

## The Relationship of Budget Deficit with Inflation: A Case Study from Jordan

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### ABSTRACT

This study aims to investigate the effects of government budget deficit on inflation in Jordan, using data for the period 1976-2015. Both the Autoregressive Distributed Lag, ARDL co-integration technique and the Error Correction Model (ECM) methodology were used to demonstrate a long-term and short-term relationship between inflation and explanatory variables. By the means of cutting on government spending and stimulating economic growth to reduce inflation.

JEL Classification: E31; H60.

Keywords: Budget Deficit; Fiscal Deficit; Money Supply; Inflation; GDP.

### 1. INTRODUCTION

The fiscal deficit is one of the biggest obstacles for achieving sustainable development in Jordan. Taking into consideration the shortage of domestic resources and the *trade balance deficit*. This study tries to explain the role of fiscal deficits in inflation. As a result of internal and external factors during 2009-2014 prices became more stable and inflation averaged 3.4%. There were three periods of time when inflation was at 19.5%. First in 1974; due to high oil prices in 1973. Second in 1989; due to the Jordanian Dinar crisis at the end of 1989. And the third in 2008; due to the subprime mortgage crisis at the end of 2007. Other times the budget deficit averaged 4.6% relative to real GDP; where moderate Inflation was relatively high.

In such chronic situation, how is the budget deficit financed for any economy? It is possible that the budget deficit is one of the most important inflationary monetary policies. As the government must pay its bills, as we pay our expenses, in two ways: by increasing revenues —through work or by borrowing. The government also has three more options: imposing taxes, borrowing through the issuance of bonds or printing money to finance its expenses, —called deficit financing. It is a well-known fact that printing money immediately causes inflation. Nevertheless, a budget deficit is not a problem if it finances economic development and therefore raises the productivity of the economy. But is the fiscal deficit the main reason for the high rate of inflation?

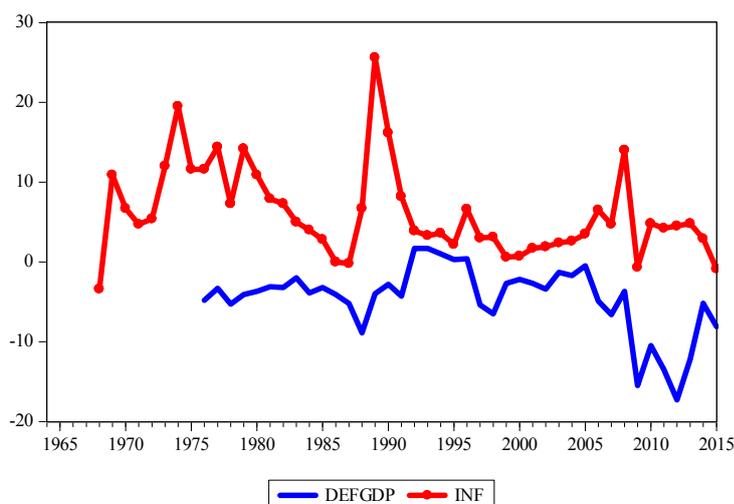


Figure 1.  
Jordan's Budget Deficit and Inflation

*Figure 1* represents the relation between the inflation rate and the budget deficit as a percentage of real GDP. It shows the direction of the budget deficit and the inflation rate during the past 40 years (1976-2015). It displays the direction trend for the inflation rate and the budget deficit. This will be confirmed by an empirical test.

The aim of this study is to demonstrate the long-term and short-term impact of the budget deficit on inflation in Jordan using annual time series data. It attempts to determine the role of the financial sector in explaining inflation in Jordan.

Section 2 reviews the literature on this subject. Section 3 presents the theoretical framework and model specifications. Section 4 reveals experimental results and discusses results. And section 5 presents conclusions and recommendations.

## **2. LITERATURE REVIEW**

The budget deficit is the difference between expenditure and revenue; if an expenditure is greater than revenue, the government will finance this shortfall through several channels, such as printing money or borrowing. Taxation is the major source of revenue in budgets (Katircioglu, 2010). As a result, inflation in the economy will increase. According to Keynes, the increase in government budget deficit will lead to a real increase in interest rates, the price level will rise and affect private investment. When the government budget deficit is financed by printing money, total demand will increase with supply remaining steady, leading to a price spiral. Thus, when the permanent deficit is funded by issuing money, inflation will continue.

Several studies examined the relationship between the short-term and long-term fiscal deficit, including those supporting a causal relationship between the budget deficit and inflation, including:

Erkam and Çetinkaya (2014) attempted to investigate the causality between the budget deficit and the rate of inflation. Using Granger's causality test in the monthly budget deficit and inflation data in Turkey, covering two nominal sub-periods (1987-2013) and (2005-2013). The results indicated a positive causal relationship between the budget deficit and inflation during the inflation period (1987-2013). This causal relationship disappeared during the low inflation period (2005-2013). The study of Anfofum et al. (2015) examined the relationship between inflation and fiscal deficits in Nigeria. The study concluded supported that the fiscal deficit had a long-term equilibrium relationship with inflation. The causal test showed a unilateral relationship from a financial deficit to inflation. They also discovered that the speed of adjusting the dynamic short-term process to long-term equilibrium has been very slow.

In addition, the study of Serfraz and Anwar (2009) explores the relationship between fiscal deficits and inflation and how the fiscal deficit affected inflation during the period 1976-2007. Various types of fiscal deficit have been observed, including deficit financing through external borrowing and internal borrowing. The empirical results of the study indicate a positive correlation between the fiscal deficit and inflation. This study concludes that fiscal deficit financing patterns created inflation in Pakistan.

However, Datta and Mukhopadhyay (2011) found that the relationship between the budget deficit and inflation is contrary to the above, which are important and controversial issues. A one-way causal relationship of inflation was found during 1997-1999 in Indonesia. Thus, economic policy supports a deflationary fiscal policy to control Indonesia's budget deficit. While Samirkaş (2014) disclosed the effects of budget deficit on inflation, economic growth, and interest rates during the years 1980-2013 in Turkey. The results obtained did not indicate any significant long-term correlation amongst the budget deficit, inflation, GDP and interest rates. The causality was tested by Granger Causality Test. The results revealed a positive relationship between the deficit in the budget and interest rates and the correlation between the interest rate and the deficit in the budget. This means that interest rates have significant implications for the budget deficit.

## **3. THEORETICAL FRAMEWORK: FISCAL DEFICITS AND INFLATION RELATIONSHIP**

As this study aims to demonstrate the impact of the government deficit on inflation in Jordan. After reviewing the literature on this aspect, we will use an econometric model that combines classical and Keynesian approaches, and build the econometric model of the fiscal deficit - inflation as follows:

$$Inf = \beta_0 + \beta_1 Def + \beta_2 MS + \beta_3 Y + u \quad (1)$$

Where *Inf* the inflation rate, *Def* the budget deficit, the money supply (M2), *Y* income and *u* the stochastic term, which captures the impact of economic reform programs on the economy during the period represented by the data, and assume that  $\beta_1, \beta_2 > 0$  and  $\beta_3 < 0$ .

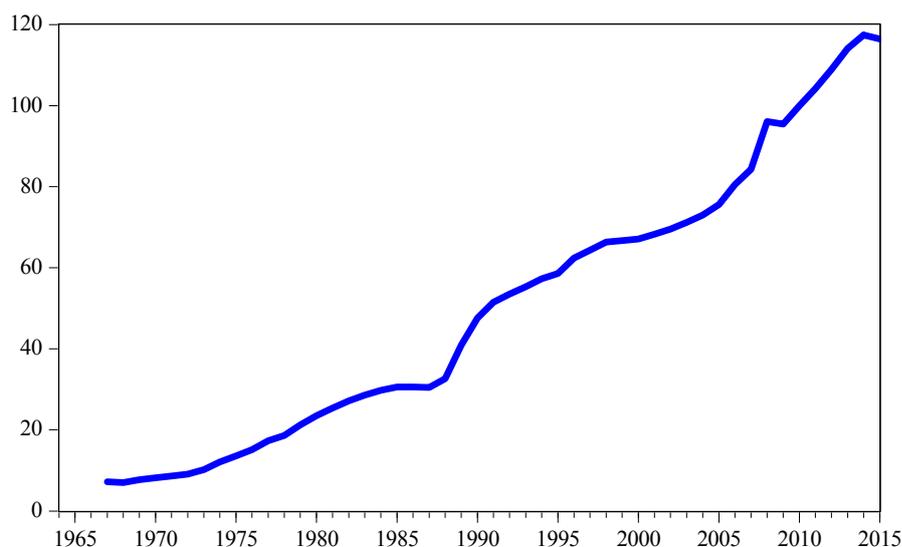
According to the Keynesian model, government deficits increase changes in the levels of key macroeconomic variables. Where the fiscal deficits resulting from the continuous increase in government expenditures or tax reductions increase the aggregate demand. And hence the price level that causes an increase in the rate of interest. Thus, the fiscal deficit will be linked to inflation and high interest rates. Monetary authorities can finance the fiscal deficit by printing money or selling government bonds, which leads to a growth in money supply, which spurs inflation and increases interest rates.

#### 4. RESULTS

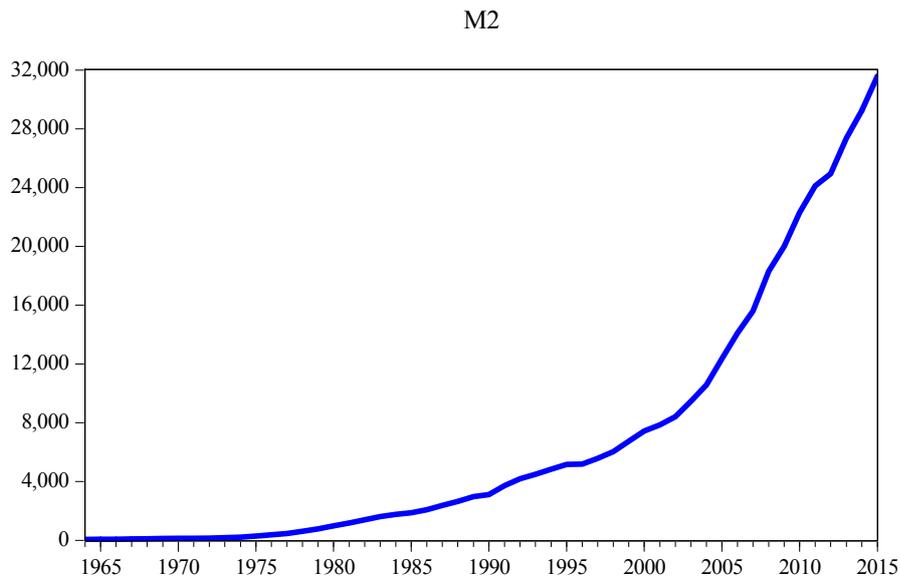
The study used annual data from 1976 to 2015, collected from the Central Bank of Jordan (50 years of completion), 2016. The CPI was used as an indicator of inflation. The M2 is used as an indicator of money supply and  $\log\left(\frac{\text{revenues}}{\text{expenditure}}\right)$  As an indicator of the government's fiscal deficit, and the logarithm of GDP as an indicator of income.

In the beginning, we will inspect the transformations of the study variables using the following graphs:

CPI



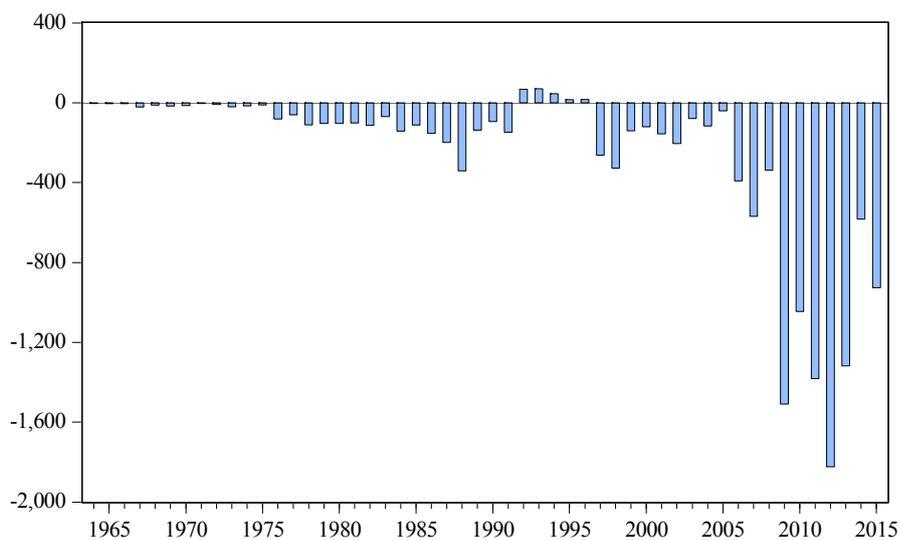
**Figure 2.**  
**Inflation Trends in Jordan**



**Figure 3.**  
**Money Supply Trend in Jordan**

Figure 3 shows the trend of the money supply in Jordan during the period 1964-2015, which was increasing rapidly after the year 2000. Whereas, Figure 2 shows that inflation, as expressed in the consumer price index, witnessed considerable growth in Jordan, particularly after 1989.

In addition, Figure 4 shows the direction of the fiscal deficit during the period 1964-2015. The size of the deficit increased after 2006 and continued to increase.



**Figure 4.**  
**Trends in Fiscal Deficit in Jordan**

After this review, we will study the data and estimate of equation (1). First, we check stationarity data, because the use of nonstationary variables using ordinary least squares regression regressions will yield spurious results (Sodeyfi & Katircioglu, 2016; Katircioglu, 2009). Therefore, the Augmented Dickey Fuller Test, *ADF*, will be used to test for the unit root.

**Table 1. Unit Root Tests**

Variable	Level		First difference	
	ADF statistics	Result	ADF statistics	Result
<i>Def</i>	-4.2188	stationary	-	-
<i>inf</i>	-5.0063	stationary	-	-
<i>M2</i>	-1.7166	not	-2.6374	stationary
<i>Y</i>	-2.6679	not	-3.7508	stationary

Using the unit root test at the norm (Level) and at the First Difference; the fiscal deficit and inflation were stationary at that level, while the money supply and income became stationary after taking the first difference.

Since all variables shown to be co-integrated I(0) and I(1), we will study the long-term relationship using co-integration analysis. But since the variables are integrated from I(0) to I(1), the Johansen method cannot be used (Katircioglu et al., 2017; Katircioglu, 2017; 2010b; 2009b). Instead, the Autoregressive Distributed Lag Model, ARDL was used. Table 2 yields the results:

**Table 2. The ARDL Co-integration Analysis**

<b>Estimated Model</b>	<b>inf=F(Ldef, Lm2, LYr)</b>	
<b>Optimal lag structure</b>	(3, 1, 3, 0)	
<b>F-statistics</b>	<b>4.7100</b>	
<b>Significant level Critical values (t=45)</b>	Lower bounds, I(0)	Upper bounds, I(1)
<b>5 percent</b>	4.35	3.23
<b>10 percent</b>	3.77	2.72

The F statistic in Table 2 indicates that the value of 4.71 is greater than the upper limit of 3.23, rejecting the null hypothesis; variables of the model are co-integrated. This requires estimating the error correction model and estimating the short- and long-term relationship. The result of the estimate was as follows:

**Table 3. ARDL Estimates**

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INF(-1)	0.353145	0.140206	2.518758	0.0168
INF(-2)	-0.108680	0.149711	-0.725929	0.4730
INF(-3)	-0.141023	0.134324	-1.049866	0.3014
LDEF	0.116225	0.067117	1.731669	0.0927
LDEF(-1)	-0.251510	0.066324	-3.792123	0.0006
LM2	9.801801	16.65226	0.588617	0.5601
LM2(-1)	-9.810415	29.18741	-0.336118	0.7389
LM2(-2)	15.66700	28.76388	0.544676	0.5896
LM2(-3)	-9.184684	28.22667	-0.325390	0.7469
LM2(-4)	-38.08750	28.41811	-1.340254	0.1893
LM2(-5)	30.51353	15.21933	2.004919	0.0532
C	12.00066	5.244147	2.288391	0.0287
<b>R<sup>2</sup></b>	0.619	F-statistics	4.394 (.001)	
<b>Adjusted R<sup>2</sup></b>	0.478	Durbin Watson Test	1.580	
<b>Diagnostic tests</b>				
	F-Value	Prob.		
<b>Serial Correlation</b>	3.272	0.1947		
<b>Functional Form</b>	17.829	0.0003		
<b>Normality</b>	11.055	0.0039		
<b>Heteroscedasticity</b>	0.988	0.4761		

Table 3 shows a strong correlation between dependent and independent variables. All diagnostic tests confirm that there is no serial correlation, no error in functional form, and there is no Heteroscedasticity.

Then, short and long-term relationships will be estimated using the error correction model. The results are as follows:

**Table 4. Long Run Results**

Dependent Variable = INF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDEF	0.262913	0.131033	2.006468	0.0549
LM2	0.137839	0.063323	2.176758	0.0384
LYr	-0.313171	0.146891	-2.131990	0.0423
C	1.440855	0.700515	2.056852	0.0495

Table 4 shows that the variables of the fiscal deficit ratio relative to income, the money supply, and real income are statistically significant and explain long-term inflation.

**Table 5. Error Correction Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF)	0.004540	0.002695	1.684461	0.1036
D(INF)	-0.001548	0.002651	-0.583809	0.5642
D(FDEF)	-0.078818	0.089081	-0.884795	0.3841
DLOG(M2)	0.100189	0.219709	0.456006	0.6520
DLOG(M2(-1))	-0.380366	0.298818	-1.272900	0.2139
DLOG(M2(-2))	0.412053	0.166942	2.468248	0.0202
DLOG(GDPR)	-0.242331	0.135101	-1.793708	0.0841
<b>CointEq(-1)</b>	<b>-0.773800</b>	<b>0.130998</b>	<b>-5.906960</b>	<b>0.0000</b>

**Cointeq = INF - (0.2629\*FDEF + 0.1378\*LM2 -0.3132\*LYr +1.4409 )**

Table 5 shows the short-term relationship between inflation and other independent variables. In the short-term error correction model, two conditions must exist: the error correction term value must be negative and significant. The short-term analysis or error correction model shows that the value of error correction or short-term correction from short to long-term is statistically negative and statistically significant, and indicates that the correction speed is 0.7738. The equilibrium position can return to its previous state after 1.29 years of the occurrence of the crisis.

## 5. CONCLUSIONS AND RECOMMENDATIONS

This study attempted to explore the main factors affecting inflation. Returned financial and monetary causes. It pointed the relationship between the government budget deficit (fiscal deficit) and inflation. The ARDL bound testing approach and the Error Correction Model were used to analyze the impact of the fiscal deficit on inflation. The results disclosed that the increase in money supply leads to an increase in inflation, not to mention that a higher income also reduces inflation.

We conclude that the results of the study indicate that the public sector significantly increases the fiscal deficit, and to maintain the stability of prices and to keep the inflation rate at a minimum. The government must spend relative to economic growth rate, which reduces the fiscal deficit leading to a reduction in inflation and so improving the economy.

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Journal of Economic & Management Perspectives ISSN 2523-5338 © International Economic Society

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