EUROASIA JOURNAL OF SOCIAL SCIENCES & HUMANITIES
International Indexed & Refereed
ISSN: 2651-5261

BUDGET DEFICITS, MONEY SUPPLY AND INFLATION: THE CASE OF FRAGILE FIVE COUNTRIES

Kemal ERKİŞİ
Asst.Prof., Phd, Istanbul Gelisim University, Faculty of Economics, Administrative and Social Sciences, Department of International Trade, Istanbul, Turkey. E-mail: kerkisi@gelisim.edu.tr, ORCID ID http://orcid.org/0000-0001-7197-8768

ABSTRACT
In this research, the long-term and the short-term relationships between budget deficits, money supply and inflation in Fragile Five Countries for the period between 1980-2018 were investigated. In the model, inflation (INF) was defined as dependent variable, while budget deficit (BD), money supply (MS), interest rate (IR) and exchange rate (EXR) are independent variables. The long-term results of PMG Estimator revealed that money supply, interest rate and exchange rate have a positive impact on inflation. In the long-term: (i) a 1% raise in money supply increases inflation by 0.36%; (ii) a 1% raise in interest rates increases inflation by 0.73%; (iii) a 1% raise in exchange rate increases inflation by 0.0015%; and (iv) Budget deficits do not have any impact on inflation. In the short-term, money supply and interest rate have an impact on inflation, while budget deficit and exchange rate do not have any impact on inflation. Accordingly; (i) a 1% raise in money supply increases inflation by 0.18%; (ii) a 1% raise in interest rates increases inflation by 0.47%. However, it is seen that the variables create a joint effect in the long-term by interacting each other in the short-term. Although the short-term and long-term results indicate that budget deficits do not cause inflation, the interaction of variables with each other in the short-term budget deficits could increase inflation through interest rates and money supply. These results support the views of classical and monetarist.

Key Words: Budget Deficit, Money Supply, Interest Rate, Exchange Rate, Inflation

1. Introduction

Budget deficits have an important place in the current macroeconomic problems regardless of the level of development of the countries. Financing methods such as money printing, taxation or borrowing are employed to cover public budget deficits caused by the imbalance between public expenditures and public revenues. While taxation is in the form of introducing new taxes or increasing existing tax rates, borrowing is in the form of domestic borrowing and external borrowing. In the literature, money printing is also expressed in terms of monetization and seigniorage. The borrowing requirement of the public sector, depending on the current and future volume of the budget deficits and the financing methods, has significant effects on the economy. In the literature, it is seen that the effects of budget deficits on the economy are subject to the studies of prominent economic schools and they differ in terms of financing methods, transfer mechanisms and the results that are produced.

In this context, debates on the effect of borrowing requirement of public sector on inflation have a wide place in the literature. Sargent and Wallace (1981), in an economy where continuous budget deficits experienced, considering that the money supply increases the inflation rate, the budget deficit, which is financed by domestic credits, cause to raise in interest rates. In this case, government will be obliged to press money to cover the new debt arising from increases interest rates. In this case, the inflation will be much higher. In the Barro-Ricardo Equivalence approach, it is argued that domestic borrowing in financing budget deficits will cause tax increases in the long-term. On the other hand, borrowing has an impact on the wealth and income of the economic units. The economic units that earn interest income as a result of repayments of domestic debt may increase their consumption. However, if the current value of the discounted public revenue does not meet the debt obligations, this will increase the savings, but not consumptions.

The effects of the budget deficit on money supply are among the most debated issues in the literature. It is emphasized that public debt causes inflationary effects through interest rates. Increasing domestic borrowing will deteriorate the effectiveness of capital markets, leading to higher interest rates and a

decline in private sector investments. Private sector investments and decrease in production will lead to an increase in price level. Therefore, the interest burden of domestic borrowing on the budget will have an inflationary effect.

In this paper, the relations between budget deficits, money supply and inflation are examined. After discussions in theoretical literature, the outcomes of empirical literature are summarized. In the econometric analysis section, the relationships between budget deficits, money supply and inflation are analysed in the context of fragile five countries that consist of Brazil, Indonesia, India, South Africa and Turkey. The reason for the selection of the Fragile Five countries is that the country's economies frequently resort to monetary and fiscal policy instruments because they are affected by endogenous shocks and are the countries where have been experienced relatively high inflation. Therefore, the effects of monetary policy, fiscal policy and foreign exchange policy on inflation are better observed.

2. Theoretical Framework

2.1. Monetarist Approach

In the monetarist approach based on the quantity theory of money, the general level of prices is determined by the nominal money supply. According to Friedman (1975), the effects of changes in money stock -or in monetary policy- on real variables such as real output level, employment, and real return of financial assets are temporary. Therefore, changes in quantity of money have only effects on nominal variables such as the general level of prices in the long-term.

On the other hand, in parallel with the progress in real activity level, the amount of money demanded (desired real money balance) by the economic units with the purpose of transaction, needed to be supplied by the central bank. If the nominal money supply exceeds the desired real money balances, it will cause inflation. In this context, under the assumption where prices are flexible and nominal money supply is considered as exogenous, the increases in nominal money supply, which will not cause inflation, should be as much as the real economic growth rate. The public sector could create unexpected inflation in order to achieve its short-term targets. These targets could be generating revenue by seigniorage, lowering the unemployment rate, increasing production and employment, and increasing investments by changing the income distribution in favor of capital owners (Yay, 2001).

Since financial shocks are immediately absorbed by the general level of prices, each increase in budget deficit causes an increase in money supply and thus inflation (Serban, 2002). In case of budget deficits are financed by seignorage (monetization), this will cause an increase in general price level. In the context of fiscal policy, the general level of prices are affected because of (i) the financing of public expenditures by seigniorage, or (ii) increases in nominal money supply as a result of open market transactions by the central bank. Since these two mechanisms, which will increase the volume of money, would have various reflections on taxes and government debt stock, their affects on prices or interest rates will be different. Financing budget deficits by seigniorage is considered exogenous. In this context, increasing money supply due to public financing requirement causes a rise in inflation. As a result, budget deficits have an inflationary effect only in case of monetization.

In practice, the monetarist view based on the quantity theory of money faces serious difficulties in controlling inflation. One of these difficulties is the introduction of an appropriate definition of nominal money supply due to the substitution between monetary and non-monetary financial assets. The elimination of barriers to financial transactions and the rapid increase in innovative financial products have led an increase in the substitution of assets in financial transactions. The fact that the increase in the nominal money supply affects prices has become questionable due to the amount of non-monetary financial assets under the control of the monetary authority. In this case, the nominal interest rate became an instrument used to control the price level, while the nominal money supply became endogenously determined in the money market.

2.2. Quantity Theory of Public Debt

The argument that monetary policy applications are the determinant of the general level of prices has been questioned since the 1980s. Sargent and Wallace (1981), in their studies that demonstrate the importance of the relationship between monetary and fiscal policies in terms of price stability, claims that the argument put forward by the monetarist view can be misleading.

Quantity Theory of the Public Debt (QTPD), which is known as "The Fiscal Theory of Price Level" suggests that the price level is determined only by public debt and fiscal policy and that monetary policy plays an indirect role. In this context, it differs from the monetarist view, which correlates the general level of prices with the increase in money supply.

The Quantitative Theory of Public Debt is divided into two different approaches based on research of Sargent and Wallace (1981) and Woodford (1994, 1995). Sargent and Wallace (1981) argue that the general level of prices depends on the coordination between the monetary and fiscal authorities and explain the issue with "unpleasant monetarist arithmetic". Accordingly, public deficits trigger inflation through the seigniorage channel.

In the research of Woodford (1994, 1995), which are based on the study of Carlstrom and Fuerst (2000), the general level of prices is determined by the public debt, and the current and the future values of public revenues. Spending plans and monetary factors do not play a role in determining the price in an economy.

Sargent and Wallace argue that in an economy where budget deficits are persistent, monetary policy will remain under pressure because of the deficits. In fact, in order to prevent inflation, the real interest rate increases if public deficits are covered by borrowing rather than monetary expansion. Since the deficits are persistent, new borrowing is required for even interest payments. In this case, the state is forced to print money to avoid default risk. As a result, the money printed at the point where there is no possibility of borrowing will result in a much higher inflation than the case where the deficits are financed by seigniorage.

In the monetarist approach, it is ignored the fact that governments would be limited by inter-temporal budget constraints (Sims, 1994, 1998). The Fiscal Theory of Price Level (FTPL) establishes a link between fiscal and monetary policies through the government's intertemporal budget constraint. If this constraint is taken as a condition of equilibrium, the real value of debt securities issued by the government must be equal to or greater than the expected present value of the current and future primary surpluses. Otherwise, in the case of the discounted value of the primary surplus is lower than the nominal debt level, prices will rise to meet the budget constraint condition. In other words, the price level will equalise the real value of current public liabilities to the current and the discounted value of future primary surpluses. In this case, the price level becomes an exclusive setting variable to maintain this condition.

A positive and endogenous price shock, which reduces the real value of public debt, leads to a reduction in the real value of private portfolios invested in public securities. These decreases in the real value of private assets have a negative effect on the demand for goods and services and create a negative wealth effect eventually. According to the Finance Theory, expectations of economic actors regarding the sustainability of fiscal policy may have a similar wealth effect (Woodford, 1995). If there is a negative perception about the sustainability of public finance in the market; that is, if the discounted value of the primary surplus of the government cannot meet the nominal value of its liabilities, this perception will lead to an increase in the price level so as to restore the balance of public budget constraint. This increase in the overall level of prices reduces the real value of private portfolios, creating the mentioned negative wealth effect. Woodford (1995) argues that it is very rare for economies to have a Ricardian approach. When the fiscal policy is not Ricardian, the primary surplus will not discounted and hence the inter-temporal budget constraint mechanism will not work. The price level is determined by the current value budget constraint. In this case, changes in fiscal

policy will increase the equilibrium price level through the effect of wealth. Prices will increase until the new equilibrium between the supply and the demand is restored.

A central bank, which does not consider the fiscal policies, will accelerate the inflation process. Fiscal policies play an important role especially in determining interest rates. Failure to maintain budgetary discipline increases both borrowing and inflation, resulting in high interest rates. This situation causes the debt-interest-inflation spiral to emerge. Accordingly, within the framework of the budget deficit - money supply - inflation relationship, the price levels are not determined by the amount of money in the long-term, but by the public deficits. Woodford (1996) argues that changes in the public budget may be the most important source of macroeconomic instability, and that the central bank cannot prevent instability if the monetary policy is implemented without considering the public debt. In the Unpleasant Monetarist Arithmetic approach, the reason for the primary deficit to cause inflation is expressed as the central bank being forced to monetize this deficit. In the analysis put forward by The FTPL, the inflationary effect of the primary deficit is not due to the central bank's monetization of this deficit, but because the fiscal policy affects the private sector's expenditures through the wealth effect channel. Therefore, it is not enough for the central bank to be independent in order to ensure stability at the general level of prices. For an effective economic policy implementation, it is necessary to carry out monetary and fiscal policies in harmony with each other.

2.3. New-Keynesian Approach

In the new Keynesian approach, the budget deficit, money supply and inflation relations are explained with the general equilibrium based on the aggregate demand and aggregate supply, under the conditions of imperfect competition and closed economy. As the public debt is seen as money debt stock as in the quantity theory of public debt, it differs from the monetarist approach based on the quantity theory of money.

The demand equation is expressed by the function of IS, which is represented equilibrium of investment and savings in the commodity market. In this sense, IS function is a negative slope curve based on expectations, which is affected by both the output gap and real interest rates. The supply equation corresponds to the new Keynesian version of the Phillips curve, which is based on the gradual maximization of the profit that temporarily adjusts the prices. Since these two systems of equations are based on the monetary policy rule, they consist of a well-defined general equilibrium model with an interest rate, which is set by the central bank, to control inflation.

Current and expected output gap, current and expected inflation and nominal interest rates are the main variables of the system. Although money is not explicitly considered as a variable, it is considered indirect in the context of utility maximisation function. For example, considering money as the part of the utility function, real money balances affect both the marginal rate of substitution between leisure and employment and hence the demand equation. More importantly, in the model, the amount of money becomes the endogenous nominal interest rate, or in other perspective inflation, and thus becomes an irrelevant variable in the context of the policy objective. According to Woodford (2001), there is no need for the money demand function in explaining inflation through its own mechanism.

2.4. Ricardian Equivalence Hypothesis

In the context of the Ricardian Equivalence Theorem, which is put forward by Ricardo and further theorized by Barro (1974), it is assumed that individuals have rational expectations, and one consequence of this assumption is that fiscal policy will have no effect on aggregate demand and therefore on prices. Ricardian equivalence theorem suggests that the borrowing to finance the public expenditures will have similar results to taxation. The rational individual will correctly perceive the future consequences of the current changes in the state budget and see that if the state borrows today, the budget deficits will be financed by tax increases in the future. In this case, individuals will increase their savings by reducing their consumption with the belief that this situation will negatively affect their wealth. The important point here is whether individuals perceive the debt securities as the part of their wealth. If the economic growth rate is higher than the interest rates, domestic debt securities will

be considered as the part of the wealth of individuals. This will lead to an increase in consumption. Otherwise, as debt repayments will not cause an increase in wealth of individuals, savings will be increased in order to cover the taxes to be transferred to future generations.

Mankiw (2012) argued, the public deficit financed without tax increases creates a net wealth effect and therefore, the debt-financed fiscal policy does not have any impact on aggregate demand, hence, employment and output level in the short-term. According to the Ricardian approach, since the public deficit does not have any impact on credits or aggregate demand, there will not any correlation with interest rates, trade deficit, price level, output and aggregate saving (Bitzis et al., 2008).

3. Literature Review

When the empirical literature is examined, it is seen that a considerable amount of studies have been conducted examining the relationship between budget deficits, money supply and inflation. In this context, the literature review is given in Table 1, which consist of the results of the study together with the year, the researcher(s), the method employed, selected country/countries, and the period.

Table 1. Literature Review

Researcher/s	Data Span	Method	Results
Alper (2018)	1971-2016 Turkey	Bayer-Hanck Cointegration	BD ⇒ MS and MS ⇒ INF
Yien et al. (2017)	1960-2014 Malesia	Johansen Cointeg. Granger Causality	BD ⇒ INF
Kaya & Öz (2016)	1980-2014 Turkey	ARDL	MS ⇒ INF BD ⇏ INF
İpek & Kara (2016)	2004-2015 Turkey	ARDL, Impulse-Response	BD ⇔ INF (in the long-run)
Şahin & Karanfil (2015)	1980-2013 Turkey	Johansen Cointegr., Granger causality	MS ⇒ EXR ⇒ BD MS ⇏ INF
Nguyen (2015)	1985-2012 9 Asian Countries	Panel Data Analysis	BD ⇒ MS ⇒ INF
Ishaq & Mohsin 2015	1981-2010 11 Asian countries	GMM	BD ⇒ INF
Hoang (2014)	January 1995 to December 2012	VAR model	MS ⇒ INF MS ⇏ BD ⇏ INF
Samirkas (2014)	1980-2013 Turkey	Johansen Cointegration	BD ⇎ INF
Bakare et al. (2014)	1975-2012 Nigeria	Johansen Cointegration, ECM	MS ⇒ INF and BD ⇒ INF (in the long-run)
Doğru et al. (2013)	1980-2011 22 Asian Countries	Panel Data Analysis	EXR ⇒ INF and BD ⇒ INF (in the long-run)
Lin & Chu (2013)	1960-2006 91 Countries	Dynamic Panel Data Analysis	BD ⇒ INF
Tiwari et al. (2012)	1970- 2008 India	VECM Granger Causality	INF ⇏ BD INF ⇏ MS
Kasseah et al. (2011)	1988-2007 20 African Countries	Panel Data Analysis	BD ⇒ INF
Habibullah et al. (2011)	1950-1999 14 Asian Countries	Granger Causality	BD ⇒ MS BD ⇒ INF
Mehdi & Reza (2011)	1975-2006 Iran	ORDG	MS ⇒ INF BD ⇏ INF
Khundrakpam & Pattnaik, (2010)	1953 to 2005 India	ARDL approach to Cointegration Analysis	Short-run: MS ⇒ INF and BD ⇒ INF Long-run: BD⇒INF
Narayan et al. (2006)	1970-2004 Fiji	Granger Causality	BD ⇒ INF (only in the long-run)
Catao & Terrones, (2005)	1960–2001 107 Countries	Panel Data Analysis	BD ⇒ INF (high-inflation and developing countries) BD⇏ INF (low-inflation advanced economies.)
Okpanachi, (2004)	1986-1998, Nigeria	2 Stages LSQ	BD ⇒ MS ⇒ INF

In the literature reviewed, 14/20 of the researches indicated that the budget deficit caused inflation via money supply, interest rates or directly. On the other hand, 6/20 of the research articles revealed that there is no relationship between budget deficits and inflation.

4. Econometric Analysis

4.1. Data Set, Variables, Methodology

The data set employed in this paper consist of 975 observation belong to the series of Inflation, (GDP deflator - annual %), budget deficits (current LCU), broad money (% of GDP), deposit interest rate (%) and official exchange rate (LCU per US$, period average). Brazil, India, Indonesia, South Africa and Turkey, which are known as the fragile five, have been subject to the analysis between 1980-2018. The data set was compiled from "the World Bank's World Development Indıcators Statistics"

Primarily, the functional, statistical and ARDL equations of the model were defined under the title of Model. Before conducting the long and the short-term relationships between the variables, in order to decide the proper error correction model, a number of pre-tests consisting the cross-section dependence, stationary of the series, homogeneity of the parameters and the appropriate lag-length are requires. To choose the right unit root test method that will be employed in the stationary analysis, cross-section dependence, in other words existence of correlation between the units, is tested with the help of Pesaran (2015) CD Test Method. Based on the results, it is decided to employ Pesaran (2007) CADF, the one of the second generation unit root test, which considers the cross-section dependence. For the homogeneity of the parameters, which is another pre-test to define proper error correction, Swamy S Test was implemented. To reveal the existence of the long-term relationships, Westerlund ECM Panel Co-integration Test was employed. Accordingly, it is decided to perform one of the models consist of Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Fixed Effects (DFE). The model was tested with these three methods, however, the best one which explain the model was defined with the help of Hausman Test.

4.2. Model

The functional model is shown as in Eq. (1). In the model, inflation (INF) is the dependent variable while budget deficit (BD), money supply (MS), interest rate (IR) and exchange rate (EXR) are the independent variables of the model.

$$INF = f(BD, MS, IR, EXR) \quad (3)$$

INF : Inflation, GDP deflator (annual %)
BD : Budget Deficits (current LCU)
MS : Broad money (% of GDP)
IR : Deposit interest rate (%)
EXR : Official exchange rate (LCU per US$, period average)

In order to employ the functional model into the analysis it is required to be converted to statistical form. Therefore the statistical expression of the model is defined in Eq. (2)

$$INF_{it} = a + \beta_1 BD_{it} + \beta_2 MS_{it} + \beta_3 IR_{it} + \beta_4 EXR_{it} + u_{it} \quad (2)$$

In Eq. (2), a represents "the constant term", while ($\beta_1 \ldots \beta_4$) are the parameters specify the relationship between the dependent variable and the independent variables. i denotes the countries $(i = 1, \ldots, 5)$, ; t shows the time period $(t = 1980, \ldots, 2018)$, and u_{it} refers to the error term.

The statistical model can be re-defined based on the ARDL Model. The re-parameterised ARDL (m, n, n, n) error correction model is expressed in general equation form as in Eq. (3);

$$\Delta y_{it} = \theta_i \left[y_{i,t-1} - \lambda'_i X_{i,t} \right] + \sum_{j=1}^{m-1} \xi_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{n-1} \beta'_{ij} \Delta X_{i,t-j} + \varphi_i + e_{it} \quad 3)$$

In Eq.(3), λ' is the vector that represents the long-term relationships. The expression of $[y_{i,t-1} - \lambda'_i X_{i,t}]$ is the error correction term. ξ_{ij} and β' are the short-term dynamic coefficients. The model can be described as in Eq. (4)

$$\Delta INF_{it} = \theta_i \left[INF_{i,t-1} - \lambda'_i X_{i,t} \right] + \sum_{j=1}^{m-1} \xi_{ij} \Delta INF_{i,t-j} + \sum_{j=0}^{n-1} \beta'_{ij} \Delta X_{i,t-j} + \varphi_i + e_{it} \quad (4)$$

4.3. Cross-section Dependence Test

Existence of cross-section between the units is crucial in selection of the correct unit root test method, which reveals the integration level of the series. Moreover, it is important while defining the appropriate panel co-integration test method as well. In case the existence of correlation between the units, it is preferred the second-generation panel unit root test is preferred, otherwise the first-generation panel unit root test is recommended in order to produce consistent results. For this purpose "H_0: cross-section independence" the null hypothesis is tested with the help of the "Pesaran (2015) CD Test Method" and the outcomes are presented in Table (2)

Table 2. Pesaran (2015) CD Test

Variables	CD-test	p-value	average joint	mean ρ	mean abs(ρ)
INF	5.56	0.000	39	0.28	0.29
BD	4.98	0.000	39	0.25	0.25
MS	5.78	0.000	39	0.29	0.29
IR	10.53	0.000	39	0.53	0.53
EXR	18.21	0.000	39	0.92	0.92

Notes: Under the null hypothesis of cross-section independence, CD ~ N(0,1)

Table 2 covers the CD-test statistics, p-values, mean ρ values and the absolute value of mean ρ of the series. Because of all the probability values of the CD test statistics belong to the series are below than 0.05, the H_0 hypothesis is rejected. This result confirmed the existence of cross-section dependence.

4.4. Stationary Test

As the outcomes of the CD-Test confirmed the correlation between the units, Pesaran (2007) CADF, which is one of the second-generation unit root test was performed. The null hypothesis "H0: all panels contain unit roots" is tested against "HA: some panels are stationary" and the outcomes are presented in Table 3.

Table 3. Pesaran CADF Unit Root Test

	I(0)			**I(1)**		
Variables	t-bar	Z[t-bar]	P-value	t-bar	Z[t-bar]	P-value
INF	-2.649**	-2.068	0.019	-	-	-
BD	-2.068	-0.685	0.247	-4.989*	-7.633	0.000
MS	-2.604**	-1.959	0.025	-	-	-
IR	-2.146	-0.871	0.192	-5.423*	-8.667	0.000
EXR	-0.750	2.451	0.993	-3.016*	-2.940	0.002

The outcomes of Table 3 showthat INF and MS are stationary at level because of p-values of the statistics are below 0.05, while BD, IR and EXR are not. However, once the first order differences are taken BD, IR and EXR became stationary because of p-values of the statistics are below than 0.05 significance level. As a result, the integration levels of INF and MS are I(0) and the integration levels of BD, IR and EXR are I(1). Because of the integration level of the series are not the same, but differ as I(0) and I(1), it is decided to perform panel ARDL method.

4.5. Homogeneity Test

Determination of the homogeneity of the parameter is another important pre-test in selecting the appropriate ECM model. For this purpose, Swamy S Test Method employed and the results are presented in Table 4.

Table 4. Homogeneity Test

$INF_{it} = a + \beta_1 INF_{it-1} + \beta_2 BD_{it-1} + \beta_3 MS_{it-1} + \beta_4 IR_{it-1}$	$\chi 2$ (28)	Prob > $\chi 2$
	145.29	0.0000

Table 4 shows the regression equation tested the values of $\chi 2$ (28) and Prob > $\chi 2$. " The parameters are homogenous the null hypothesis" is tested against "the parameters are heterogeneous the alternative hypothesis". Because of the probability value of $\chi 2$ is lower than 0.05, it is concluded that the parameters are heterogeneous.

4.6. Appropriate Lag-length Selection

In order to produce consistent results in the long-term and the short-term analysis, it is required to define the appropriate lag-length value. For this purpose, Hansen J Test was employed and the outcomes are presented in Table 5.

Table 5. Lag-length Selection

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	**.7075603**	**75.04534**	**.142314**	**-238.4889**	**-50.95466**	**-127.1562**
2	.5624101	57.42266	.1654808	-181.4606	-38.57734	-96.63563
3	.9984902	37.89454	.2182425	-121.3609	-26.10546	-64.81098
4	.9999906	43.16021	.0004549	-41.44427	9.160209	-11.4021

Table 5 shows the CD, J, prob. value of J and the values of information criteria of MBIC, MAIC and MQIC. Because of the lag-length, which makes the MBIC, MAIC and MQIC selection criteria minimum, is 1, it is concluded that optimal lag-length is 1.

4.7. Confirmation of the Long-term Relationship

Before performing MG, PMG and DFE Estimators, it is needed to confirm the existence of a long-term relationships between the series. For this purpose, Westerlund ECM Panel Co-integration Test, which considers the heterogeneity, was employed and the outcomes are shown in Table 6

Table 6. Westerlund ECM Panel Co-integration Outcomes

Statistic	Value	z-value	P-value	Robust P-value
Gt	-2.115**	-1.564	0.059	0.020
Ga	-12.353**	-2.670	0.004	0.020
Pt	-28.484	-19.859	0.000	0.140
Pa	-70.646*	-31.090	0.000	0.000

Note: ** and * indicate cointegration at the 5% and 1% significance level respectively.

Table 6 displays the values of test statistics, z-values, p-values and the robust p-values of Gt, Ga, Pt and Pa. "H0: no cointegration hypothesis" was tested. Since the robust p-values of Gt, Ga, Pa, which are considered in heterogeneous panel cointegration, are less than 0.05 significance level, "The null hypothesis is rejected" and therefore it is concluded existence of co-integration between the units.

4.8. Estimation of the Long-Term and the Short-term Relationships

Because of the outcomes of Table 6 confirmed a long-term relationship, Mean Group Estimator (MG), Pooled Main Group Estimator (PMG) and Dynamic Fix Effect Estimator (DFE) are employed and the outcomes are presented in Table 7.

Table 7. PMG, MG and DFE Error Correction Models' Outcomes

	PMG		MG		DFE	
D.INF	Coef.	Std. Err. (p-value)	Coef.	Std. Err. (p-value)	Coef.	Std. Err. (p-value)
Long-term						
BD L1.	59.93736	53.65089 (0.264)	29521.3	29335.98 (0.314)	164.219	105.6687 (0.120)
MS L1.	.360405	.0878748 (0.000)	.3682113	.1154477 (0.001)	.6669922	.0219581 (0.000)
IR L1.	.7307174	.1194298 (0.000)	.449567	.2682194 (0.094)	.084894	.010466 (0.000)
EXR L1.	.0015255	.0005156 (0.000)	-2.716757	1.867616 (0.146)	.0024407	.0013132 (0.063)
ECT	-.4668611	.1552745 (0.003)	-.0806324	.5080741 (0.874)	1.441638	.153793 (0.000)
Short-term						
BD D1.	21865.5	21380.45 (0.306)	45324.98	45053.99 (0.314)	545.7715	166.0616 (0.001)
MS D1.	.1825587	.0572394 (0.001)	.1316408	.0467973 (0.005)	.1442081	.014023 (0.000)
IR D1.	.4732952	.1744666 (0.007)	4732453	.2610411 (0.070)	.5957141	.0209125 (0.000)
EXR D1.	3.817634	2.960265 (0.197)	6.701633	4.034919 (0.097)	.0067791	.0047221 (0.151)
_cons	-10.5219	4.356716 (0.016)	-13.02929	9.72029 (0.180)	2.98087	3.482664 (0.392)

Table 7 presents the estimation of the models based on PMG Estimator, MG Estimator and DFE Estimators. Table 7 includes the long-term and short-term coefficients of the model, the standard errors and p values. Top side of the table shows the outcomes of the long-term estimations and the bottom end of the table reveal the short-term outcomes. Error correction term (ECT) which is seen in the midsection of the table shows the joint effects of the variables.

Before interpretation of the outcomes of the Estimators, Hausman Test will be performed to define which estimator is fit with the model and produce the most appropriate results.

Table 8. Hausman Test Outcomes

Test Stats.		**$\chi 2$ (2)**	**Prob> $\chi 2$**	**Decision**
(1)	*MG or PMG*	0.22	0.8955	PMG
(2)	*DFE or PMG*	0.08	0.9601	PMG

Note: "Ho: difference in coefficients not systematic."

Table 8 reveals the estimations of $\chi 2$ and the probability value of $\chi 2$ based on testing MG and PMG Estimators in the first line and DFE and PMG Estimators in the second line. The null hypothesis homogeneity through Hausman Test was investigated. As it is seen the outcomes in the first line, because of the probability of chi2 is 0.8955 and significantly higher than 0.05, the null hypothesis is rejected and concluded that the model supports PMG rather than MG. Similarly, as it is seen in the second line, because of the probability of chi2 is 0.9601and significantly higher than 0.05, the null hypothesis is rejected and concluded that the model supports PMG rather than DEF. Therefore, it is decided to interpret the outcome of PMG Estimators seen on Table 7.

When the results of PMG Estimator are examined in Table 7, it is seen that the ECT coefficient is negative and significant because of the probability value is less than 0.05. This result confirms the long-term relationships. The long-term outcomes indicated that MS, IR and EXR have a positive impact on INF because of p-values are less than 0.05 significance level, however, BD does not have an impact on INF in the long-term. Accordingly;

(a) a 1% raise in money supply increases inflation by 0.36%
(b) a 1% raise in interest rates increases inflation by 0.73%
(c) a 1% raise in exchange rate increases inflation by 0.0015%
(d) Budget deficits do not have impact on inflation.

In the short-term, MS and IR have an impact on INF while BD and EXR, do not have an impact on INF in the short-term. Accordingly;
(a) a 1% raise in money supply increases inflation by 0.18%
(b) a 1% raise in interest rates increases inflation by 0.47%

On the other hand, the outcomes of the ECT shows that the variables create a joint effect in the long-term by interacting each other in the short-term. It the model, approximately 47% of imbalances in a period will be recovered in the next period. In other words, the system will re-balance itself in about two years.

Conclusion

In this research, the long-term and the short-term relationships between budget deficits, money supply and inflation in Fragile Five Countries for the period between 1980-2017 were investigated. In the model, inflation (INF) was defined as dependent variable, while budget deficit (BD), money supply (MS), interest rate (IR) and exchange rate (EXR) are independent variables.

Before conducting the long and the short-term relationships between the variables, in order to decide the proper error correction model, cross-section dependence via "Pesaran (2015) CD Test", stationary of the series with the help of "Pesaran (2007) CADF", homogeneity via "Swamy S", and the appropriate lag-length with the help of "Hansen J" were tested. To reveal the existence of the long-term relationships, Westerlund ECM Panel Co-integration Test was employed. As a result of the preliminary test, Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Fixed Effect (DFE) Estimators were employed in estimation of the model. Hausman Test indicated that the model supports PMG.

The long-term results of PMG Estimator revealed that money supply, inflation rate and exchange rate have a positive impact on inflation. In the long-term: (i) a 1% raise in money supply increases inflation by 0.36%; (ii) a 1% raise in interest rates increase inflation by 0.73%; (iii) a 1% raise in exchange rate increases inflation by 0.0015%; and (iv) Budget deficits do not have any impact on inflation.

In the short-term, money supply and interest rate have an impact on inflation while budget deficit and exchange rates do not have an impact on inflation in the short-term. Accordingly; (i) a 1% raise in money supply increases inflation by 0.18%; (ii) a 1% raise in interest rates increases inflation by 0.47%. However ECT indicated that the variables create a joint effect in the long-term by interacting each other in the short term.

Although the short-term and long-term results indicate that budget deficits do not cause inflation, the interaction of variables with each other in the short-term create joint effect on inflation in the long-term. Accordingly, budget deficits could increase inflation through interest rates and money supply. These results support the views of classical and monetarist.

REFERENCES

1. Alper, F. O. (2018). Türkiye'de bütçe açığı, para arzı ve enflasyon arasındaki ilişkinin incelenmesi: 1971-2016. Business and Economics Research Journal, 9(4), 799-810.
2. Bakare, I. A. O., Adesanya, O. A., & Bolarinwa, S. A. (2014). Empirical investigation between budget deficit, inflation and money supply in Nigeria. European Journal of Business and Social Sciences , 2(12), 120 - 134.
3. Barro, R. J. (1974), "Are government bonds net wealth?" Journal of Political Economy, 82 (6),1095-1117.
4. Bitzis, J., Paleologos, M. & Papazoglou C. (2008). The determinants of the Greek current account deficit: The EMU experience. Journal of International and Global Economic Studies, 1(1), 105-122.
5. Carlstrom, C. T. & Timothy S. F. (1999). The fiscal theory of the price level. Federal Reserve Bank of Cleveland Economic Review 3.
6. Catao, L.A.V., & Terrones, M. E. (2005). Fiscal deficits and inflation. Journal of Monetary Economics, 52, 529-554.
7. Doğru, B., Recepoğlu, M., & Çelik, O. (2013). Döviz kuru hareketleri ve bütçe açığı, enflasyona yol açar mı? Gelişmekte olan Asya ülkelerine üzerine bir panel nedensellik analizi. Eskişehir Osmangazi Üniversitesi İİBF Dergisi, 8(2), 21-36.
8. Friedman, M., (1975) Unemployment versus inflation? An evolution of Phillips Curve, IEA Lecture, No: 2.
9. Habibullah, M. S., Cheah, C. & Baharom, A.H., (2011), Budget deficits and inflation in thirteen asian developing countries. International Journal of Business and Social Science, 2(9), 192-204
10. Hoang, K. V., (2014), Budget deficit, money growth and inflation: Empirical evidence from Vietnam. National Graduate Institute for Policy Studies, Banking Academy, Paper No. 54488, 1-34.
11. İpek, E., & Akar, S. (2016). Bütçe açığı ve enflasyo n arasındaki ilişki: Türkiye için ampirik bir analiz. Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi, 38(2), 167-189.
12. Ishaq, T. & Mohsin, H. M. (2015): Deficits and inflation: Are monetary and financial institutions worthy to consider or not?. Borsa Istanbul Review, 15(3): 180-191.
13. Kasseah, H., Weng, M. F. & Moheeput, K. H. (2011). Central bank independence: Evidence from Africa. Journal of Emergin Trends in Economics and Management Sciences. 2(4), 325-332.
14. Kaya, M.G., & Öz, E., (2016), Enflasyon, bütçe açığı ve para arzı ilişkisinin Türkiye ekonomisi açısından değerlendirilmesi: 1980-2014 dönemi, Manisa Celal Bayar Üniversitesi İ.İ.B.F Yönetim ve Ekonomi, 23(3), 639-651.
15. Khundrakpam, J. K., & Patanaik, S. (2010). Fiscal stimulus and potential inflationary risks: An empirical assessment of fiscal deficit and inflation relationship in India. Journal of Economic Integration, 25, 703-721.
16. Lim, H. & Chu, H. (2013). Are Fiscal Deficits Inflationary? Journal of International Money and Finance. Sayı: 32 (2013), ss.214-233.
17. Mankiw, N. G. (2012). Macroeconomics. Worth Publishers / Palgrave Macmillan.
18. Mehdi, S. & Reza, M. (May 2011). Relationship between government budget deficits and inflation in the Iran's economy. Information Management and Business Review, 2(5), 223-228.
19. Narayan, P.K., Narayan, S. & Prasad, A. D. (2006). Modelling the relationship between budget deficits, money supply and inflation in Fiji. Pacific Economic Bulletin, 21(2), 103-116.
20. Nguyen, V. B. (2015). Effects of fiscal deficit and money M2 supply on inflation: Evidence from selected economies of Asia. Journal of Economics, Finance and Administrative Science, 20, 49-53.
21. Okpanachi, U. M. (2004). Goverment deficit and the inflationary process in Nigeria: 1986-1998. A Thesis in the Depatment of Economics, Faculty of Social Sciences, University of Jos.
22. Şahin, İ. & Karanfil, M., (2015), Türkiye Ekonomisinde 1980-2013 dönemi para arzının enflasyon üzerindeki etkisi. Business and Economics Research Journal, 6(4), 97-113.
23. Samirkas, 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, 2(4): 203-210.
24. Sargent, T. J., & Wallace N. (1981). Some unpleasant monetarist arithmetic. Federal Reserve Bank of Minneapolis Quarterly Review.

25. Serban, M. (2002). Budget deficit and inflation. Academy of Economic Studies, Doctoral School of Finance and Banking, Bucharest. TCMB, www.tcmb.gov.tr.
26. Sims, C. A. (1994). A simple model for the study of the determination of the price level and the interaction of monetary and fiscal policy. Economic Theory, 4(63), 381-399.
27. Sims, C. A. (1998), Econometric implications of the government budget constraint. Journal of Econometrics, 83, 9-19.
28. Tiwari, A., Tiwari, A., & Pandey, P. (2012). Fiscal deficit and inflation: What causes what? The case of India. Journal of International Business and Economy, 13(1), 57-81.
29. Woodford, Michael (1994). Monetary policy and price level determinacy in a cash-in advance economy. Economic Theory, 4, 345-380.
30. Woodford, M. (1995). Price-level determinacy without control of a monetary aggregate. In Carnegie-Rochester Conference Series on Public Policy 43, Bennett T. McCallum and Charles I. Plosser, eds. (Amsterdam: North-Holland): 1-46.
31. Yay, Gülsüm G. (2001). Chicago okulu: Milton Friedman ve monetarism. http://www.libertedownload.com/LD/arsiv/24/16-gulsun-gurkay-yay-chicago-okulu-milton-friedman-ve-monetarizm.pdf
32. Yien, L. C., Abdullah, H., & Azam, M. (2017). Granger causality analysis between inflation, debt, and exchange rate: Evidence from Malaysia. International Journal of Academic Research in Accounting, Finance and Management Sciences, 7(1), 189-196.