Impact of the Primary Budget Deficit on the Nominal Long Term Interest Rate Yield on Tax Free Municipal Bonds

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ABSTRACT

This study empirically investigates the impact of the federal budget deficit on the nominal interest rate yield on high grade long term tax free municipal bonds. Within a system that includes income tax rates, international capital flows, and the primary budget deficit, which excludes net interest payments by the Treasury, cointegration and error-correction model estimation leads to the conclusion that the primary budget deficit acted to raise this interest rate yield over the 1973-1996 study period but that the causality was not bi-directional.

Keywords: *Primary Deficit; Tax Free Interest Rate; Crowding Out.*

1. INTRODUCTION

In the U.S., there was a brief experience with federal government budget surpluses during the 1998-2001 period. However, given the 2001 recession, sluggish economic growth since 2001, and budgetary demands involving proposed further income tax cuts on the one hand and the "war on terrorism" in the aftermath of the terrorist attacks on the U.S. on September 11, 2001 on the other hand, the specter of federal government budget deficits, potentially huge ones, has raised its ugly head once again. As Alan Krueger (2003) observes, budget deficits have re-emerged as a major economic concern.

The impact of deficits on interest rates has been studied extensively [Barth, Iden and Russek (1984; 1985), Barth, Iden, Russek, and Wohar (1989), Carlson and Spencer (1975), Cebula (1988; 1997), Cebula and Belton (1993), Cukierman and Meltzer (1989), Feldstein and Eckstein (1970), Findlay (1990), Hoelscher (1983; 1986), Holloway (1988), Johnson (1992), Ostrosky (1990), Saltz (1998), Swamy, Kolluri, and Singamsetti (1990), Tanzi (1985), Zahid (1988)]. These studies typically are couched within IS-LM or loanable funds models or variants thereof. Many of these studies find that the government budget deficit acts to raise longer term rates of interest while not significantly affecting shorter term rates of interest. Since capital formation is presumably much more affected by long term than by short term rates, the inference has often been made that budget deficits may lead to "crowding out" [Carlson and Spencer (1975), Cebula (1985), Krueger (2003)].

A large portion of this literature ignores net international capital flows, thereby neglecting the interest-rate impact of such flows in the global economy and raising the question of a possible omitted-variable bias [Penner (1987)]. Moreover, an even larger portion of this literature ignores income tax rates, thereby raising the question of omitted-variable bias on another level [Cf. see Cebula and Belton (1993) and Tanzi (1985)]. This omission seems especially serious since such tax rates arguably can profoundly influence private sector spending and savings decisions, and hence *tax collections, unemployment, unemployment benefits,* and *budget deficits.*

Potentially more important, the deficit measures adopted most commonly in this literature, the N.I.P.A. total budget deficit, the structural budget deficit, and the cyclical budget deficit, all include interest payments on the national debt. This presence of interest payments on the national debt in the budget-deficit measure raises the possibility of a fundamental misspecification. Namely, the interest rate is

typically treated in these studies as the "dependent" variable whereas interest payments on the national debt are also a major component of arguably the key *explanatory* variable, i.e., the budget deficit, with causality typically characterized as flowing from the deficit to the interest rate. Thus, interest rates appear on both sides of the estimating equation. To address this problem, this study adopts the primary budget deficit, which excludes interest rate payments from the deficit measure.

This study seeks to investigate the budget deficit/long-term tax free interest rate relationship after accounting for these three potential problems. The emphasis on the tax-free interest rate yield reflects in part a relative neglect of this interest rate measure in this literature. Emphasis on the tax free yield also reflects the need for policymakers to understand better the impact of their policies on state and local government entities, entities whose debt lacks the broader financial market appeal of U.S. Treasury issues. The study adopts cointegration and error-correction estimation to investigate the possibility that the direction of causality between federal budget deficits and the long term tax free interest rate may be bi-directional rather than simply bi-directional. In addition, the model formally adopts the primary budget deficit as the deficit variable so as to avoid a possible misspecification. Using the primary deficit should permit an analysis of whether there is an actual economic impact of the deficit on the long term interest rate and not merely an accounting relationship reflecting the "mechanical" payment of interest on the national debt. Finally, the model includes net international capital inflows as well as a federal personal income tax rate measure so as to avoid omitted-variable bias. Using seasonally adjusted quarterly data, the study period is 1973.2-1996.4. We begin with 1973.2 because this is the quarter by which the system of fixed exchange rates (Bretton Woods) had effectively collapsed. Thus, over the entire study period, there effectively is a uniform exchange rate system in place. Furthermore, since there was no entirely satisfactory way to allow for the numerous provisions of and complex impacts of the Balanced Budget Act of 1997, the study period ends in 1996.4.

Section 2 provides the framework for the empirical analysis. Section 3 defines the variables in the empirical model and describes the data, including the measurement of the expected inflation. Sections 4 and 5 provide the empirical results, whereas an overview of the study findings is found in Section 6.

2. THE BASIC FRAMEWORK

In developing the underlying framework for the empirical analysis, we first consider the following intertemporal government budget constraint:

$$ND_{t+1} = ND_t + G_t + F_t + AR_tND_t - T_t \quad [1]$$

where:

ND_{t+1} = the national debt in period t+1
ND_t = the national debt in period t
G_t = government purchases in period t
F_t = government non-interest transfer payments in period t
AR_t = average effective interest rate on the national debt in period t
T_t = government tax and other revenues in period t

The total government budget deficit in period t (TDt) is the difference between ND_{t+1} and ND_t:

$$TD_t = ND_{t+1} - ND_t = G_t + F_t + AR_tND_t - T_t \quad [2]$$

Rather than focusing on the total deficit, this study focuses on the primary budget deficit, which excludes interest payments made by the Treasury. The primary deficit (PD_t) is given by:

$$PD_t = TD_t - AR_tND_t = ND_{t+1} - ND_t - AR_tND_t = G_t + F_t - T_t \quad [3]$$

One can incorporate I, the federal income tax rate; M2, the growth rate of the real M2 money supply; TF, the nominal average interest rate yield on tax free long term high grade municipal bonds; and EAR, the *ex ante* real short term taxable interest rate yield, into the model, as follows:

$$F = f(M2, TF,...),\ f_{m2} < 0,\ f_{TF} > 0 \quad [4]$$

$$T = g(M2, I, TF, EAR,...), g_{M2} > 0, g_1 >=< 0, g_{TF} < 0, g_{EAR} > 0 \quad [5]$$

$$G = h(TF, ...),\ h_{TF} >= 0 \quad [6]$$

It is hypothesized in this study that plausible factors influencing F, T, and G may well include long-term interest rates, such as the nominal interest rate yield on long term municipals (TF). If TF were to rise, as a practical matter, then other markets competing for long term loanable funds, such as the corporate bond and home mortgage markets, would presumably be faced with higher nominal long term rates as well, due to financial market competition. To the extent that these higher long-term nominal interest rates lead to reduced real economic activity, tax collections might fall and government transfers might increase. Even *discretionary* government purchases might be increased and/or tax rates decreased to offset any recessionary trend, especially in an election year. The *potential* outcome: an increased primary deficit.

Based on the conventional wisdom, *ceteris paribus,* a rise in M2 is expected (albeit with a time lag) to accelerate economic activity and therefore to decrease F and to increase T, thereby lowering the primary deficit, PD. In addition, in theory, the higher the income tax rate, the higher the level of tax collections, *ceteris paribus,* and hence the lower the primary deficit. On the other hand, to the extent that a higher income tax rate either reduces real purchases by reducing disposable real income and/or induces income tax evasion [Feige (1994)1, tax collections could actually decline. Accordingly, the net impact of 1 on PD is unclear. Finally, the higher the ex *ante* real *short term taxable* interest rate, EAR, the higher the aggregate level of taxable income and hence the higher the level of tax collections should be, *ceteris paribus.* Thus, the primary deficit is likely to be a function of M2, I, TF, and EAR, such that:

$$PD = j(M2, I, TF, EAR,...) \quad [7]$$

where:

$$j_{M2} < 0, J_1 >=< 0, j_{TF} > 0, j_{EAR} < 0 \quad [8]$$

The intertemporal budget constraint model above focuses on determinants of the primary deficit. Based extensively on Hoelscher (1986), but on Barth, Iden, and Russek (1985) and Cebula (1988; 1997) as well, to explain the determination of the nominal interest rate yield on the long-term municipal bonds, including the impact of the primary deficit on same, a simple open-economy loanable funds model is adopted in which the long-term interest rate is determined by an equilibrium of the following form:

$$D+C+M=S+PD \quad [9]$$

where:

D = real domestic demand for long-term municipal bonds
C = real net international capital inflows (as above)
M2 = real domestic money supply growth (as above)
S = real domestic supply of long-term municipal bonds
PD = real net government borrowing, as measured by the primary budget deficit (as above)

In this framework, it is expected

$$D= D(EAR, EP, I, TF,...),\ D_{EAR} < 0, D_{EP} < 0,\ D_1 > 0,\ D_{TF} > 0 \quad [10]$$

$$S = S(EAR, EP, TF,...),\ SEAR > 0,\ S_{EP} > 0,\ S_{TF} < 0 \quad [11]$$
$$C = C(EAR,...),\ C_{EAR} > 0 \quad [12]$$

Variable EP represents the expected future inflation rate. It is expected that, in principle paralleling Barth, Iden, and Russek (1985), Cebula (1988; 1997), and Hoelscher (1986), the real domestic demand for long term tax free municipal bonds is a decreasing function of the ex *ante* real short-term rate whereas the real domestic supply of long-term tax free municipal bonds is an increasing function of the *ex ante* real short-term taxable interest rate, *ceteris paribus.* These signs reflect the competition between long-term tax free markets and short term taxable markets. In addition, as suggested in Penner (1987, p. 123), it is expected that "...high real interest rates...would attract massive inflows of international capital;" this accounts for the expected positive sign on GEAR. On the other hand, it seems unlikely that nominal tax-free rates *per se* would have a major direct impact on net international capital inflows, given that they yield direct tax advantages to domestic (U.S.) citizens and firms. According to the conventional wisdom, the demand for bonds is a decreasing function of EP, whereas the supply of bonds would be an increasing function of EP, *ceteris paribus.* Next, the higher the federal income tax rate, the greater the demand for long term tax free municipals, as investors substitute tax free instruments for taxable ones, *ceteris paribus.* Finally, the demand for long term municipal bonds is an increasing function of the tax free interest rate yield, *ceteris paribus,* whereas the supply is a decreasing function of the tax free interest rate yield, *ceteris paribus* (conventional wisdom).

Substituting equations [10], [11], and [12] into equation [9] and solving for EAR yields:

$$TF = TF(PD, M2, C, EAR, I, EP) \quad [13]$$

such that:

$$TF_{PD} > 0,\ TF_{M2} < 0,\ TF_{c} < 0,\ TF_{EAR} > 0,\ TF_{1} < 0,\ TF_{EP} > 0 \quad [14]$$

The first of these expected signs is positive in order to reflect the traditional argument that, when the government attempts to finance a budget deficit, it forces interest rates upwards as it competes with the private sector to attract funds from the financial markets, *ceteris paribus.* The expected negative sign on the second partial reflects the fact that a greater real money supply growth provides a larger source of loanable funds and indeed may act to offset the interest rate effects of budget deficits, *ceteris paribus.* The expected sign on the capital flows variable is negative because net capital inflows absorb debt issues and presumably help offset the effects of primary budget deficits [Cebula and Belton (1993)], *ceteris paribus.* The positive sign on TFEAR reflects the hypothesis that a higher *ex ante* real short term interest rate will force up the longer term tax free rate due to financial market competition, *ceteris paribus.* A higher federal income tax rate will act to raise the demand for tax free issues, thereby raising their prices and lowering their yields, *ceteris paribus.* Finally, per the conventional wisdom, the greater the expected inflation rate, the greater the long-term nominal interest rate yield, *ceteris paribus.*

3. VARIABLES AND DATA

The first step in the analysis is to develop an appropriate empirical measurement of *expected inflation.* This determination is essential to the specification of both variables EP and EAR. One possibility is to adopt the well-known Livingston survey data. However, as observed by Swamy, Kolluri, and Singamsetti (1990, p. 1013) there may be serious problems with the Livingston series:

> "Studies by some psychologists have shown that the heuristics people have available for forming expectations cannot be expected to automatically produce expectations that come anywhere close to satisfying the normative constraints on subjective probability judgments provided by the Bayesian

> theory...failure to obey these constraints makes Livingston...data incompatible with...stochastic law.. ."

Accordingly, following the lead by Swamy, Kolluri, and Singamsetti (1990), rather than using the Livingston series, the study adopts a distributed lag model on actual inflation to construct the values for the *expected inflation rate,* EP_t, for quarter t. In particular, to construct the values for EP_t, a four-quarter distributed lag model of actual inflation (as measured by the annualized percent rate of change of the CPI, 1996=100.0) was used.

Based on the framework expressed above, the following variables are included in the analysis:
EP_t = the expected inflation rate of the CPI in quarter t, expressed as a percent per annum

EAR_t = the *ex ante* real average interest rate yield on 52 week U.S. Treasury bills in quarter t, expressed as a percent per annum (EAR_t = the nominal average interest rate yield in quarter t on 52 week U.S. Treasury bills minus expected inflation)

PDY_t = the ratio of the seasonally adjusted nominal *primary* federal budget deficit in quarter t to the seasonally adjusted nominal GDP in quarter t, as a percent

TF_t = the nominal average interest rate yield on long-term Moody's Aaa-rated municipal (tax free) bonds, as a percent annum

I_t = the maximum marginal federal personal income tax rate in quarter t, as a percent

$M2_t$ = the percent change in the seasonally adjusted real M2 money supply in quarter t, expressed at an annual rate

CY_t = the ratio of the seasonally adjusted nominal net international inflow of capital in quarter t to the seasonally adjusted nominal GDP in quarter t, as a percent.

The primary deficit is scaled by the GDP level, as are net international capital inflows; this is because the sizes of the deficit and international capital flows should both be judged relative to the size of the economy [Hoelscher (1986), Cebula (1997), Holloway (1986), Ostrosky (1990)]. The variable I_t represents the personal income tax rate variable, I, in the model developed above. Since municipal bonds would clearly yield greater tax benefits to those individuals subject to the higher marginal federal personal income tax rate, I_t is simply the maximum marginal federal personal income tax rate. The study period, using quarterly data, is 1973.2-1996.4.

The data sources are, as follows:

Board of Governors of the Federal Reserve System: http://www.federalreserve.gov/Releases/H15/data;
The Council of Economic Advisors (1974, Table C-58; 1979, Table B-65; 1984, Table B-67; 1989, Table B71; 1992, Table B-69; 1995, Table B-72; 1998, Table B-71; 2002, Table B-73);
Bureau of Labor Statistics, Tables 1.1 and 3.2:
http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp?Selected=N;

Tax Facts, Urban Institute, Brookings Institution, 2002:
http://www.taxpolicycenter.org/TaxFacts/individual/schedule.cfm.

4. EMPIRICAL ANALYSIS

The results of the Phillips Perron test for stationarity for each variable in levels and in first differences are reported in Table 1. The choice of lag length was determined using the Schwarz-Bayesian criterion.

TABLE 1: PHILLIPS-PERRON UNIT ROOT TEST STATISTICS

Variable	Levels	First Differences
PDY	-1.45	-10.08**
TF	-1.60	-5.06**
EAR	-2.00	-8.61**
I	-1.79	-9.68**
M2	-1.44	-8.56**
EP	-2.12	-4.51**
CY	-1.98	-8.52**

**Statistically significant at the one percent level.

The statistics in Table 1 reveal that all seven series in this analysis contain a unit root in levels, but are stationary in first differences. As a result, all causality tests must be performed in first differences. Furthermore, to determine the correct specification of the causality test, we must test for cointegration among the variables. This is accomplished using the Johansen (1990) cointegration test. To perform the cointegration test, we must first determine the appropriate lag-length to be used to estimate the VAR (Vector Auto-Regressive) model below:

$$[Y_t] = [a] \sum_{i=1}^{p} [b_i][Y_{t-i}] + [u_t] \qquad [15]$$

where [ ] indicates a matrix, [a] is the matrix of constant terms, and $[u_t]$ is the matrix of stochastic error terms. The lag length p is so chosen that it minimizes the final prediction error using log-likelihood ratio tests and ensures that all u_t are white noise. In the present model, *p* was determined to be 4.

To begin the cointegration analysis, the results of the trace and maximum eigenvalue tests, using p = 4 are provided in Table 2.

TABLE 2: BASIC COINTEGRATION TEST RESULTS

	Trace Test		Maximum Eigenvalue Test	
Rank	L.L.R.	1% c.v.	L.L.R.	1% c.v.
None	142.46**	119.80	49.34**	47.15
At most 1	90.12	90.45	36.54	41.00

**Statistically significant at the one percent level.
L.L.R. is log likelihood ratio and C.V. is critical value.

Using the one percent level of significance as the appropriate criterion, the trace and maximum eigenvalue test statistics both reveal the existence of a single equation that describes the long run relationship among the seven variables in the model. Accordingly, testing for causality among the variables requires the use of the error-correction model (ECM), which in this case must be estimated including the cointegrating equation in order to avoid misspecification. Table 3 provides the coefficients and t-statistics for the normalized cointegrating equation. These results imply that the tax-free interest rate yield is positively related to the primary deficit.

TABLE 3: **NORMALIZED COINTEGRATION EQUATION**

Variable	Results
Intercept	-6.21
TF_{t-1}	1.00000
CY_{t-1}	-71.44
	(-0.97)
PDY_{t-1}	-167.2**
	(-8.39)
L_{t-1}	+1.67
	(+3.27)
EP_{t-1}	-3.38**
	(-5.90)
$M2_{t-1}$	+0.645#
	(+1.77)
EAR_{t-1}	-1.068**
	(-8.46)

**Statistically significant at the one percent level;
#Statistically significant at the ten percent level.

The next step in the analysis is the estimation of the error-correction model (ECM) for the two emphasized variables in this study. Testing for causality between PDY_t and TF_t in the ECM requires not only checking the statistical significance of the lagged independent variables, but also checking the statistical significance of the error-correction terms. Thus, we proceed with testing for causality by estimating the full ECM used to test for cointegration. This ECM contains 4 lags of each exogenous variable, a constant, and the error-correction term/equation (CointEq). The parameters of the ECM are estimated using OLS, correcting for heteroskedasticity using Newey-West heteroskedasticity-consistent standard errors and covariances.

5. ECM RESULTS

The estimate for the primary deficit variable is:

$$vPDY_t = 0.07 - 0.05467vPDY_{t-1} + 0.2566vPDY_{t-2} + 0.116\ vPDY_{t-3} + 0.092\ vPDY_{t-4}$$
(-0.43) (+1.97)* (+0.88) (+0.83)

$$- 0.00027\ vTF_{t-1} - 0.0014\ vTF_{t-2} - 0.00002\ vTF_{t-3} + 0.00062\ vTF_{t-4}$$
(-0.19) (-1.15) (-0.02) (+0.50)

$$- 0.0033\ vEAR_{t-1} + 0.00093\ vEAR_{t-2} - 0.00117\ vEAR_{t-3} - 0.00122\ vEAR_{t-4}$$
(-2.42)** (+0.58) (-0,85) (-1.04)

$$+ 0.3465\ vCY_{t-1} - 0.086\ vCY_{t-2} - 0.33998\ vCY_{t-3} - \textit{0.43684}\ vCY_{t-4}$$
(+1.54) *(-0.42)* *(-1.56)* (-2.00)*

$$- 0.00128\ vI_{t-1} + 0.0588\ vI_{t-2} + 0.0204\ vI_{t-3} + 0.04159\ vI_{t-4}$$
(-0.07) (+3.12)** (+0.89) (+1.83)#

$$- 0.003\ vEP_{t-1} - 0.0099\ vEP_{t-2} + 0.0017\ vEP_{t-3} - 0.00477\ vEP_{t-4}$$
(-0.60) (-1.61) (+0.32) (-0.84)

$$- 0.0005\ vM2_{t-1} + 0.0003\ vM2_{t-2} - 0.00032\ vM2_{t-3} - 0.00175\ vM2_{t-4} + 0.00286\ CointEg \quad [16]$$
(-0.43) (+0.26) (-0.31) (-1.87)# (+4.23)**

R^2 = 0.60, F=3.25, LI=365.79

**Statistically significant at 1% level; *statistically significant at 5% level; #statistically significant at 10% level. Terms in parentheses are t-values and "v" is the first-differences operator.

In equation [16], the estimated coefficient on the cointegrating equation is positive and significant at the one percent level. Furthermore, as shown in equation [16], the coefficients on the lagged vTF variables all fail to be statistically significant at acceptable levels. Thus, there is no compelling evidence whatsoever of any positive causal impact of the nominal tax free interest rate yield on the primary deficit. The estimate for the nominal tax-free interest rate yield is:

$$vTF_t = 0.02 + 38.56\ vPDY_{t-1} + 26.44\ vPDY_{t-2} + 33.83\ vPDY_{t-3} + 32.1\ vPDY_{t-4}$$
$$(+2.69)^{**} \quad (+1.80)^{\#} \quad (+2.27)^{*} \quad (+2.55)^{**}$$

$$- 0.4629\ vTF_{t-1} - 0.15\ vTF_{t-2} - 0.4847\ vTF_{t-3} - 0.3475\ vTF_{t-4}$$
$$(-2.95)^{**} \quad (-1.11) \quad (-3.53)^{**} \quad (-2.51)^{**}$$

$$+ 0.53\ vEAR_{t-1} + 0.1856\ vEAR_{t-2} + 0.0907\ vEAR_{t-3} + 0.3528\ vEAR_{t-4}$$
$$(+3.46)^{**} \quad (+1.01) \quad (+0.58) \quad (+2.67)^{**}$$

$$+ 12.578\ vCY_{t-1} - 37.41\ vCY_{t-2} + 23.535\ vCY_{t-3} - 2.31\ vCY_{t-4}$$
$$(+0.50) \quad (-1.60) \quad (+0.96) \quad (-0.09)$$

$$+ 1.70\ vI_{t-1} - 1.76\ vI_{t-2} - 0.24\ vI_{t-3} - 3.1298\ vI_{t-4}$$
$$(+0.86) \quad (-0.82) \quad (-0.09) \quad (-1.22)$$

$$+ 1.41\ vEP_{t-1} + 1.41\ vEIp_{t-2} - 0.399\ vEP_{t-3} + 1.60\ vEP_{t-4}$$
$$(+2.48)^{*} \quad (+2.02)^{*} \quad (-0.66) \quad (+2.51)^{*}$$

$$0.3057\ vM2_{t-1} + 0.083\ vM2_{t-2} - 0.31\ vM2_{t-3} + 0.0955\ vM2_{t-4} + 0.206\ CointEq$$
$$(-2.24)^{*} \quad (+0.62) \quad (-2.68)^{**} \quad (+0.90) \quad (+2.69)^{**}$$

R^2 = 0.50, F= 2.22, LI=-59.77 [17]

To begin with, in equation [17], the estimated coefficient on the cointegrating equation is positive and significant at the one percent level. In addition, the coefficients on vPDYt-1, vPDYt-3 and VPDYt-4 are statistically significant at the one, five, and one percent levels, respectively, with positive signs. Based on these results, it appears that the primary budget deficit positively caused the nominal interest rate yield on long term high grade tax free municipals over the study period. For the interested reader, based on the results in estimate [17], the nominal tax free interest rate yield also appears to have been positively caused by the ex ante real short term interest rate and expected inflation, whereas it appears to have been negatively caused by monetary policy.

6. CONCLUSION

The conventional wisdom argues that, *ceteris paribus,* the federal budget deficit acts to elevate the nominal long term rate of interest. Despite the appearance and high visibility of Ricardian Equivalence arguments and studies based thereupon, a number of studies in recent years have provided empirical support for the conventional wisdom.

The present study has used cointegration and error-correction model (ECM) techniques to investigate the causality relationship between the federal budget deficit and the nominal tax free interest rate yield on long-term municipal bonds. To avoid a possible misspecification, (1) the primary budget deficit, which excludes Treasury net interest payments, is adopted as the federal budget deficit measure, (2) a federal income tax rate measure is included in the system, and (3) net international capital flows are included in the analysis. The use of the primary deficit permits evaluation of whether there may exist economic reasons (above and beyond interest simply paid on the national debt) for an impact of the nominal long term interest rate on the budget deficit. Emphasis on the nominal tax free interest rate yield on long-term municipal reflects (a) the comparative lack of attention on this interest rate measure in this literature and (b) the need for policymakers to better understand the impact of federal budget deficit conditions and policies on state and local government finances.

In this study, strong empirical support based on the ECM estimation is provided indicating that the primary budget deficit ***does*** act to raise the nominal interest rate yield on long term high grade municipals. However, there is no evidence that the tax free interest rate yield influences the primary deficit. Thus, it appears that there does ***not*** exist a bi-directional relationship between the nominal tax free interest rate yield on long-term municipal bonds and the primary budget deficit of the federal government over the 1973:2-1996.4 study period.

In conclusion, it appears that factors elevating the primary federal budget deficit act to raise the cost of municipal borrowing, presumably through increasing the competition for loanable funds. This confirms the validity of Alan Krueger's (2003) statement that federal deficits cause interest rates to rise. Moreover, federal government policies that affect the primary budget deficit cannot be viewed in a vacuum since they impact profoundly on the finances of state and local governments and the agencies and commissions thereof.

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