.0999
9	31.03498	0.1879
10	29.82303	0.2310
11	39.74470	0.0310
12	43.28200	0.0130

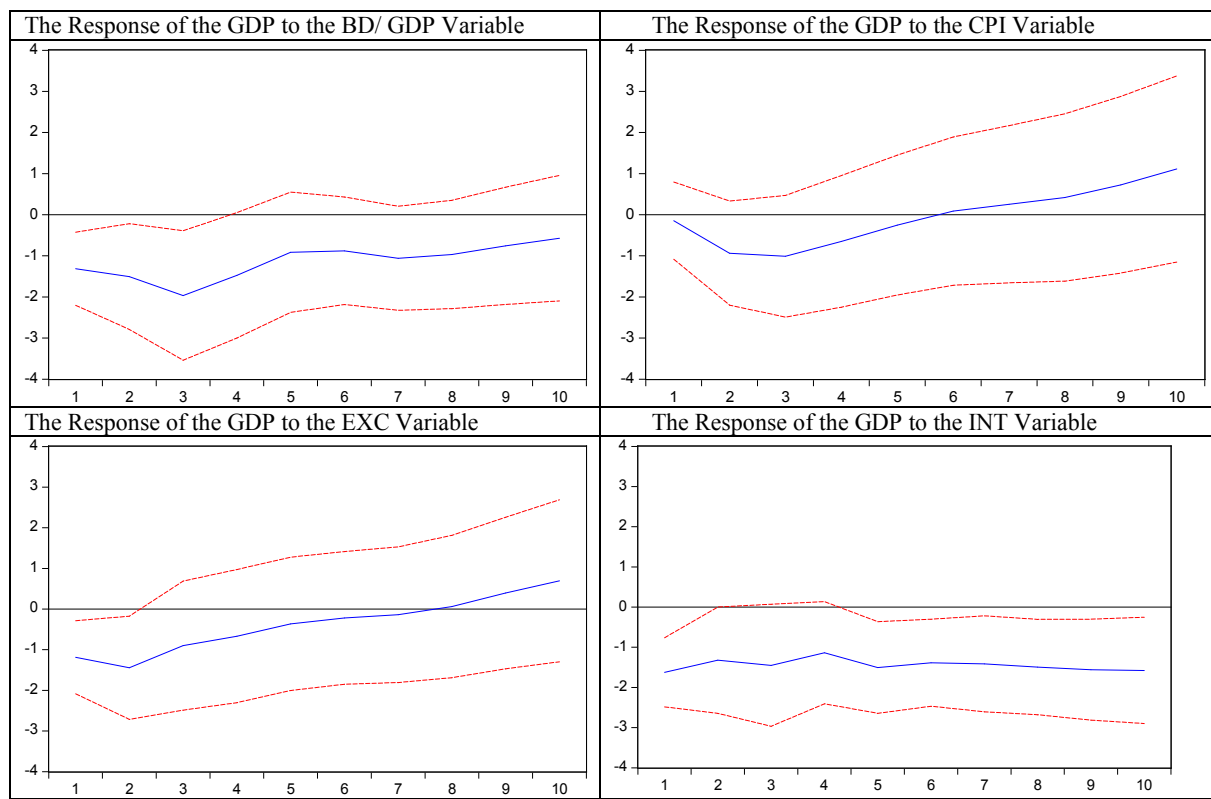
Impulse-response graphs of the VAR model with three delay numbers are given below. In each chart, response of 1% to the shock variable of the gross domestic product, which is due to budget deficit, inflation, interest rate and exchange rate variables are shown. According to the impulse-response analysis, the %1 positive shock gross domestic product reacts negatively to the budget deficit. Response is meaningful as statistical and economical. The response continues throughout the whole period, but after the fourth year it becomes meaningless. However, the size of the response is small. The response of the 1% positive shock gross domestic product variable in the inflation is negative. The response lasts for six years and is relatively strong. However, the economically meaningful result is statistically insignificant. When the impact on the economy of the 1% shock in the exchange rate is examined, it is clear that there is a negative response. As statistical and economical relation is meaningful. Even the response continues strongly for eight years, the second year it becomes meaningless. Finally, when the 1% positive shock economy effect on interest rates is examined, it is seen that there is a economical and statistical meaningful negative response. Accordingly, the increase in the interest rate throughout the period has a relatively strong negative response to the economy. But, the response becomes meaningless at the end of two years.

These results show us that, exchange rate and interest rates, especially budget deficit, have effects on economic growth. The budget deficit is the most influential among these variables. The results are consistent with the existing literature, which suggests that budget deficits have adverse effects on economic growth. When the variance decomposition results are examined, the results are similar to the effect - response analysis results. According to this, the shock of a gross domestic product reveals only the first period itself, while the budget deficit, inflation and interest rates are explained in the following periods. The explanatory power of the budget deficit

is only 2% in the second year and up to 11% in the tenth year. Inflation and interest rates can also account for 17% and 10% of the shock, respectively, while increasing their explanatory power to 21% and 14% respectively in the tenth year.

System published by the Central Bank of the Republic of Turkey.

**Graphic 1. Impulse-Response Analysis Results**



**Table 4. GDP Variance Decomposition Results**

Period	S.E.	GDP	BD/GDP	CPI	INT	EXC
1	2.778012	100.0000	0.000000	0.000000	0.000000	0.000000
2	3.341421	69.46368	1.979248	16.64993	10.02314	1.884009
3	3.755919	58.26345	7.880639	19.36751	12.24023	2.248164
4	3.812154	57.27972	7.653684	20.12173	12.72516	2.219710
5	3.889079	55.06367	8.368344	20.45042	13.60762	2.509945
6	3.998176	52.46184	9.021174	22.09298	13.97811	2.445896
7	4.058715	51.20435	10.18423	21.66186	14.44216	2.507408
8	4.069652	50.98890	10.42299	21.61271	14.36550	2.609899
9	4.111843	51.72176	10.33892	21.17718	14.20171	2.560419
10	4.128265	51.78713	10.28631	21.16369	14.14485	2.618022

**Conclusion**

The effects of budget deficits on different units of the economy are one of the topics that are often discussed in the economic literature. One of the most critical discussions in the literature is the effect of budget deficits on economic growth. Hence, there are different opinions among economists. According to Keynesian economists, while budget deficits have had a positive impact on economic growth, neo-classical economists have argued that there is an inverse relationship between budget deficit and economic growth. On the other hand, economists claiming that individuals will act in rational behavior have argued that there is no relationship between budget deficit and economic growth, and the Ricardian equivalence hypothesis has come to the fore. In this study, the impact of budget deficits on economic growth in Turkey was examined with the annual data of 39 years between 1975 and 2013. The data used in the analysis were obtained from the International Finance Statistics published by the International Monetary Fund (IMF) and the Electronic Data Distribution

According to the impulse-response graphs obtained as a result of the VAR analysis, there is a negative effect of budget deficits on economic growth in Turkey and the effect is affected in the medium term. According to the results of the analysis, exchange rates and inflation also have a negative effect on economic growth. The empirical analysis confirms the hypothesis that Neo-Classical economists have adverse economic effects of budget deficits. According to this, it can be said that the government should support the smallest and the same budget policy and assist the private sector to implement the free market economy in order to provide economic growth. In this study the relationships between economic growth and budget deficits, inflation and Exchange rate in Turkey to data from the period 1975-2013 were analysed. For the next studies using the country groups regional /comparative analysis can be made.

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