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Government Budget Deficit and Long-Term Interest Rate Yields in Jordan

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Abstract

The paper is aimed at investigating the main factor that influences the long-term interest rate yields in Jordan. That is the government budget deficit. The importance of which is that such knowledge would help not only financial managers with their capital and operational decisions, but also bank asset/liability management and risk. For this purpose, the paper examines the effect of the government budget deficit and other factors on the ex post interest rate yield on long-term bonds in Jordan during the period (2000-2013). The multi-regression results show that government budget deficit and real personal tax rate variables are statistically significant. This indicates that, after controlling for other variables, there is a significant impact of budget deficit on long term interest rate in Jordan. This result is in line with the theory and the literature.

Key Words: *Government Budget, Deficit, Long Term, Interest Rate, Jordan.*

Introduction

Understanding the factors affecting long-term interest rate yields is a crucial element of not only financial management decisions, but also of financial risk management decisions, including risk exposures in banks and capital markets. Long-term interest rate yield affects corporate profit as well as growth. The factors stimulating long-term interest rate yields shape many corporate decisions, including the discounting factor for computation of present value of the cash-flows, types and timing of capital financing, sales projection, and hence working capital requirements (see, for example, Lamont (1997)). In addition, knowing the factors that affect long-term interest rate yields is a critical element of bank asset/liability management, and hence managing interest rate, since interest rate movements affect bank earnings and value (see, for example, Schrand (1997)).

Theoretically, Irving Fisher, in 1930, was among the first to explain the interest rates movement in what becomes well-known as a Fisher Effect. It indicates that all market interest rates tend to rise and fall with the rate of inflation.

Thus,

$$K_n = K^* + IP \qquad (1)$$

Where: K_n is the nominal interest rate, K^* is the real interest rate, and IP is the expected inflation rate (Francis and Ibbotson, 2002, p. 596).

Financial economists (see, for instance, Shiller and Siegel (1977)) show that market interest rates have a tendency to vary directly with large movements in the general price level. While it is possible to find periods of years when Fisher Effect works very well, it is also possible to find periods of years when Fisher Effect does not work at all. In the short-run, however, the market interest rates may not respond at all or might respond inversely to movements in the general price level (Francis and Ibbotson, 2002, p. 600). This deviation from Fisher Effect can be attributed to other explanatory factors that affect the long-term interest rate yields. Thus, Fisher Effect can be re-written as:

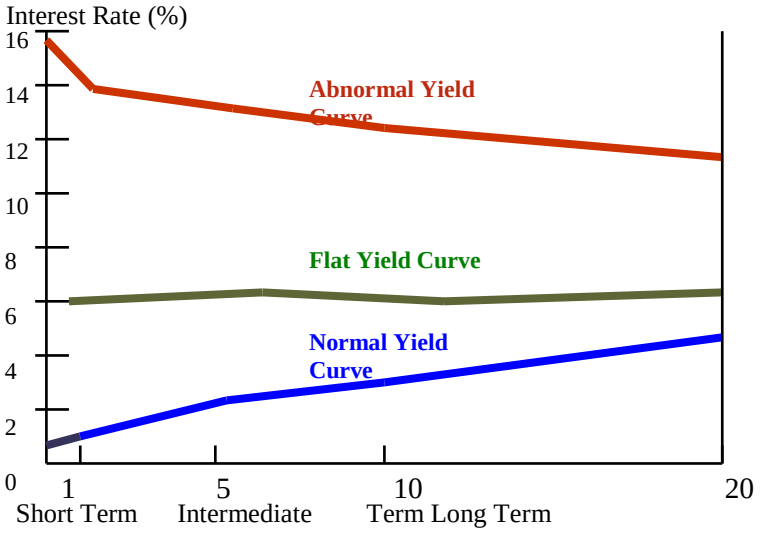
$$K_n = K^* + IP + \varepsilon_t \qquad (2)$$

Where: ε_t represents other explanatory factors.

When Fisher Effect works very well, $\varepsilon_t = 0$; otherwise $\varepsilon_t > 0$.

Other interest rate theories are devoted to explain the term structure of the interest rates, *i.e.* the yield curve. These are (1) The Expectations Theory, which asserts that the shape of the yield curve depends on investors' expectations about future inflation rates. (2) The Liquidity Preference Theory, which states that lenders prefer to lend short-term than long-term loans. Thus they will lend short-term funds at lower rates than long-term funds. (3) Market Segmentation Theory, which argues that each borrower and lender has a preferred maturity and that the slope of the yield curve depends on the supply of and demand for funds in the long-term market relative to the short-term one (Besley and Brigham, 2005, p.54). Figure (1) exhibits three shapes of the yield curve: (i) Normal, when long-term K_m > short-term K_n . (ii) Flat, when long-term K_m = short-term K_n, and (iii) Abnormal yield curve, when long-term K_m < short-term K_n.

Figure (1) Shapes of the Yield Curve



Source: Besley & Brigham (2005)

Moreover, it can be argued that fluctuations of long-term bond prices are more volatile than short-term ones, even though short-term interest rates fluctuate more than long-term ones. That is because the capital gain (loss) of the long-term issues, resulted from the difference between the market value and the par value, is divided by more years than for shorter-term issues (Graddy and Spencer, 1990, p. 329).

There is a consensus among economists that the other explanatory factors that affect the long-term interest rates include the business cycle, national monetary policy, foreign trade balance and most importantly the government budget deficit. This latter factor is of the interest of this study.

The objective of the study is to investigate the main factor that influences the long-term interest rate yields. That is the government budget deficit. For this purpose, the study examines the effect of the government budget deficit and other factors on the ex post interest rate yield on long-term bonds in Jordan.

Literature Review

Numerous studies have shown that budget deficits lift up interest rate yields. Boskin (1987) argued that deficits raise interest rates directly, by increasing the demand in credit markets; and indirectly via the uncertainty over the state of the economy. Cebula (2003) provides updated evidence on causality of budget deficits and real interest rates. MacAvoy (2003) suggested that budget deficits may lead to "crowding out" private investment, and Krueger (2003) anticipated that budget deficits crowding out investment in new plants and equipments for many coming years. It has been found out that most of the empirical literature was carried out in developed countries. This study seeks to fill the gap in the literature by using data from an emerging economy, *i.e.* Jordan.

The Methodology

Empirical literature has used a general model, such that:

$$K_n = f(GBD) \qquad (3)$$

Where: GBD is the government budget deficits.

However, most of the literature has misspecified the model when included interest payments on outstanding government debt in the budget deficits. This in turn indicates that interest rate appears on both sides of the equation, *i.e.* the independent factor (GBD) as well as the dependent one (Kn). Interest charge is a major component of the government debt, which is resulted from multiplying the outstanding government debts with interest rates. In addition, most studies have ignored the income tax rate, which is a major factor affecting not only the type of bonds purchased, but also the volume of bond purchased. This study tries to correct these two misspecifications in examining the causal effect of government budget deficit on raising the interest rate yield on long-term bonds, expressed in the following model:

$$int\_r = a + b1*pdif3ym + b2*tax\_r + b3*intrepo\_r + b4*m2\_rg + b5*cfinym + e \qquad (4)$$

Where:
int_r = Real Prime Lending Rate
pdif3ym = Primary Deficit/GDPm
tax_r = Calculated Real Personal Tax Rate
intrepo_r = Real Interest Rate on Repo
m2_rg = Calculated Real Money Supply Growth Rate
cfinym = Inflows/GDPm

The Data

The following tables and figures present the data used in the study.

Table (1) the government local debt and the interest expenses actually paid (in million JDs) during the period (2000-2013)

1	4	5	6=5/4
Year	Local Govt. Debt	Interest on Local Govt. Debt	Calculated Interest Rate on Local Debt
Year	LGD	IntLGD	EARlgd
2000	944.0	48.6	5.1%
2001	1,152.0	57.6	5.0%
2002	1,335.0	59.3	4.4%
2003	1,704.0	61.4	3.6%
2004	1,834.0	63.6	3.5%
2005	2,437.0	94.2	3.9%
2006	2,163.0	132.8	6.1%
2007	2,946.0	169.2	5.7%
2008	4,911.0	248.5	5.1%
2009	5,791.0	303.9	5.2%
2010	6,852.0	310.9	4.5%
2011	8,915.0	333.9	3.7%
2012	12,678.0	483.1	3.8%
2013	13,440.0	634.7	4.7%
All Data Sources are from CBJ Annual F			

Table (2) Government Tax and Non-Tax Revenues, Grants, Current and Capital Expenditures and Deficits (in million JDs) during the period (2000-2013)

1	7	8	9=7+8	10	11=9+10	12	13	14=12+13	15=14-11
Year	Non-Tax Domestic Revenues	Tax Revenues	Govt Tax & Non-Tax Domestic Rev	Foreign Grants to Govt	Total Revenues	Govt Current Exp	Govt Capital Exp	Total Govt Exp	Calculated Deficit / Surplus Including Grants
Year	NonTaxRev	TaxRev	DomRev	Aid	TRev	CExp	KExp	TExp	Def(Exp-Rev)
2000	679.4	961.9	**1,641.3**	391.2	**2,032.5**	1,718.3	335.8	**2,054.1**	**21.6**
2001	662.2	996.4	**1,658.6**	433.4	**2,092.0**	1,912.5	403.8	**2,316.3**	**224.3**
2002	643.8	1,000.3	**1,644.1**	491.9	**2,136.0**	1,899.9	496.3	**2,396.2**	**260.2**
2003	592.4	1,083.2	**1,675.6**	937.4	**2,613.0**	2,163.7	646.1	**2,809.8**	**196.8**
2004	718.4	1,428.8	**2,147.2**	811.3	**2,958.5**	2,377.8	802.7	**3,180.5**	**222.0**
2005	796.0	1,765.8	**2,561.8**	500.3	**3,062.1**	2,908.0	630.9	**3,538.9**	**476.8**
2006	1,030.9	2,133.5	**3,164.4**	304.6	**3,469.0**	3,118.1	794.1	**3,912.2**	**443.2**
2007	1,156.0	2,472.1	**3,628.1**	343.4	**3,971.5**	3,743.9	842.6	**4,586.5**	**615.0**
2008	1,617.3	2,758.0	**4,375.3**	718.3	**5,093.6**	4,473.4	958.5	**5,431.9**	**338.3**
2009	1,307.9	2,879.9	**4,187.8**	333.4	**4,521.2**	4,586.0	1,444.5	**6,030.5**	**1,509.3**
2010	1,275.1	2,986.0	**4,261.1**	401.7	**4,662.8**	4,746.6	961.4	**5,708.0**	**1,045.2**
2011	1,136.7	3,062.2	**4,198.9**	1,215.0	**5,413.9**	5,739.5	1,057.1	**6,796.6**	**1,382.7**
2012	1,375.5	3,351.4	**4,726.9**	327.3	**5,054.2**	6,202.8	675.4	**6,878.2**	**1,824.0**
2013	1,466.7	3,652.4	**5,119.1**	639.1	**5,758.2**	6,050.4	1,015.0	**7,065.4**	**1,307.2**
All Data Sources are from CBJ Annual Reports									

Figure (2) GDP, Local Government Debt, Revenues and Expenditures during the period (2000-2013)

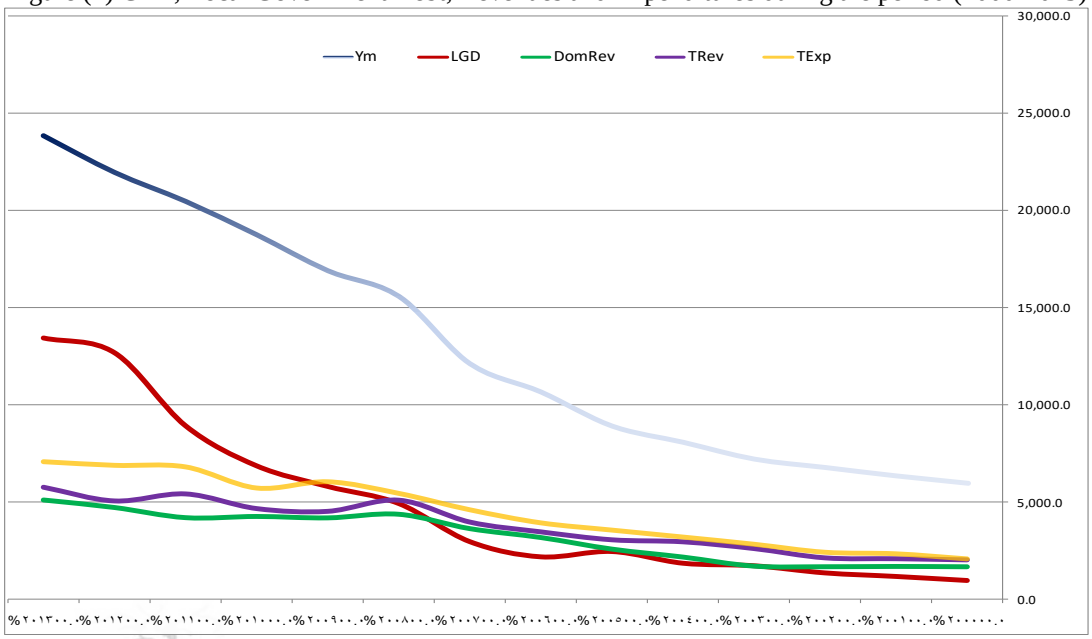


Table (3) The Calculated Government Local Debt and Deficit and the Primary Defict (in million JDs) during the period (2000-2013)

1	15=14-11	16	17=4+14-11	18=17-4	19=18-5	20=15-5
Year	**Calculated Deficit / Surplus Including Grants**	Interest on Foreign Debt	**Calculated Local Debt (t+1)**	**Calculated Govt Deficit**	**Primary Govt. Deficit**	**Primary Govt. Deficit**
Year	**Def(Exp-Rev)**	**IntFD**	**LGD(t+1)**	**Def(LGDt+1-EARlgd)**	**PDef1**	**PDef2**
2000	**21.6**	244.5	**1,131.6**	**187.6**	**139.0**	**-27.0**
2001	**224.3**	220.4	**965.6**	**-186.4**	**-244.0**	**166.7**
2002	**260.2**	192.1	**1,376.3**	**41.3**	**-18.0**	**200.9**
2003	**196.8**	208.9	**1,595.2**	**-108.8**	**-170.2**	**135.4**
2004	**222.0**	165.4	**1,900.8**	**66.8**	**3.2**	**158.4**
2005	**476.8**	172.9	**2,056.0**	**-381.0**	**-475.2**	**382.6**
2006	**443.2**	185.0	**2,913.8**	**750.8**	**618.0**	**310.4**
2007	**615.0**	198.1	**2,606.2**	**-339.8**	**-509.0**	**445.8**
2008	**338.3**	103.9	**3,561.0**	**-1,350.0**	**-1,598.5**	**89.8**
2009	**1,509.3**	88.3	**5,249.3**	**-541.7**	**-845.6**	**1,205.4**
2010	**1,045.2**	86.7	**7,300.3**	**448.3**	**137.4**	**734.3**
2011	**1,382.7**	95.6	**7,897.2**	**-1,017.8**	**-1,351.7**	**1,048.8**
2012	**1,824.0**	99.9	**10,297.7**	**-2,380.3**	**-2,863.4**	**1,340.9**
2013	**1,307.2**	101.8	**14,502.0**	**1,062.0**	**427.3**	**672.5**

All Data Sources are from CBJ Annual Reports

Figure (3) Government Local Debt and Interest Payments during the period (2000-2013)

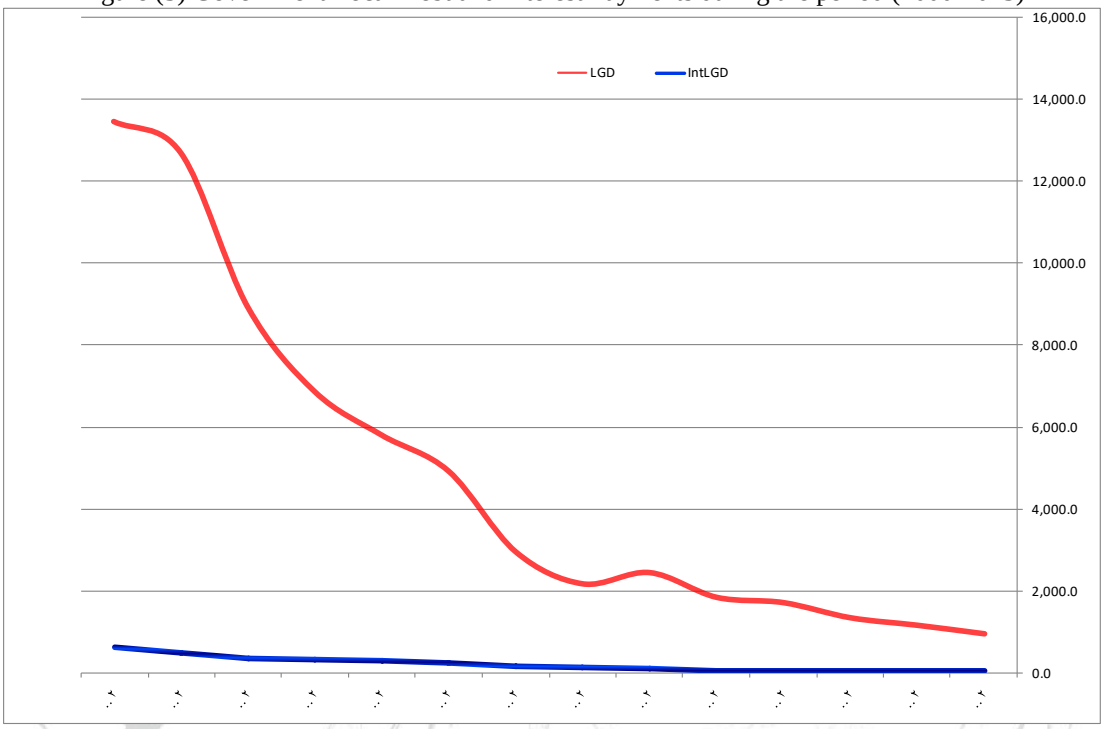
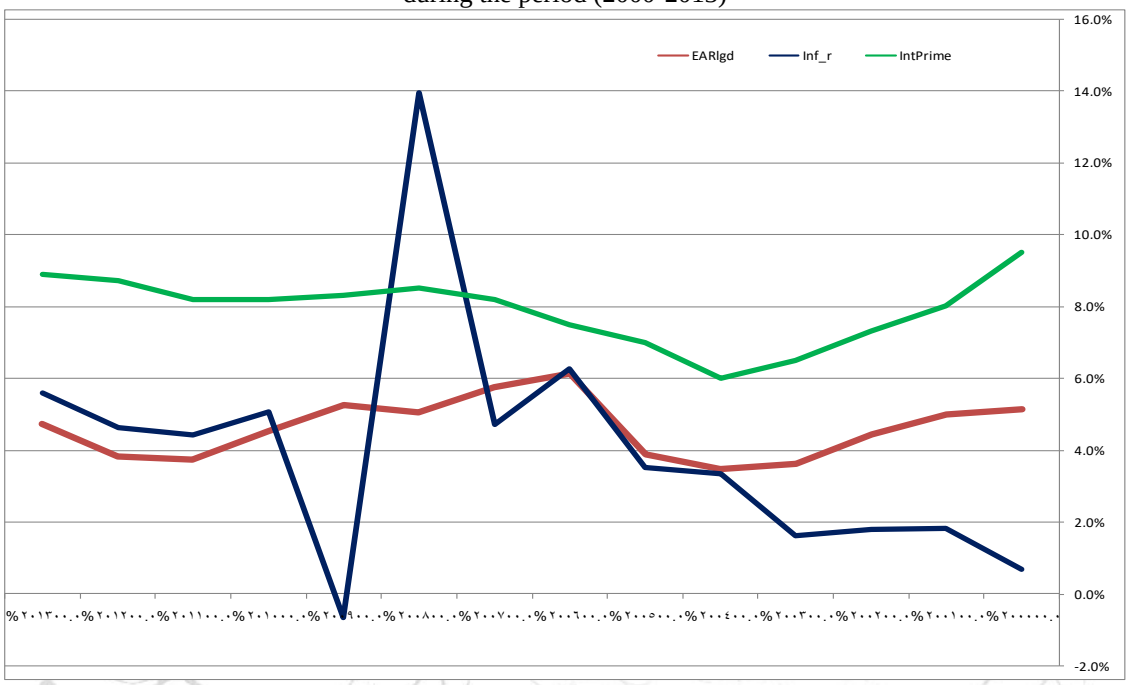


Table (4) The Main Interest Rates and Inflation Rate during the period (2000-2013)

1	22=21/2	23	24	25	26=23-25	27	28	29	30=30-25
Year	**Primary Deficit/GDPm**	Prime Lending Rate	Interest Rate on Repurchase Agreements	**Calculated Inflation Rate**	**Real Prime Lending Rate**	**Calculated Real Money Supply Growth Rate**	**Calculated Real Personal Tax Rate**	**Inflows/GDPm**	**Real Interest Rate on Repo**
Year	**PDif3Ym**	**IntPrime**	**IntRepo**	**Inf_r**	**Int_r**	**M2_rg**	**Tax_r**	**Cfin/Ym**	**IntRepo_r**
2000	**-0.0045**	0.0950	0.0750	**0.0068**	**0.0882**	**0.0951**	**0.0892**	**-0.0442**	**0.0682**
2001	**0.0262**	0.0800	0.0600	**0.0182**	**0.0618**	**0.0398**	**0.0907**	**-0.0041**	**0.0418**
2002	**0.0296**	0.0730	0.0550	**0.0179**	**0.0551**	**0.0524**	**0.0868**	**-0.0391**	**0.0371**
2003	**0.0187**	0.0650	0.0350	**0.0160**	**0.0490**	**0.1083**	**0.0941**	**-0.1364**	**0.0190**
2004	**0.0196**	0.0600	0.4750	**0.0335**	**0.0265**	**0.0833**	**0.1142**	**-0.0246**	**0.4415**
2005	**0.0429**	0.0700	0.7500	**0.0352**	**0.0348**	**0.1343**	**0.1281**	**0.1101**	**0.7148**
2006	**0.0291**	0.0750	0.8500	**0.0626**	**0.0124**	**0.0786**	**0.1265**	**0.1283**	**0.7874**
2007	**0.0367**	0.0820	0.6750	**0.0470**	**0.0350**	**0.0591**	**0.1325**	**0.1367**	**0.6280**
2008	**0.0058**	0.0850	0.0600	**0.1394**	**-0.0544**	**0.0334**	**0.1184**	**0.0835**	**-0.0794**
2009	**0.0713**	0.0830	0.0450	**-0.0067**	**0.0897**	**0.1001**	**0.1127**	**0.0358**	**0.0517**
2010	**0.0391**	0.0820	0.0400	**0.0506**	**0.0314**	**0.0640**	**0.1140**	**0.0412**	**-0.0106**
2011	**0.0512**	0.0820	0.0425	**0.0442**	**0.0378**	**0.0371**	**0.1065**	**0.1138**	**-0.0017**
2012	**0.0610**	0.0870	0.0475	**0.0462**	**0.0408**	**-0.0119**	**0.1096**	**0.1682**	**0.0013**
2013	**0.0282**	0.0890	0.0425	**0.0559**	**0.0331**	**0.0411**	**0.1117**	**0.0861**	**-0.0134**

All Data Sources are from CBJ Annual Reports

Figure (4) Effective Interest Rate, Bank Lending Prime Rate and Inflation Rate during the period (2000-2013)



The Analysis

This study uses time-series data, summarized in the tables above, in a multiple regression model to investigate the impact of government budget deficit on the long term interest rate yields in Jordan during the period (2000-2013). It examines the operational effect of the government budget deficit as measured relative to the size of the economy.

Table (5) Stata© Regresion Results of the Impact of Budget Deficit on the Long Term Real Interest Rate Yield in Jordan during the period (2000-2013)

Source	SS	df	MS	Number of obs	=	14
Model	.011115466	5	.002223093	F(5, 8)	=	**3.98**
Residual	.004471329	8	.000558916	Prob > F	=	0.0414
				R-squared	=	0.7131
				Adj R-squared	=	**0.5338**
Total	.015586795	13	.001198984	Root MSE	=	.02364

int_r	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
pdif3ym	**0.9177146**	0.3930574	**2.33**	**0.048**	.0113226	1.824107
tax_r	**-2.585015**	0.9289095	**-2.78**	**0.024**	-4.727084	-.4429455
intrepo_r	0.0312227	0.0354135	0.88	0.404	-.0504409	.1128863
m2_rg	0.4528765	0.3165198	1.43	0.190	-.2770194	1.182772
cfinym	0.1092554	0.188256	0.58	0.578	-.3248637	.5433745
_cons	0.2515738	0.0887878	2.83	0.022	.0468288	.4563188

According to the initial analysis of the Jordanian government budget deficit, it is expected that the government budget deficit will have an impact on the long term interest rate yields. Table (5) reports the regression results, using STATA©. The real long term interest rate yield (int_r) is the dependent variable and the government budget deficit (pdif3ym) is the independent variable.

The results show that regression coefficient for the government budget deficit and real personal tax rate variables are statistically significant indicating that, after controlling for other variables, there is significant impact of budget deficit on long term interest rate in Jordan. This result is in line with Boskin (1987) and Cebula (2003).

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