Middle-East Journal of Scientific Research 8 (1): 257-260, 2011
ISSN 1990-9233

Budget Deficit and Inflation: A Sensitivity Analysis to Inflation and Money Supply in Iran

[1]Ahmad Jafari Samimi and [2]Sajad Jamshidbaygi

[1]Professor of Economics, University of Mazandaran, Babolsar, Iran
[2]M.A. Student in Economics, University of Mazandaran, Babolsar, Iran

Abstract: Investigation The relationship between budget deficit and inflation is one of the most important issues in macroeconomics. The main purpose of the study that is the relationship between budget deficit and inflation which is generally ambiguous from the theoretical perspective. This paper surveyed the relationship between budget deficit and inflation in Iran using the quarterly data covering the period 1990-2008. We have also analyzed the robustness or fragility of this relationship regarding the definitions of inflation and supply money. To do so, we used the simultaneous equation model, including four structural equations for budget deficit, monetary base, money supply and inflation. Our findings indicate a positive and significant impact of the budget deficit on monetary variables and as result on inflation. We have also found a positive and significant impact of price index on budget deficit. Finally regarding the sensitivity analysis our findings support the robustness of our estimation results with respect to definitions of inflation as well as money supply.

Key words: Budget Deficit · Inflation · Seasonal Data · Iran

INTRODUCTION

The purpose of this paper is to show that there is a two-way relationship between inflation and government budget deficit. Also this paper surveyed that this relationship is robust or fragile toward different definitions of inflation and supply money. The link between Budget deficit, Money supply and Inflation is a universal phenomenon and it is peculiar to every government in the world. In other words, while government budget deficit may cause higher inflation, government expenditure and revenue and therefore government budget deficit is itself affected by the inflationary process.Therefore, inflation and budget deficit are both considered as endogenous variables. It is shown that although in general there may be some ambiguity with respect to the effect of budget deficit on inflation and vice versa, but as far as the features of public sector economics in most developing countries are concerned, we have presented that higher budget deficit causes monetary base to increase and this, by increasing money supply raises the rate of inflation. Similarly, as a result of higher inflation, budget deficit increases therefor the process of self-generating inflation continues as long as budget deficit is not being eliminated. The empirical part of this paper, by concentrating on the case of the Islamic Republic of Iran as a typical example of developing countries, supports the above hypothesis. An important and arguable is whether higher government budget deficit are alwayas correlated whith higher inflation. Sargent and Walace [1] maintain that financing government budget deficit by money creation cause higher inflation. But it should be mentioned that there is ambiguity with respect to the relation between budget deficit and inflation because deficit can be financed by borrowing as well as through money creation. Economic theory suggests that the strength of the relationship between government budget deficits and inflation depends on whether monetary policy is independent or dependent relative to fiscal policy. In countries where seigniorage is an important component of government finance, we are likely to find that government budget deficits and inflation are empirically linked. In countries with independent monetary authorities, the link between deficits and inflation is likely to be weaker (By Keith Sill). In general, as far as the financing of government budget deficits is concerned, the following identity can be written.

Corresponding Author: Dr. Ahmad Jafari Samimi, Professor of Economics, University of Mazandaran, Babolsar, Iran.

Government Deficit Fnancing: Therefore, the impact of deficit on inflation depends on how it is financed. According to Easterly and Schmidt-Hebbel [2] money creation causes inflation.Domestic borrowing means that the government increases its demand for available credit, therefore the price of credit that is, interest rate must go up which causes a fall in private investment. In other words, government budget deficits displace or "crowd out" productive private investment.[1] External borrowingleads to a current deficit and sometimes may cause anexternal debt crisis. Following Dornbusch, Sturzenegger and Wolf [3], it can be argued that in economies like most of the developing countries, where money creation is the only way to finance government budget deficit, the budget deficit becomes a principal determinant of money growth and inflation. 3McCallum [4] considers the possible theoreticalvalidity of the following "monetarist hypothesis": that a constant, positive government budget deficit can be maintained permanently and without inflation if it is financed by the issue of bonds rather than money. He has shown that the monetarist hypothesis is defined exclusive of interest payments, but that it is valid under the usual definition. [2]KivilcimMetin [6] in his article analyzed the empirical relationship between inflation and the budget deficit for the Turkish economy by a multivariate cointegration analysis. A single-equation model shown that the scaled budget deficit (as well as income growth and debt monetization) significantly affects inflation in Turkey. Abbas Alavirad [7] analyzed The effect of inflation on government revenue and expenditure: the case of the Islamic Republic of Iran, he concluded that rate of inflation tends to increase nominal government expenditure faster than government revenue. In the country's inflationary condition, this will be increase the government's budget deficit and financing of the fiscal deficit will increase money supply and this tends to increase inflation. Solomon and Wet [8] made a research on Tanzania. They found a strong positive relationship between inflation and budget deficit. They stated that budget deficit has a significant effect on inflation. They also concluded that developing countries should give more importance to inflation because inflation tends to be affected from many economic shocks such as high budget deficit. According to them inflation should be controlled by efficient fiscal policies. Paresh Kumar Narayan, Seema Narayan [9] analyzed relationship between budget deficits, money supply and inflation in Fiji whit Use of four long-run estimators, namely, the OLS, the FMOLS, the DOLS and the ARDL.They found that the money supply has a statistically significant positive impact on inflation in all four estimators. However, deficits have a statistically significant positive impact on inflation in only two of the four estimators by using of Granger F-test, it is resulted that there is unidirectional causality running from money supply to inflation and bi-directional causality between money supply and the deficit and that over the long run both the deficit and money supply 'Granger cause' inflation. Makochekanwa, Albert [10] studied the impact of budget deficit on inflation in Zimbabwe with Using annual data for the Zimbabwean economy for the period 1980 to 2005. He found a significant positive impact of the budget deficit on inflation in Zimbabwe. Marco and Andrew [11] in your study survey relationship between large deficits and inflation in industrialized countries and show that large fiscal deficits in industrialized countries did not coincide with higher inflation, nor did large deficits precede higher inflation. Sahan F. [12] survey relationship between budget deficit and inflation for EU countries and Turkey by annual data for period 1990-2008. He concluded have no long run relationship between deficits and inflation in the developed countries, whereas there is Turkey has a long term relationship among inflation and budget deficit between 1990-2008. TahirMukhtar* Muhammad Zakaria [13] worked on the relationship between budget deficit, money supply and inflation in the case of Pakistan Using the quarterly data covering the period 1960-2007. The study indicates that inflation in Pakistan is mainly attributable to an increase in money supply. There is no significant long-run relationship between inflation and budget deficit.

[1] It should be mentioned that the crowding-out argument is not always correct. If the increased government domestic borrowing results from a tax cut, then the net income after tax (i. e., disposable income) would rise by the same amount. Some of the increase in income (depending on the marginal propensity to save) will be saved. As a result, the borrowing demands of the private sector fall and there is no pressure on interest rates to rise. Penner [5] argues that in reality the correlation between budget deficits and interest rates would most likely be negative

[2] It should be added that there are many problems related to the measurement of budget deficit. These problems occur because it is difficult to measure both government incomes and expenditures. For more information see Boskin [14]

[3] Money supply is defined as currency outside banks plus demand deposits held by the public

Data and Model: The data employed are seasonal observation for sample period running from 1990 to 2008. The data source is from the Central Bank of Islamic Republic of Iran for our variables: Government Budget deficit (BD), Money Supply(M), Inflation(p), Money Base(MB) and GDP(Y).

Having discussed the above two-way relation between inflation and government budget deficit in developing countries, the following four simultaneous equations models explain the process by which inflation and budget deficit are related to each other. See Handroyiannis, & Papapetrou [15] and Jafari Samimi [16]:

$$1 \quad \frac{dMB}{MB} = f(BD)$$

$$2 \quad \frac{dM}{M} = g\left(\frac{dMB}{MB}\right)$$

$$3 \quad \frac{dP}{P} = h\left(\frac{dMB}{MB}\right)$$

$$4 \quad BD = Q\left(\frac{dP}{P}\right)$$

Where, $\frac{dP}{P}$ denotes the rate of inflation, $\frac{dM}{M}$ is the rate of money supply growth.[3] $\frac{dMB}{MB}$ is the rate of growth of monetary base[4] and BD is government budget deficit.

Equation (1) shows that an increase in government budget deficit raises the monetary base.[5] Equation (2)relates the rate of money supply growth to the rate of increase in monetary base. In other words, this equation shows that an increase in the rate of growth of monetary base implies an increase in the rate of volume of money supply. Equation (3) indicates that an increase in the rate of money supply results in an increase in the rate of inflation.[6] Finally, equation (4) examines the impact of inflation on the nominal budget deficit. It is assumed that an increase in inflation rate results in an increase in government budget deficit.

As it is seen in our four simultaneous equations model, all variables are considered to be endogenous. The following specific form has been used to estimate the two-way relation between budget deficit and inflation:[7]

Table 1: Sensitivity analysis to inflation and money definition[8]

		Estimated results with definition of inflation (CPI)	Estimated results with definition of inflation (WPI)	Estimated results with definition of inflation (GDP Deflator)	Estimated results with new definition of money supply (M2)
Variables		Coefficient	Coefficient	Coefficient	Coefficient
Equation (1)	BD	2.85E-06**(2.164455)	2.85E-06**(2.164455)	2.85E-06**(2.164455)	3.01E-06*(3.188845)
	Log MBt-1	0.980836*(74.80568)	0.980836*(74.80568)	0.980836*(74.80568)	0.954567*(55.39829)
	R2	0.996315	0.996315	0.996315	0.996315
Equation (2)	Log MBt	1.198174*(3.316504)	1.198174*(3.316504)	1.198174*(3.316504)	0.594481*(2.613650)
	Log Mt-1	0.820782*(8.645658)	0.820782*(8.645658)	0.820782*(8.645658)	0.960825*(16.96807)
	Log MBt-1	-1.008650*(-3.048511)	-1.008650*(-3.048511)	-1.008650*(-3.048511)	-0.549235*(-3.068204)
	R2	0.997076	0.997076	0.997076	0.997076
Equation(3)	Log Mt	0.691533*(6.962299)	0.653042*(6.139687)	0.532755*(3.217211)	0.227495**(2.232776)
	Log Yt	0.097046(1.098462)	0.139708(1.476700)	0.218124(1.480889)	0.486300*(4.857777)
	R2	0.985865	0.984189	0.959482	0.984189
Equation(4)	LogPt	5021.127(2.659078)	4896.922*(2.653372)	4949.658*(2.640031)	7822.983*(2.847257)
	BDt-1	-0.013389*(-0.122874)	-0.009184(-0.084688)	-0.000345(-0.003194)	0.020995(0.198816)
	BDt-2	0.498076(4.574230)	0.501642*(4.624620)	0.511150*(4.737314)	0.588633*(5.601732)
	R2	0.450479*	0.448957	0.438788	0.714254

Figures in parenthesis denote the t-statistics. * denotes significance at tile 1 percent level and **denotes significance at the 5percent level and ***denotes significance at the 10 percent level

[4] Monetary base consists of currency held by the public plus reserves (i.e., currency held by bank plus commercial bank deposits held by central bank)

[5] Since changes in monetary base are mainly due to the increase of foreign reserves as well as government bonds held by central bank

[6] It is assumed that real output cannot adjust itself to higher aggregate demand caused by increase in money supply which is usually true for most developing countries. This equation can be interpreted as an application of the quantity theory of money

[7] In this paper is taken to be the base of all logarithms

$$1 \quad \log MB_t = \alpha_0 + \alpha_1 BD_t + \alpha_2 \log MB_{t-1} + U_{1t}$$

$$2 \quad \log M_t = \beta_0 + \beta_1 \log MB_t + \beta_2 \log M_{t-1} + U_{2\square}$$

$$3 \quad \log P_t = \delta_0 + \delta_1 M_t + \delta_2 \log Y_t + U_{2t}$$

$$4 \quad BD_t = \lambda_0 + \lambda_1 \log P_t + \lambda_2 \log BD_{t-1} + U_{4t}$$

Where the expression P (Price index). Y_t is the real GDP. MB_t , M_t, $\log P_t$ and BD_t are endogenous variables. Mb_{t-1}, M_{t-1}, Bd_{t-1} and Y_t are exogenous variables and U_{it} (i= 1,2,3,4) are the error terms.

Estimation Results: We estimated and compared the model toward different prices index (CPI, WPI and GNP Deflator) and also toward new definition of money supply with using the 2SLS method in Table (1).

We use the t-test to Survey that relationship between budget deficit and inflation is robust or fragile toward different definitions of prices index and supply money.

H_0 : $b_{cpi} = b_{wpi}$
H_1 : $b_{cpi} \neq b_{wpi}$

$$t = \frac{b_{epi} - b_{wpi}}{S_{bepi} - b_{ppi}}$$

CONCLUSION

This paper analyzed the relationship between budget deficit and inflation in Iran using a simultaneous equation system for the period. 1990-2008. we have also analyzed the robustness or fragility of this relationship regarding the definitions of inflation and supply money. Our findings indicate a positive and significant impact of the budget deficit on monetary variables and as result on inflation. We have also found a positive and significant impact of price index on budget deficit. Finally regarding the sensitivity analysis our findings support the robustness of our estimation results with respect to definitions of inflation as well as money supply.

REFERENCES

1. Sargent, T. and N. Wallace, 1985. Some unpleasant monetarist arithmetic. Federal Reserve Bank of Minneapolis Quarterly Review, 2: 15-31.
2. Easterly, W. and K. Schmidt-Hebbel, 1993. Fiscal deficits and macroeconomic performance in developing countries. The World Bank Research Observer, pp: 211-37.
3. Dornbusch, R., F. Sturzenegger and H. Wolf, 1990. Extreme Inflation: Dynamics and Stabilization. Brookings Paper on Economic Activity, pp: 1-84.
4. McCallum, B.T., 1984. Are bond financed deficits inflationary? A. Ricardian Analysis. J. Political Economy, pp: 123-35.
5. Penner, R.G., 1988. The consequences of persistent large budget deficits. In: H. Cavanna, (Ed.), Public sector deficits in GECD countries. London: Macmillan Press.
6. KivilcimMetin, 1989. The Relationship between Inflation and the Budget Deficit in Turkey. J. Business & Economic Statistics, 16(4): 412-422.
7. Alavirad, A. and S. Athawale, 2005. The Impact of the Budget Deficit on Inflation in the Islamic Republic of Iran. OPEC Review.
8. Solomon, M. and A. Wet, 2004. The Effect of a Budget Deficit on Inflation: The Case of Tanzania. SAJEMS NS, 7(1).
9. Narayan, Paresh Kumar, Narayan, Seema, 2006, Modeling the relationship between budget deficits, money supply and inflation in Fiji, Pacific Economic Bulletin , vol .21 no 2 , pp 103-116.
10. Makochekanwa, A., 2010. The Impact of a Budget Deficit on Inflation in Zimbabwe. MPRA Paper No. 24227, posted 03. August 2010.
11. Marco, B. and R. Andrew, 2010. What is the relationship between large deficits and inflation in industrialized countries?. Federal Reserve Bank of Chicago 2010.
12. Sahan, F., 2010. A Panel Cointegration Analysis of Budget Deficit and Inflation for EU Countries and Turkey. Empirical Studies in Social Sciences. 6th International Student Conference, Izmir University of Economics, Izmir Turkey (2010).
13. Mukhtar, T. and M. Zakaria, 2010. Budget Deficit, Money Supply and Inflation: The Case of Pakistan. Privredna Kretanja I Ekonomska Politika 122 / 2010.
14. Boskin, M., 1982. Federal government deficits: Some myths and realities. American Economic Review" Papers and Proceedings, 72: 296-303.
15. Handroyiannis, G. and E. Papapetrou, 1994. Co integration, Causality and Government Budget inflation relationship in Greece. Applied Economic Letters, 1: 204-206.
16. Jafari Samimi A., 2000. A Two-Way Relation Between Inflation and Public Sector Economics: Theory with an Application to the Case of Islamic Republic of Iran. Journal of Humanities, 7(1&2): 8-15.

[8] Broad money is defined as M1 plus Quasi-money