The Role of Budget Deficit on Rise in The Inflation Rate in Non-Ricardian Fiscal Policies: An Approach of Time-Varying Parameters Model

Elif Erer
PhD, İktisat, Turkey,
elif_erer_@hotmail.com

Deniz Erer
PhD, İktisat, Turkey,
denizerer@hotmail.com

Abstract

Fiscal Theory of the Price Level emphasizes the monetary policy's effect on public finance. In accordance with non-Ricardian fiscal theory in which fiscal policy is active, the relationship between bugdet deficit and inflation stems from wealth effect in finance of budget deficits. Budget deficits from tax reduction or increase in public expenditures lead to increase individuals' disposable income. Rising disposable income enhances inflation through domestic demand. The countries with permanent deficits attempt to finance so-called deficits with money creation. This situation cause higher inlation rate.The aim of the study is to execute the role of budget deficit in the determinings of inflation over the periods of 1994Q1-2018Q4.In the study, we used external debt, trade openess, exchange rate and interbank rate as well inflation rate and budget deficit, and utilized from time-varying parameters model. Therefore, fiscal policy effect on achieving price stability was evaluated for each period. In particular, it is seen from the results that budget deficit an indicator of expansionary fiscal policy enhances inflation rate in high inflation periods. However, so-called effect is lower in low inflation periods.

Keywords: Fiscal Policy; Inflation Rate; Time-Varying Parameters Models.

JEL Classification Codes: H30, E31, C32

1. Introductıon

According to Clasical Quantitiy Theory of Money which explain fluactions in price levels, changes in money supply cause changes in price levels and any increase in level of prices of goods and services generates inflationist pressure due to be checked exogenously for circuit velocity of money. This theory assumed that one of the most important determinants of inflation is considered in money side of economy and fiscal policy doesn't have any impact on price levels. According to Monetarism, increases in budget deficits cause inflationist pressure by raising monetary supply. In this view, output, demand, level of employment and level of prices are affected by changes in money supply. Friedman stated that fluactions in money supply have effect on only nominal variables (such as inflation) in long term even though they affect real variables in short term. Inflation is a phenemenon occuring when the goverment carries out its requirements. Nominal output grows due to increases in inflation; thus, it is provided to decrease unemployment, to increase output level and to promote investments (Friedman, 1975: 21).

In contrast to Classical Theory, demand-side policies influence to be changed output level. Budget deficit, which stems from increase in goverment spending or decrease in tax income, cause total demand to rise. Increasing demand enhances output level when the economy is below full employment However, this situation results in improving price levels if economy is at full unemployment. According to Keynesian Theory, budget deficits lead to inflation when the government finances debt by borrowing or monetizing by central bank.

The fiscal theories of the price level state that price level cannot be determined independently of monetary policy (Leeper, 1991; Sims, 1994). Fiscal Theory of the Price Level, which is offered by Leeper (1991), Sims (1994) and (Woodford (1994,1995) and based on Sargen

and Wallace (1981)'s article focuses on the concepts of budget constraint and equilbrium conditions in the models regarding to market economy. Fiscal Theory of the Price Level is seperated two groups, which are Ricardian fiscal regime and non-Ricardian fiscal regime. Ricardian fiscal regime is monetary dominant regime. Accordingly, general level of prices is determined by supply and demand for Money. In this regime, monetary policy is active. General level of prices is determined by monetary authority independently of budget balance. Non-Ricardian fiscal regime is fiscal dominant regime. According to so-called regime, budget deficits have influence in determining of general level of prices. In this regime, fiscal policy is active. Monetary policy is adjusted to finance fiscal requirements and thus, it affects price level. On the other hands, inflation is considered as a fiscal phenomenon. Expectations of inflation depends on goverment's fiscal decisions.

The purpose of this study is to exhibit the role of budget deficit in terms of the determinants of inflation over the period of 1994Q1-2018Q4. In other words, it is investigated whether budget deficits cause inflationist pressure in non-Ricardian fiscal regime. Inflation rate, budget deficit, external debt, trade balance, exchange rate, interbank rate was considered in the models and time varying parameter model was applied. Thanks to so-called model, it was evaluated the effect of fiscal policy on price stability for each period. The study contributes to the existing litetature from this aspects.

2. Literature

To finance budget deficit through monetise by central bank lead to an increase in money supply, which generate upward pressure on inflation. When examined the literature, we saw not to be an aggrement about relationship between budget deficit and inflation. Some studies showed budget deficit causes inflation while some studies don't find a significant relationship between budget deficit and inflation.

Studies examining so-called relationship for countries exception Turkey are as below: Catao and Terrones (2003) investigated relationship between budget deficit and inflation for developed and developing countries using panel data analysis during the period 1960-2001. From the results of the study used M1 money supply/GDP, budget balance, trade openness, they concluded that budget deficit generates an upward pressure on inflation in developing countries struggling with inflation, but they didn't find an significant relationship between budget deficit and inflation in developed countries having low inflation. Alavirad (2003) examined effect of budget deficit on money supply and inflation using three stage least square in Iran for the period of 1981-1997. From the results, he concluded that budget deficit lead to increase money supply and therefore generate upward pressure on inflation. Karakaplan (2009) analyzed effect of external debt on inflation in 121 countries containing Latin American countries, Europe Union countries, transition economies and countries with high inflation. He used GMM method and showed that external debt redeuces inflation when financial development is high, relationship between external debt-inflation varies across country groups. Habibullah (2011) examined effects of budget deficit on money supply and inflation using error correction model and Granger causality in 13 Asia countries over the period of 1950-1999. He stated that budget deficit rises inflation.

It is importance of studies examining relationship between budget deficit and inflation although CBRT (Central Bank of The Republic of Turkey) implemented an implicit inflation targeting between 2002-2005 and put in to practice open inflation targeting after 2006, which ensured to pass low inflation environment. Metin (1995) expressed that monetary expansion used to finance budget deficit has influence on increase in inflation and that minimum budget deficit plays an important role decrease in inflation. Akçay et.al. (2001) analyzed long run relationship budget deficit and inflation for the period of 1970-2000 using variables containing consolidated budget deficit, real economic growth, inflation, reserve money stock. From the results of the study, they concluded that public sector borrowing requirement rather than budget deficit is more effective on inflation. Özgün (2000) stated that there is positive and two way causal relationship between budget deficit and inflation during the period of 1950-1998.

Altıntaş et.al. (2008) analyzed relationship among budget deficit, money supply and inflation for the period of 1992-2006. They showed that money supply increase inflation. However, they can not find an significant relationship between budget deficit and inflation. Aksoy (2010) examined that effects of budget deficit on inflation, economic growth and interest rate in Turkey over the period of 1980-2008. From the findings of the study, he concluded that budget deficit don't have an significant effect on inflation. Similarly, Samirkaş (2014) analyzed so-called relationship using Johansen cointegration and Granger casuality and stated that there is not long-run relationship among budget deficit, inflation, economic growth and interest rate, and there exists one way causality from interest rate to budget deficit. Kaya and Öz (2016) investigated effects of budget deficit on money supply and inflation using ARDL method for the period of 1980-2014. From the results of the study, they expressed that there is not an significant relationship between budget deficit and inflation.

3. Data

The purpose of the study is to invesitgate the role of budget deficit in terms of the determinings of inflation for the period of 1994Q1-2018Q4. In the study, inflation rate based on CPI, budget deficit/GDP ratio, external debt/GDP ratio, trade openess, TL/USD exchange rate, interbank rate and interest rate differential between Turkey and USA were considered. Explanations relating to so-called variables were showed in Table 1:

Table 1. Explanations of The Variables

Variables	Explanations	Data Sources
Budget	Budget deficit to GDP ratio	Ministry of Treasury statistics
Debt	Public debt to GDP ratio	Ministry of Treasury statistics
Externaldebt	External debt to GDP ratio	Ministry of Treasury statistics
Exchange	Returns of TL/USD exchange rate	Ministry of Treasury statistics
Tradeopeness	İmport surplus export to GDP ratio	Fred Database
İnterbank	Interbank rate	Fred Database
İnterbankyield	Interest rate differential between Turkey and USA	Fred Database
İnflation	Inflation rate based on CPI	Fred Database

All variables are seasonally adjusted via Tramo-Seats method. Firstly, the stationarity of so-called variables was researched. Zivot Andrews unit root test with structural breaks was applied because of many economic and financial crisis in Turkey in the considered time period. The results of Zivot-Andrews unit root test were showed in Table 2.

Table 2. The Results of Zivot-Andrews Unit Root Test

Variables	Model	Break Date	Test Statistics
Budget	A	1999Q4	-4.3132
	B	2004Q1	-3.1071
	C	2000Q2	-4.2538
Δbudget	A	1998Q2	-13.8602[***]
	B	2015Q1	-13.7940[***]
	C	2015Q1	-13.7940[***]
Debt	A	1999Q1	-4.2498
	B	2001Q3	-4.0096
	C	2001Q1	-4.7245
Δdebt	A	2001Q4	-8.3455[***]
	B	1999Q2	-7.4536[***]
	C	2001Q4	-9.3120[***]
Externaldebt	A	2003Q3	-3.4072
	B	2013Q3	-2.3100
	C	2003Q3	-4.0538
Δexternaldebt	A	2002Q3	-7.7121[***]

	B	2005Q2	-6.0992***
	C	2002Q3	-8.1485***
Exchange	A	2002Q1	-12.7344***
	B	2007Q2	-10.7125***
	C	2002Q1	-12.5399***
Tradeopeness	A	2001Q2	-3.2795
	B	2001Q2	-3.6080
	C	2001Q2	-3.6080
Δtradeopeness	A	2008Q3	-9.2145***
	B	2015Q1	-9.4072***
	C	2011Q4	-9.5259***
İnterbank	A	2003Q2	-5.3300***
	B	2010Q1	-4.5852**
	C	2003Q3	-5.4684***
İnterbankyield	A	2003Q2	-5.6567***
	B	2009Q3	-4.6327**
	C	2003Q2	-5.8201***
İnflation	A	2002Q2	-3.0250
	B	2004Q4	-2.6675
	C	2003Q2	-4.8036
Δinflation	A	1998Q1	-8.3124***
	B	2000Q3	-9.8831***
	C	2004Q2	-10.2360***

Note: The values in parenthetic represent lag lengths determined according to Akaike information criteria. *, ** and *** represent respectively significant levels at %10, %5 and %1. Model A, Model B and Model C show respectively structural breaks in constant, trend, constant and trend.

As examined the results of Zivot Andrews unit root test, according to A, B and C models, the variables of budget, debt, externaldebt, tradeopeness and inflation are not stationary at level, but become stationary at first difference. However; the variables of exchange, interbank and interbankyield are stationary at level in A, B and C models.

After applied the test of stationarity, vector autoregression model was generated to exhibit the dynamic effects of budget deficit to GDP ratio, public debt to GDP ratio, external debt to GDP ratio, trade openess, interest rate differential between Turkey and USA, interbank rate and TL/USD exchange rate on inflation rate. For this purpose, firstly optimal lag length was determined. The results were showed in Table 3.

Table 3. Determined of Optimal Lag Length

Length	LogL	LR	FPE	AIC	SC	HQ
0	-1810.753	NA	1.48e+08	38.67560	38.86499	38.75210
1	-1429.328	697.9274	125551.0	31.60272	33.11787*	32.21473
2	-1361.284	114.3712	85105.93	31.19753	34.03845	32.34506
3	-1270.464	139.1284	36478.60	30.30775	34.47442	31.99078
4	-1211.631	81.36494	32171.10	30.09853	35.59097	32.31707
5	-1144.998	82.22830	25492.89	29.72336	36.54155	32.47741
6	-1033.646	120.8290*	8471.021*	28.39671*	36.54067	31.68628*

As investigated the results in Table 3, optimal lag length was determined as 6 by information criteria. The results of the tests of autocorrelation and heteroscedasticity relating to the vector autoregresion model with 6 lengths were showed in Table 4. According to Table 4, it can be said that the model doesn't have the problems of autocorrelation and heteroscedasticity.

Table 4. The Results of Autocorrelation and Heteroscedasticity Relating to the Vector Autoregression Model

Autocorrelation Test		
Length	LM-Stat	Prob
1	56.92342	0.2040
2	79.23823	0.0040
3	56.04695	0.2275

4	41.38863	0.7717
Farklı Varyans Testi		
Chi-Square	**Df**	**Prob.**
2395.590	2352	0.2606

The impulse-response functions which represent the response of inflation rate to the shocks in budget deficit to GDP, public debt to GDP, external debt to GDP, trade openess, interest rate differential between Turkey and USA, interbank rate and TL/USD exchange rate were exhibited in Figure 1.
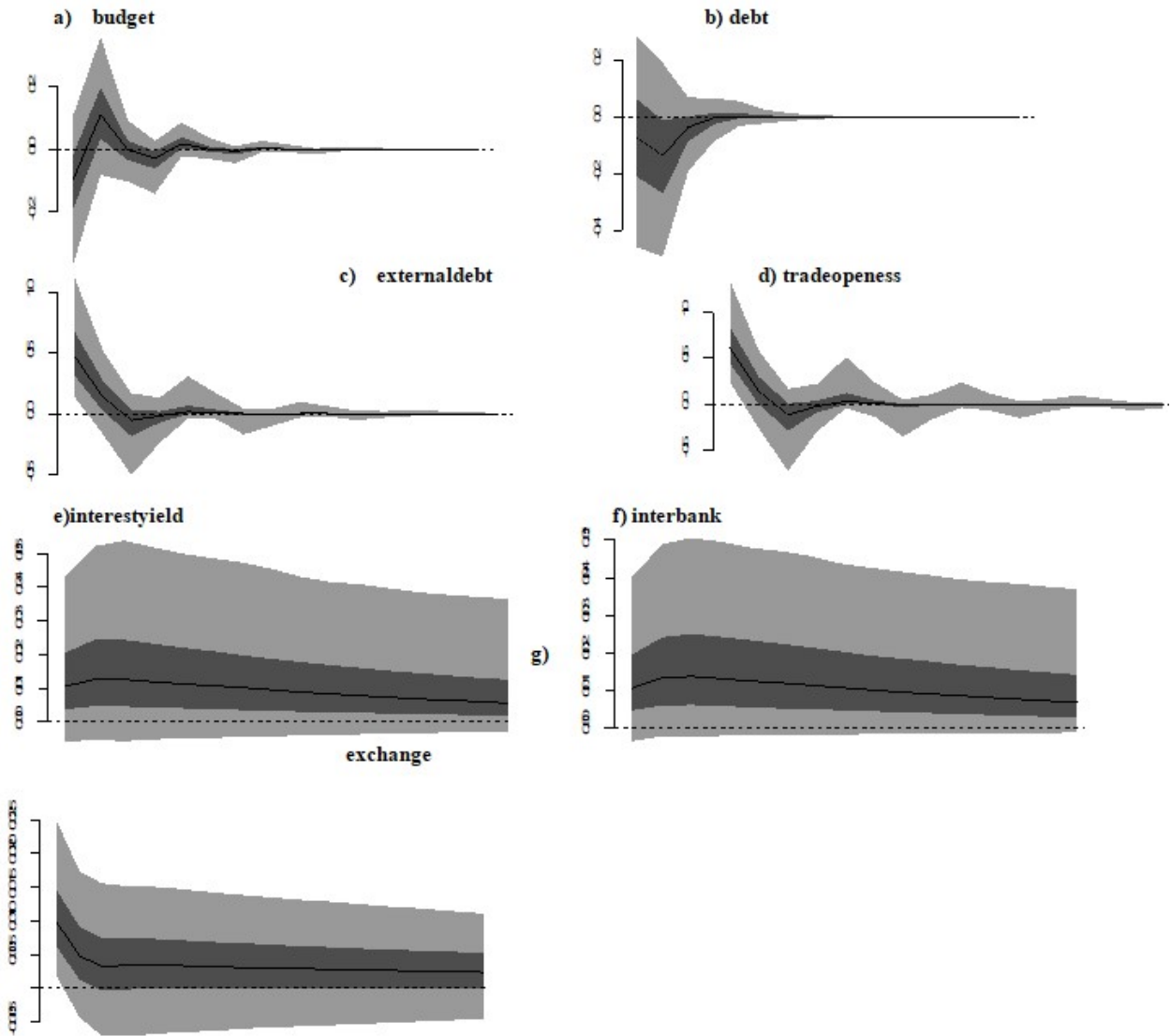

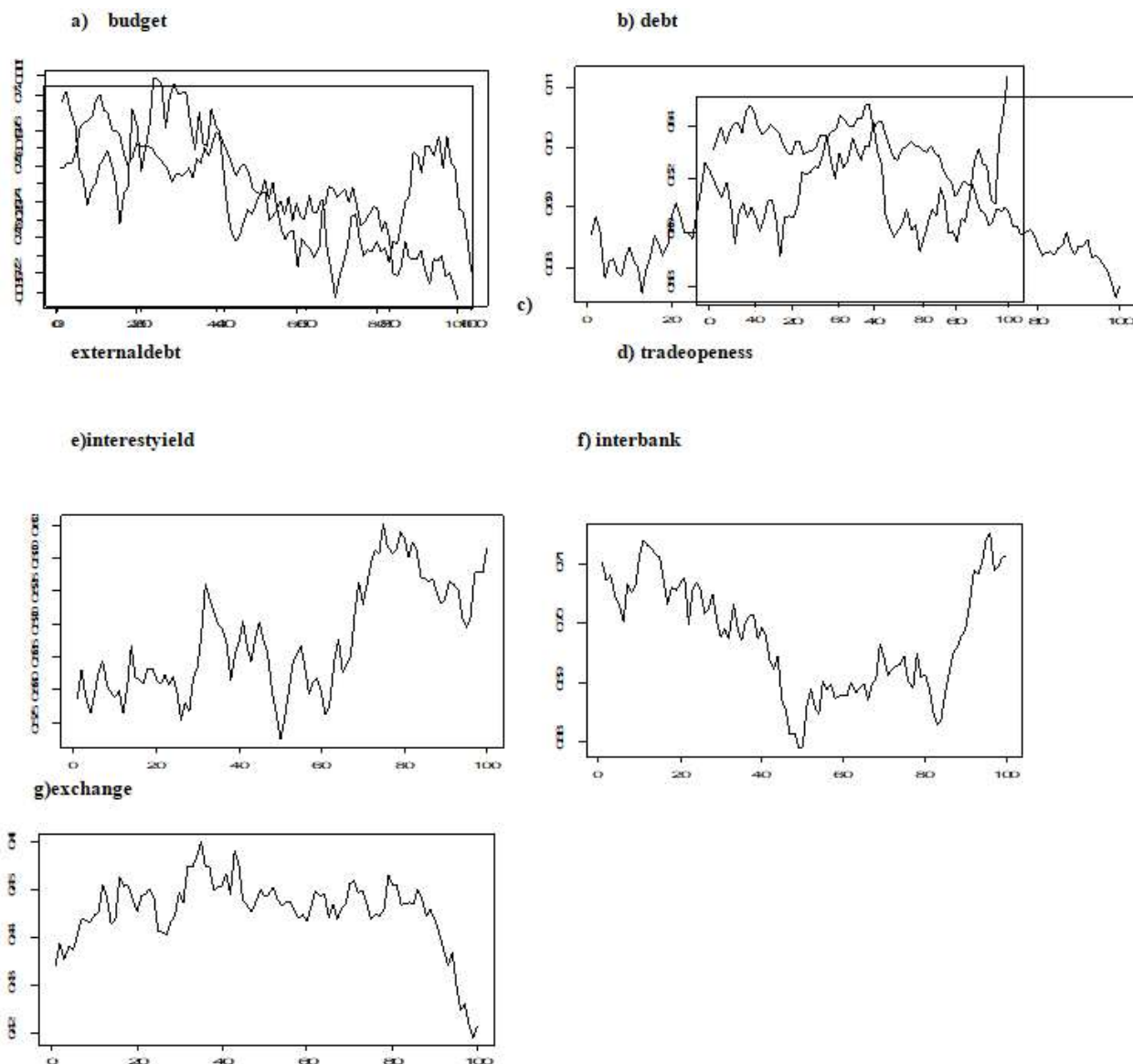*Figure 1. Impulse-Response Functions*

Figure 2. Time Varying Beta Coefficients

As evaluated impulse-response functions, inflation rate positively responds to one-standart error shock in budget deficit over two periods, and then, so-called response become statistically insignificant. This situation reflects that non-Ricardian fiscal regime, which budget deficit leads to inflation, is dominant. Hovewer, the response of inflation rate to public debt to GDP ratio is insignificant. Inflation rate positively responds to external debt to GDP ratio. Increases in external debt to GDP ratio cause soverign credit default swaps to improve, and consequently capital outflows occur. Increases in exchange rate stemming from capital outflows create positive pressure on inflation due to incremental costs. Similarly, positive shocks in trade openess cause infltion rate to go up. The responses of inflation rate to interbank rate, TL/USD exchange rate and interest rate diiferential between Turkey and USA are positive.

The graphs reflecting time varying beta coefficients for the period of 1994Q1-2018Q4 were exhibited in Figure 2. According to Figure 2, it is seen that the beta coefficient reflecting the influence of increases in budget deficit on inflation rate was higher before 2002; however, degree of so-called influence have decreased since Transition to the Strong Economy Program. A similar situation is also valid for external debt to GDP ratio. Nevertheless, effect size of interest rate differential between Turkey and USA on inflation rate has had trend of increasing since 2002,

especially it has recently reached to the highest level. Inflationist effect of TL/USD exchange rate is at high level for each period.

4. Conclusıon

In this study, we analyzed wheter or not non-Ricardian fiscal regime is valid in Turkey for the period of 1994Q1-2018Q4. In other words, we aimed to reveal effect of budget deficit on inflation. For this purpose, we used variables affecting inflation such as budget deficit, goverment debt stock, external debt stock, trade openness, TL/USD exchange rate, interbank rate and interest rate differential between Turkey and US. We utilized time varying parameter vector autoregressive model (TVP-VAR) in order to determine dynamic effect of so-called variables on inflation. Therefore, we evaluated the effect of fiscal policy on price stability in non-Ricardian fiscal regime for each periods.

As examined the results, it is stated that the shocks in budget deficit to GDP ratio, external debt to GDP ratio and trade openess create inflationist pressure. The effect size of so-called variables has decreased as a result of the implemented policies in Transition to the Strong Economy Program while their inflationist effects were higher before 2002. Inflation responds positively to interest rate differenital between Turkey and USA, interbank rate and TL/USD exchange rate. The effect size of interest rate differential between Turkey and USA on inflation rate has increased since 2002, especially it has recently reached to the highest level. Inflationist effect of TL/USD exchange rate is at high level for each period.

According to the results obtained, it is stataed to be dominant for non-Ricardian fiscal regime in Turkey. Inflation has positive response to budget deficit. In high inflation periods budget deficit, which is an indicator of fiscal policy, enhances inflation rate. However, in low inflation periods so-called effect is lower. The policies relating to primary balance are of importance in decreasing of budget deficits and inflation.

5. References

Akçay, O. C., Alper C. E., Özmucur S. (2001), "Budget Deficit, Inflation and Debt Sustainability: Evidence from Turkey (1970-2000)", Boğazici University Research Papers, SBE 01-12.

Aksoy, A. (2010), "Türkiye'de Bütçe Açıklarının Enflasyon,Büyüme ve Faiz Üzerine Etkileri: Türkiye Uygulaması", YL Tezi, Afyon Kocatepe Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı, Afyon.

Alavirad, A. (2003), "The Effect of Inflation on Government Revenue and Expenditure: The Case ofIslamic Republic of Iran", *Opec Review*, 27(4)

Altintaş, H., Çetintaş, H., Taban, S. (2008), "Türkiye'de Bütçe Açığı, Parasal Büyüme ve Enflasyon Arasındaki İlişkinin Ekonometrik Analizi", Eskişehir Anadolu Üniversitesi Sosyal Bilimler Dergisi, 8 (2), 185–208.

Catao, L., Terrones, M. (2003), "Fiscal Deficits and Inflation", *IMF Working Paper* No. 03/65, 1-32.

Habibullah, M. S., (2011), "Budget Deficits and Inflation in Thirteen Asian Developing Countries", International Journal of Business and Social Science, 2(9)

Karakaplan, M. U. (2009), "The Conditional Effects of External Debt on Inflation", SÜ İİBF Sosyal ve Ekonomik Araştırmalar Dergisi, 9(17), 204-217.

Kaya, M. G., Öz, E. (2016). "Enflasyon, Bütçe Açığı ve Para Arzı İlişkisinin Türkiye Ekonomisi Açısından Değerlendirilmesi: 1980-2014 Dönemi", Yönetim ve Ekonomi dergisi, 23(3), 640-651.

Leeper, E. M. (1991). "Equilibria Under Active and Passive Monetary and Fiscal Policies". Journal of Monetary Economics, 27(1), 129-147

Metin, K. (1995). "An Integrated Analysis of Turkish Inflation", Oxford Bulletin of Statistics an Economics, 57(4), 513-533

Özgün, D. B. (2000), "An Empirical Approach to Fiscal Deficits and Inflation: Evidence From Turkey", Hazine Müsteşarlığı, Ekonomik Araştırmalar Genel Müdürlüğü: Ankara.

Samirkaş, M. (2014), "Effects of Budget Deficits on Inflation, Economic Growth and Interest Rates: Applications of Turkey in 1980-2013 Period", Journal of Economics and Development Studies December, 2(4), 203-210.

Sargent, T., Wallace, N. (1981). "Some Unpleasant Monetarist Arithmetic". Federal Reserve Bank of Minnepolis, 5, 1-17

Sims, C. (1994). "A Simple Model fort he Study on the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy". Economic Theory, 4(3), 381-399

Woodford, M. (1994). "Monetary Policy and Price Level Determinacy in a Cash-in-Advance Economy". Economic Theory, 4(3), 345-380

Woodford, M. (1995). "Price Level Determinacy Without Control of a Monetary Aggregate". NBER Working Paper No. 5204