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The Relationship between Budget Deficit and Inflation in Iran

Jamaleddin Mohseni Zonuzi*
Mahnaz S.Hashemi Pourvaladi**
Nasrin Faraji***

Abstract

Government budget deficit has been one of the topical issues in the country's historical economic problems. The budget deficit-inflation relationship is not always obvious and it is different between countries. Since government of Iran has consistently run its economy with a budget deficit and high inflation, this paper re-investigate the deficit-inflation nexus in the Iranian economy by using quarterly data for the period of 1990:1-2007:4. To cary out a test of no structural break against an unknown number of breaks in the Iranian macroeconomic variables, we use the endogenously determined multiple break test developed by Bai & Perron (2003). As, there is a structural break in the time series date, we use Perron(1990) unit root test to test of stationarity. We employ Bounds test approach to cointegration proposed by Pesaran et al. (2001) to investigate the long-run relationship between budget deficit and inflation. The key findings from the empirical studies investigating the relationship between the budget deficit and inflation indicated strong evidence towards supporting a significant and positive relationship between budget deficit and inflation in Iran. At the end, we obtained volatility of budget deficit by using GARCH model, and showed that, volatility of budget deficit has a positive effect on the inflation too.

Keywords: budget deficit, inflation, Bounds test, volatility, GARCH, Iran.

1- Introduction

Government deficit has been one of the topical issues in the country's historical economic problems. The relationship between budget deficit and

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* Assistant professor; Department of Economics, Urmia University.
** Graduate student; Department of Economics, Urmia University.
*** Graduate student; Department of Economics, Urmia University.

inflation has acquired a prominent place in literature on monetary economics. For most episodes of high inflation in developing countries, it can be said that the source of inflation is an imbalance in the fiscal sphere. For a long time, economists and policymakers have worried about the relationship between government budget deficit and inflation. These worries stem from the possibility that the government will finance its deficit by borrowing or by printing money. However, the question is this: Do government budget deficit lead to higher inflation? Some countries with high inflation, also have large government budget deficits. This suggests a link between budget deficit and inflation.

Budget deficit is the state that total government expenditures exceed total government revenues. According to Ackay et al.(1996), there are two possible channels through which higher deficit lead to higher inflation. Firstly, the government's borrowing requirements normally increase the net credit demands in the economy, driving up the interest rates and crowding out private investment. The resulting reduction in the growth rate of the economy will lead to a decrease in the amount of goods available for a given level of cash balances and hence the increase in the price level. Secondly, deficit can also lead to higher inflation even when central banks do not monetize the debt when the private sector monetizes the deficits. This occurs when the high interest rates induce the financial sector to develop new interest bearing assets that are almost as liquid as money and are risk free. Thus, the government debt not monetized by the central bank in monetized by the private sector and the inflationary effects of higher deficit policies prevail.

An extensive theoretical and empirical literature has been developed to examine the relationship between the budget deficit and inflation. At a theoretical level, according to Akcay et al. (1996), the correlation from deficit to inflation is generally a difficult one to establish. Hamburger and Zwick (1981) argue that, from the monetarist view, budget deficits can lead to inflation, but only to the extent that they are monetized. Alavirad and Athawale (2005) argue that the basis of theory, the relationship between budget deficit and inflation is extensive. The monetarist theory postulates that money supply drives inflation. In the other theoretical studies, for example, Metzler (1951), Patinkin (1965), Friedman (1968), Sargent and

Wallace (1981), Dywer (1982), and Miller (1983) has argued that government deficit spending is a primary cause of inflation.

On the other hand, some empirical literatures have investigated the relationship between government budget deficit and inflation. For example, Edwards and Tabellini (1991) in their study found that budget deficits are an important determinant of inflation. They used cross section techniques for a wide sample of developed countries. Spinelli (1991) assessed the relationship among these variables for an extended period (1875-1975) in Italy. In doing so, they confirmed the positive long-term causal direction from budget deficit to money growth and from money growth to inflation, emphasizing the effects very according to the degree of central banking independence and the type of monetary policy regime. Evidence from Ackay (1996) study about the relationship between the general level of prices and budget deficit in Turkey shows that, budget deficit growth had a positive effect on increased price levels in Turkey. Solomon and de Wet (2004) studied the relatively high inflation rate and high fiscal deficit for a prolonged period for the economy of Tanzania. The study concluded that " due to monetization of the budget deficit, significant inflationary effects are found for increases in the budget deficit. Alavirad and Athawale (2005) investigate the impact of budget deficit on inflation in Iran, by employing the ARDL model and based on the annual data from 1960 to 1999. The result show that budget deficit has a major impact on inflation in Iran. Albert (2008) in his study investigates the impact of a budget deficit on inflation in Zimbabwe over the period of 1980—2005. Due to massive monetization of the budget deficit, significant inflationary effects are found for increase in the budget deficit. Pekarski (2008) in his study contributes to the literature on budget deficit and inflation in high inflation economies. The main finding of this study is that recurrent outbursts of extreme inflation in these economies can be explained by a certain hysteresis effect associated with public finance. It is also showed that the division of the operational budget deficit into the part that is subject to negative inflation feedback and the part that is inflation-proof, has implication for both the discussion of the inflationary consequences of budget deficit and the proper design of stabilization policy. Lozamo (2008) evidence of the causal long-term relationship between budget deficit, money growth and inflation in Colombia, using the vector error correction model with quarterly data. His conclusion supported by hypothesis would be the most appropriate approach to understanding the dynamics of these variables.

Since government of Iran has consistently run its economy with a budget deficit and high inflation, this paper re-investigate the deficit-inflation nexus in the Iranian economy by using quarterly data for the period of 1990:1-2007:4.

This paper is organized as follows. Section 2 provides the paper econometric methodological. Section 3 presents the empirical results, and finally section 4 concludes.

2- Data and methodological issues

2-1- Data

This paper uses quarterly data of the Iranian economy covering the period of 1990:1-2007:4. Following Solomon and Wet (2004) and Abdul (2008), to estimate the effect of the budget deficit on inflation, we formulate the inflation equation as bellow;

$$inf = f(def, oer, gdp)$$

Where; l, I, (and g are the inflation, budget deficit, official exchange rate and gross domestic product at 1997 constant prices respectively.

All of the data are gathered from central bank of Iran and international financial statistics (IFS). Summary statistics for the series are given in table (1). E-views(6), Microfit(4), and GAUSS software are used.

Table 1: summary statistics for variables, 1990:1-2007:4

	def	Inf	gdp	oer
Mean	-6491.79	20.29417	82155.31	3874.526
Median	-542.65	17.70228	76195.50	1755.000
Maximum	30343.90	63.60000	127157.0	9327.400
Minimum	-57495.80	4.300000	53673.00	64.50000
Std.dev	14655.38	11.06220	19756.63	3516.259
Skewness	-1.462389	1.924752	0.710034	0.654731
kurtosis	5.527166	7.141262	2.406821	1.574490
Jarque-bera	44.82267	95.90622	7.105367	11.24031

The high standard deviation of budget deficit with respect to mean is an indication the high volatility in the budget deficit. So, we will calculate the volatility of budget deficit by using GARCH model, and investigate its effect on the inflation. From the p-values, the null hypothesis that g, i, (, and c are normally distributed at 5% level of significance cannot be rejected.

2-2- Unit Root Tests

2-2-1- Unit Root Tests Without any Structural Break

The characterizes of the time series data, has investigated by employing the standard unit root tests such as, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Ng-Perron (NP) and Kwiatkowski et al. (KPSS) tests using Eviews 6.0 microsoft. The hypotheses of ADF, PP, and NP tests are the same. They assumes that, the series has a unit root. But, the null hypothesis of the KPSS test is stationarity. The results of the standard unit root tests are presented in table (2).

Tabel 2: ADF , PP, NP and KPSS tests for unit root:

Statistics (L)	def	lag	inf	lag	gdp	lag	oer	lag
τ (ADF)	2.66	10	-2.67	0	2.63	3	-0.55	0
τ_T(ADF)	-3.16	6	-2.97	0	0.22	3	-1.95	0
τ(ADF)	3.07	10	-0.50	1	4.46	2	0.69	0
τ (PP)	-6.79	4	-2.74	4	2.49	31	-0.54	1
τ_T (PP)	-9.08	5	-3.01	4	-0.74	9	-1.96	1
τ (PP)	-5.88	4	-0.70	3	6.23	27	0.71	1
τ_μ(kpss)	0.71	6	0.30	6	1.08	6	0.93	6
τ_T(kpss)	0.26	4	0.11	6	0.26	6	0.19	6
$MZ_{a\mu}$(np)	-3870	6	-3.95	1	3.08	3	0.37	0
$MZ_{t\mu}$(np)	-43.98	6	-1.29	1	5.06	3	0.23	0
MZ_{aT}(np)	-1195	6	-8.50	0	-2.57	1	-6.10	0
MZ_{Tt}(np)	-24.45	6	-2.05	0	-0.87	1	-1.74	0
Statistics (FD)	Δdef	lag	Δinf	lag	Δgdp	lag	Δoer	lag
τ_μ (ADF)	-10.44	2	-10.77	0	-10.39	0	-8.47	0
τ_T (ADF)	-3.59	11	-10.71	0	-6.92	2	-8.43	0
τ (ADF)	-10.40	2	-10.82	0	-1.51	5	-8.28	0
τ_μ (PP)	-69.19	61	-10.53	4	-10.49	6	-8.47	1
τ_T (PP)	-81.85	46	-10.48	4	-12.96	15	-8.43	2
τ (PP)	-44.99	69	-10.57	4	-8.81	3	-8.28	0
τ_μ(kpss)	0.14	14	0.11	3	0.35	12	0.09	2
τ_T(kpss)	0.09	14	0.10	3	0.17	31	0.07	2
$MZ_{a\mu}$(np)	-26.78	2	-32.73	0	-33.22	0	-34.99	0
$MZ_{t\mu}$(np)	-3.65	2	-4.04	0	-40.08	0	-4.18	0
MZ_{aT}(np)	-18.97	11	-32.64	0	-32.89	0	-34.97	0
MZ_{Tt}(np)	-3.07	11	-4.03	0	-40.05	0	-4.18	0

Note: .τ_T represents the most general model with a drift and trend; τ_μ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum 3) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255)The critical values are obtained from Mackinnon(1991) for the ADF and PP test and from Kwiatkowski et al(1992)for the KPSS test and from Ng-Perron(2000) for the ng-perron. Tests for unit roots have been carried out in EVIEWS 6.0.

Table (2) shows that different tests has a different results. With ADF, bdef has a unit root at level, and it is stationary at first differences. While, with the PP, KPSS, and NP tests, it is stationary at level. Also, gdp, inf, and oer has a unit root at level, but they are stationary at first differences.

2-2-2- unit root with structural break

These standard unit root tests are biased in favour of identifying data as integrated in the presence of structural break. Then, we use unit root test with structural break. We employ Cosum , Cusum of squares, Chow and Bai & Perron (2003) tests to investigate a presence of structural break in the series. The results of Bai & Perron (2003) test are presented in the appendix A. Table (3), summarizes the results of structural break tests.

Table 3: Resalts of structural break tests

Series / Criterion	def	inf	gdp	oer
Cusum	√	×	×	×
SupF	×	×	×	√
SupF Conditional	×	×	×	×
UDmax-WDmax	×	×	√	√
BIC-LWZ	√	√	√	√
Sequential	√	√	√	√

and × show the presence and no-presence of structural break respectively.

Considering to the structural break tests, we find at least1 break point in all of the series.

Perron(1990) argues that in the presence of a structural break, the standard ADF, PP, KPSS and NP tests are biased towards the nonrejection of the null hypothesis. So, we employ perron(1990) unit root test with structural break. Below, we explain the perron(1990) procedure.

Perron's (1990) procedure is characterized by a single exogenous (known) break in accordance with the underlying asymptotic distribution theory. Perron uses a modified Dickey-Fuller (DF) unit root tests that includes dummy variables to account for one known, or exogenous structural break. The break point of the trend function is fixed (exogenous) and chosen independently of the data. Perron's (1990) unit root tests allows for a break under both the null and alternative hypothesis. Based on Perron (1990), the following three equations are estimated to test for the unit root.

Model(a)

$$x_t = \alpha_0 + \alpha_1 DU_t + d(DTB)_t + \beta t + \rho x_{t-i} + \sum_{i=1}^{p} \varphi \Delta x_{t-1} + \quad (2)$$

Model(b)

$$x_t = \alpha_0 + \gamma DT_t^* + \beta t + \rho x_{t-i} + \sum_{i=1}^{p} \varphi_i \Delta x_{t-1} + \quad (3)$$

Model(c) (4)

Where the intercept dummy D represents a change in the level; $DU_t =$ if ($t >$) and zero otherwise; the slope dummy *I (also I*)* represents a change in the slope of the trend function , $DT^* = t - TB$ (or $DT_t^* = t$ if $t > T$ and zero otherwise; the crash dummy $(DTB) =$ if $t = TB$, and zero otherwise; and is the break date. Each of the three models has a unit root with a break under the null hypothesis, as the dummy variables are incorporated in the regression under the null. The alternative hypothesis is a broken trend stationary process. Table (4) shows the results of Perron(1990) test.

Table 4: Perron (1990) unit root test

series	model	Break point	Dummy variable	Test statistic	Critical value 5%	result
level						
def	(1)	1377q1	Du77q1,dt77q1	-8.9052	-3.76	**I(0)**
def	(2)	1377q1	tt77q1	-10.9402	-3.96	**I(0)**
def	(3)	1377q1	Du77q1,dt77q1,tt77q1	-10.9602	-4.24	**I(0)**
Inf	(1)	1374q4	Du74q4,dt74q4	-3.3667	-3.76	**I(1)**
Inf	(2)	1374q4	tt74q4	-5.4515	-3.87	**I(0)**
Inf	(3)	1374q4	Du74q4,dt74q4,tt74q4	-4.9184	-4.17	**I(0)**
Gdp	(1)	1374q4	Du74q4,dt74q4	-1.7228	-3.76	**I(1)**
Gdp	(2)	1374q4	tt74q4	-3.0639	-3.87	**I(1)**
Gdp	(3)	1374q4	Du74q4,dt74q4,tt74q4	-3.0243	-4.17	**I(1)**
Oer	(1)	1381q1	Du81q1,dt81q1	-1.7495	-3.80	**I(1)**
Oer	(2)	1381q1	tt81q1	-1.6084	-3.85	**I(1)**
Oer	(3)	1381q1	Du81q1,dt81q1,tt81q1	-1.5826	-4.18	**I(1)**
First difference						
infΔ	(1)	1374q4	Du77q1,dt77q1	-11.9342	-3.76	**I(0)**
gdpΔ	(1)	1374q4	Du77q1,dt77q1	-10.5593	-3.76	**I(0)**
gdpΔ	(2)	1374q4	tt77q1	-10.7513	-3.87	**I(0)**
gdpΔ	(3)	1374q4	Du77q1,dt77q1,tt77q1	-10.6258	-4.17	**I(0)**
oerΔ	(1)	1381q1	Du81q1,dt81q1	-4.7252	-3.80	**I(0)**
oerΔ	(2)	1381q1	tt81q1	-7.6776	-3.85	**I(0)**
oerΔ	(3)	1381q1	Du81q1,dt81q1,tt81q1	-4.7117	-4.18	**I(0)**

Du74q4 is a dummy variable due to increase the government expenditure at 1995. Du77q1 is a dummy due to undesirable oil markets and decrease of government revenue at 1998, and du81q1 is a dummy due to the increase of government tax revenue at 2002.

The results of perron(1990) indicates that in the presence of structural break, bc is stationary at level and it is integrated of order 0 – I(0). While, inf, gdp, and oer are integrated of order one – I(1). It is clear from the result of unit root tests, because of the series aren't the same order – they are I(0) and I(1) – we use Bounds test approach to cointegration presented by Pesaran et al. (2001) to investigate the long-run relationship between variables.

2-2-3- Measurement of budget deficit volatility

We find that the best fitting time series model for the Iranian budget deficit includes 1, 2 and 4 of its lags:

$$def = c + \alpha\, def(-1) + \beta\, def(-2) + \delta\, def(-4) + ma(2) + \varepsilon$$

In order to find out whether the residuals are serialy correlated, we use Breus h-Godfrey Serial Correlation Lagrange Multiplier (LM) Test. The result shows that the residuals are not serialy correlated. Morever to test whether there are any remaining ARCH effects in the residuals, we use the LM test for ARCH in the residuals (see, e.g. Engle 1982). The results of the ARCH-LM test expresses that there is ARCH effect in the residuals. The volatility of budget deficit has obtained by using GARCH(1,1) model.

Empirical results

We use Bouds test approach to cointegration developed by Pesaran et al. (2001). This method can be applied irrespective of whether the underlying regressors are I(1) or I(0) or fractionaly integrated. The F-test statistic tests the joing significance of the coefficients on the period lagged levels of the variables in bellow equation;

$$\begin{aligned} Dinf = {} & C_0 + C_{1t} + \alpha_0 inf(-1) + \beta_0\, def(-1) + \gamma_0\, gdp(-1) \\ & + \delta_0\, oer(-1) + \beta_1\, dinf + \gamma_1 Ddef + \delta_1 Dgdp + doer \\ & + DU74q + \varepsilon_t \qquad (6) \end{aligned}$$

$$H_0 : \alpha_0 = \beta_0 = \gamma_0 = \delta_0 = 0$$

$$H_1 : \alpha_0 \neq 0, \qquad \beta_0 = \gamma_0 = \delta_0 \neq 0$$

The asymptotic distribution of critical values is obtained for cases in which all repressors' are purely I(1) as well as when the repressors' are purely I(0) or mutually cointegrated. These hypotheses can be examined using the standard wald or F statistics. The F-test has a non-standard distribution which depends upon: 1) whether variables included in the ARDL model are I(0) or I(1); 2) the number of regressors; 3) whether the ARDL model contains an intercept and/or a trend; 4) the sample size. Two sets of critical values are reported in pesaran et al.(2001). these critical values provide critical value bounds for all classification of the repressors' into purely I(1), purely I(0) or mutually cointegrated. However, these critical values are generated for sample sizes of 500 and 1000 observations and 20000 and 40000 replications respectively and is not suitable for our estimation. Narayan (2005) provides two sets of critical values for sample size ranging from 30 to 80 and for the two polar cases such as Pesaran rt al. (2001): one which assumrs that all the regressors are I(1), and the other assuming that are I(0). It is important to note that the critical values based on large sample size deviates significantly from of small sample size. Critical values for F- statistic are taken from Narayan (2005) and presented in table (5). The lag length (p) for this test is based on Schwarz-Bayessian (SBC) and Akike information criteria (AIC). We use SBC criterion to select the optimal lag length.

Table 5: F- statistic critical values for Bound test

K=3	5%		Calculated F- statistic
	I(0)	I(1)	
F_{IV}	3.60	4.51	14.46**
F_{III}	3.37	4.54	9.18**
F_{V}	3.61	4.63	10.38**

Source: Narayan(2005)

Note: k is the number of regressores for dependent variable in ARDL model, F_{II}, represents the F statistic of the model with no intercept and no trend, F_V, represents the F statistic of the model with unrestricted intercept and trend, and F_{III}, represents the F statistic of the model with unrestricted intercept and no trend.

In order to model (III), model (IV) and model (V), there is a long run relationship between variables under investigation. Possibility, if we do unit root test with more than one structural break, the hypothesis of unit root for gdp, inf, and oer will reject and they will be integrated of same order. So, we employ Johansen and Joselius(1992) test to investigation the long run relationship between variables under investigation too.

The number of cointegration relations by different models are presented table (6). The Johansen test for cointegration between variables under investigation, was employed both the maximum eigenvalues and the trace of the stochastic matrix suggests one cointegration relationship at a 5 percent level of significance between variables in the long run cointegration relationship. Table (7) shows the result of Johansen and Joselius(1992) test.

Table 6: number of cointegration relations by model

Test type	None no intercept no trend	None intercept no trend	Linear intercept no trend	Linear intercept no trend	Quadratic intercept no trend
Trace	2	1	0	0	0
Max-eig	0	0	0	0	0

Critical values based on Mackinnon-Haug-Michelis (1999)

Table 7: Johansen and Joselius (1992) Test

null hypothesis		**Trace statistic**		**max- eigenvalue**	
r>0	r=1	41.009	47.856**	24.685	27.584
r>1	r=2	16.323	29.797	8.797	21.131

According to the results of Bounds test and Johansen and Joselius test, we accept the presence of long-run relationship between variables under investigation. So, to obtain the long-run and short run coefficients, we estimate the ARDL and ECM models. The results of these estimations are presented in tables (8) and (9) respectively.

- indicates the statistical significant at the 5% level.

Also,We estimate long-run coefficient of ARDL(1,0,0,0) specification with estimates of the levels relationship given by ;

$$inf = 2.47 - 1.28\,t + 0.00001\,def - 0.00035\,gdp + 0.00033\,oer - 2.25\,du74q4 \qquad (7)$$

Equation (7): ARDL (2,0,0,0) selected based on SBC, dependent variable is			
regressors	**coefficient**	**Standard error**	**T-ratio(prob)**
inf(-1)	0.615	0.091	6.79(0.000)*
def	-0.000012	0.000063	2.23(0.03)*
gdp	-0.0032	0.0032	3.43(0.02)*
oer	+0.00036	0.00055	-3.651(0.02)*
C	3.65	2.48	2.028(0.04)*
T	0.491	0.237	2.065(0.04)*
Du74q4	-2.39	3.708	-3.342(0.001)*
Du77q1	-1.61	0.384	-1.364(0.178)
$R^2 = 0.78$	$\bar{R}^2 = 0.72$	DW=2.29	

The optimal lag is selected by using SBC criterion. All levels estimates are significant and have the expected signs. As we expected, *gdp* has negative effect on the *inf*. While, *oer* has a positive impact on the *inf*. The main result of this estimation is a positive impact of *def* on *inf*.

Increase of exchange rate lead to external goods more expensive than internal goods. So, export of internal goods increase and it make the excess of balance of payments. Then, central bank increase the money supply, and it cause to high inflation. Inversely, with gdp increasing, the total revenue will be increase and it make more import and deficit of government budget and through demand channel, cause to low inflation. Also, with deficit of government budget, the central bank will issue the money and it make high money growth and inflation.

Also, we has entered the bedget deficit volatility in the ARDL model. The result show that the volatility of budget deficit has a positive effect on the inflation.

The results of short run dynamic coefficient associated with the long run relationships obtained from ECM equation are given in table (9).

Table 9: Error Correction Representation for the Selected ARDL Model

ARDL (2,0,0,0) selected based on SBC, dependent variable is Δ.			
Regressors	**Coefficient**	**Standard error**	**T-ratio(prob)**
Ddef	0.000012	0.000063	2.48(0.03)*
Dgdp	-0.0033	0.0031	3.35(0.02)*
Doer	0.00035	0.00056	-3.64(0.02)*
Dc	2.47	1.95	2.045(0.04)*
Dt	0.489	0.233	2.066(0.04)*
DDu74q4	-2.35	3.655	-3.322(0.001)*
DDu77q1	-1.59	0.381	-1.357(0.185)
Ecm(-1)	-0.39	0.091	-4.254(0.000)*
$ecm = 2.47 + 0.000012ddef - 0.0033dgdp + 0.00035doer + 0.489dt - 2.35ddu74q4$			
R-Squared= 0.53	**R-Bar-Squared= 0.46**	**DW= 1.75**	

All lagged changes in the variables are statistically significant. The error correction term, that is *ecm (-1)* in the estimated equation is significant with theoretically correct signs. The estimated coefficient of *ecm (-1)* indicates that 39 percent of the disequilibrium in the inflation is corrected immediately i.e., in the next season. The changes in the *def* positively affect inflation, over the short-run, as its coefficient is +0.000012. The estimated coefficient of changes in the *gdp* is 0.0033. *Oer* has a positive and significant effect on ι. The results of Granger causality F-test are presented in table(10).

Table 10: Results of Granger causality test

The null hypothesis	**F-statistic**	**Probablity**
def does not granger cause inf inf does not granger cause def	3.29 0.71	0.04 0.48
gdp does not granger cause inf inf does not granger cause gdp	2.73 1.33	0.05 0.26
oer does not granger cause inf inf does not granger cause oer	2.84 0.58	0.05 0.56

According to table (10), there is a unilateral relationship between *def*, *gdp* and *oer* from these variables to *inf* . Also, there is a unilateral cause from budget deficit to inflation.

The preferred inflation function would have to pass a number of diagnostic tests. These tests include Breusch-Godfrey serial correlation test, ARCH heteroskedasticity test and CUSUM stability tests. These tests indicate that there aren't any serial correlation, heteroskedasticity and structural instability in the residual of the inflation function.

Conclusion

This paper re-investigates the empirical relationship between budget deficit and inflation in Iranian economy by using the quarterly data for the period of 1990:1-2007:4. To cary out a test of no structural break against an unknown number of breaks in the Iranian macroeconomic variables, we use the endogenously determined multiple break test developed by Bai & Perron (2003). As, there is a structural break in the time series data, we use Perron(1990) unit root test to test of stationarity. According to unit root tests, the variables under investigation aren't in the same order of integrating, we employ Bounds test approach to cointegration proposed by Pesaran et al. (2001) to investigate the long-run relationship between budget deficit and inflation. The result show that, there is a positive and significant relationship between deficit-inflation in Iran. Also, there is a unilateral relationship between *def*, *gdp* and *oer* from these variables to *inf*. Our finding is in line with Abdul (2008) and Pekarski (2008). With regard to the role of the fiscal deficit, the estimation provide evidence that a one percentage point increase in the budget deficit leads an increase of almost 0.00001 percentage points in the inflation. This implies that inflation bias can be explained by deficit bias in Iran. Based on these conclusion, it seems reasonable to conclude that expansionary fiscal can be inflationary.

References

1- Akcay, O.C., Alper, C.E., and Ozmucur, S. (1996), " Budget deficit, money supply and inflation: Evidence from low and high frequency data for Turkey", *Bogazici University, Department of Economics.*

2- Alavirad, A. and Athawale, S. (2005), " The impact of the budget deficit on inflation in the Islamic Republic of Iran", *Organization of the Peteroleum Exporting Countries (OPEC) Review*.

3- Albert, M. (2008), " The impact of a budget deficit on inflation in Zimbabwe", *Munich Personal RePEc Archive*, No. 24227.

4- Bai, J. and Perron, P. (2003) Computation and analysis of multiple structural change models, *Journal of Applied Econometrics*,No. 18, PP:1-22.

5- Dickey, D.A. and W.A. Fuller (1979). “Distribution of the Estimators for Autoregressive Time Series with a Unit Root,” *Journal of the American Statistical Association*, 74, 427–431.

6- Edwards, S. and Tabellini, G. (1991), “ Explaning fiscal polices and inflation in developing countries”, *Journal of International Money and Finance*, No. 10, PP: 16-48.

7- Friedman, M. (1968), “ The role of monetary policy”, *American Economic Review*, Vol. 58, PP: 1-17.

8- Hamburger, M.J. and Zwick, B. (1981), “ Deficit, money and inflation”, *Journal of Monetary Economics*, No. 7.

9- Keith, S. (2005), “ Do budget deficit cause inflation?” , Business Review.

10-Kwiatkowski, Denis, Peter C. B. Phillips, Peter Schmidt & Yongcheol Shin (1992). “Testing the Null Hypothesis of Stationary against the Alternative of a Unit Root,” *Journal of Econometrics*, 54, 159- 178.

11-Lozano, I. (2008), “ Budget deficit, money growth and inflation: Evidence from the Colombia case”, *Borradores de Economia*, No. 537.

12-MacKinnon, James G. (1991). “Critical Values for Cointegration Tests,” Chapter 13 in R. F.

13-Engle and C. W. J. Granger (eds.), “Long-run Economic Relationships: Readings in Cointegration”, *Oxford: Oxford University Press*.

14-Metzler, L.A. (1951), “ Wealth, saving, and the rate of interest”, *Journal of Political Economy*, Vol. 59, PP: 93-116.

15-Miller, P. (1983), “ Higher deficit policies lead to higher inflation”, *Quarterly Review, Federal Reserve Bank of Minneapolis*, PP: 8-19.

16-Narayan, P.K.(2005) " the saving and investment nexus for china: evidence from cointegration tests", *applied economics*, No. 37, pp: 1979-1990.

17-Ng, Serena and Pierre Perron (2001). “Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power,” *Econometrica*, 69(6), 1519-1554.

18-Pekarski, S. (2008), “ Budget deficit and inflation feedback”, *Core Discussion Paper*, No. 54.

19-Pesaran, M.H., Shin, Y., Smith, R.J.(2001) " Bounds testing approaches to the analysis of level relationships ", *journal of applied econometrics*, 16: 289-326.

20-Phillips, P.C.B. and P. Perron (1989). "Testing for a Unit Root in Time Series Regression," *Biometrika*, 75, 335–346.

21-Sargent, T. and Wallace, N. (1981), " Some unpleasant monetarist arithmetic", *Federal Reserve Bank of Minneapolis Quarterly Review*, No. 5, PP: 1-17.

22-Solomon, M. and De Wet, W.A. (2004), " The effect of a budget deficit on inflation: The case of Tanzania", *South Africa Journal of Economic and Management (SAJEMS)*, Vol. 7, No. 1.

Appendix A

Bai & Perron (2003) structural break test:

inf

nrer	Critical value1%	Critical value2.5%	Critical value5%	Critical value10%	value of test
supfT(1)	6.4853	12.29	10.18	8.58	7.04
supFT (2)	5.8976	9.36	٨.١۴	7.22	6.28
supF T (3)	4.3580	7.60	6.72	5.96	5.21
supF T (4)	3.8774	6.19	5.51	4.99	4.41
supF T (5)	2.5804	4.91	4.34	3.91	3.47
UD max	6.4853	12.37	10.39	8.88	7.46
WDmax		7.7488/13.98	7.3756/11.67	7.0085/9.91	6.6113/8.20
supF(2|1)	3.6858	12.29	10.18	8.58	7.04
supF(3|2)	1.1546	13.89	11.86	10.13	8.51
supF(4|3)	1.4855	14.80	12.66	11.14	9.41
supF(5|4)	0	15.28	13.40	11.83	10.04

note: Bai and Perron(2003) test have been used in uncertainty literature by *Fang et all(2008) and Fang & Miller(2009).*

gdp

nrer	Critical value1%	Critical value2.5%	Critical value5%	Critical value10%	value of test
supfT(1)	12.29	10.18	8.58	7.04	0.6467
supFT (2)	9.36	8.14	7.22	6.28	0.4727
supF T (3)	7.60	6.72	5.96	5.21	4.3924
supF T (4)	6.19	5.51	4.99	4.41	16.3453
supF T (5)	4.91	4.34	3.91	3.47	18.6643
UD max	12.37	10.39	8.88	7.46	18.6643
WDmax	46.7170/13.98	43.7708/11.67	40.0188/9.91	37.8888/8.20	
supF(2|1)	12.29	10.18	8.58	7.04	5.0637
supF(3|2)	13.89	11.86	10.13	8.51	6.3618
supF(4|3)	14.80	12.66	11.14	9.41	29.1187
supF(5|4)	15.28	13.40	11.83	10.04	0

note: Bai and Perron(2003) test have been used in uncertainty literature by Fang et all(2008) and Fang & Miller(2009).

oer

nrer	Critical value1%	Critical value2.5%	Critical value5%	Critical value10%	value of test
supfT(1)	12.29	10.18	8.58	7.04	9.0547
supFT (2)	9.36	8.14	7.22	6.28	21.3658
supF T (3)	7.60	6.72	5.96	5.21	36.2869
supF T (4)	6.19	5.51	4.99	4.41	20.9648
supF T (5)	4.91	4.34	3.91	3.47	13.0081
UD max	12.37	10.39	8.88	7.46	36.2869
WDmax	[illegible]	[illegible]	[illegible]	[illegible]	
supF(2|1)	12.29	10.18	8.58	7.04	25.3181
supF(3|2)	13.89	11.86	10.13	8.51	0.6957
supF(4|3)	14.80	12.66	11.14	9.41	0.3800
supF(5|4)	15.28	13.40	11.83	10.04	0.0668

note: Bai and Perron(2003) test have been used in uncertainty literature by Fang et all(2008) and Fang & Miller(2009).