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Recent Evidence on the Impact of Federal Government Budget Deficits on the Nominal Long Term Mortgage Interest Rate in the U.S.

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Abstract

This study provides recent empirical evidence on the impact of the federal budget deficit on the nominal long term mortgage interest rate yield in the U.S. The study is couched within a loanable funds model that includes the cost to financial institutions of borrowing funds, expected inflation, and the percentage growth rate of real GDP, as well as the federal budget deficit expressed as a percent of GDP. Using annual data for the period 1970-2008, two-stage least squares autoregressive estimation reveals that the federal budget deficit, expressed as a percent of GDP, exercised a positive and statistically significant impact on the long term mortgage interest rate yield.

Keywords: mortgage interest rate, budget deficits, loanable funds model, two stage least squares

1. Introduction

In the U.S., there was a fleeting experience with federal government budget surpluses beginning with the latter part of the Clinton Administration over the period 1998-2001. However, given the 2001 recession, sluggish economic growth since 2001, and budgetary demands initially involving rounds of income tax cuts on the one hand and the "war on terrorism" involving, among other events, the Wars in Iraq and Afghanistan in the aftermath of the terrorist attacks on the U.S. on September 11, 2001 on the other hand, the specter of growing federal government budget deficits, raised its ugly head once again. As Alan Krueger (2003) has observed, budget deficits had in 2003 re-emerged as a major economic concern. In 2013, unprecedented huge federal budget deficits [in the face of several years of rapidly growing federal government outlays] remain a major if not increasing concern to many economists, citizens, and politicians. Indeed, the Obama Administration orchestrated a round of federal income tax increases, effective January 2, 2013, with expressed intentions of further federal income tax increases being announced with great frequency.

The impact of government budget deficits on interest rates has been studied extensively (Al-Saji, 1992, 1993; Barth, Iden & Russek, 1984, 1985, 1986; Cebula, 2005; Cebula & Cueller, 2010; Cukierman & Meltzer, 1989; Feldstein & Eckstein, 1970; Findlay, 1990; Hoelscher, 1983, 1986; Holloway, 1988; Johnson, 1992; Ostrosky, 1990; Cebula & Saltz, 1998; Swamy, Kolluri, & 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 and real estate market construction are 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" of private sector spending (Carlson & Spencer, 1975; Cebula, 1985; Krueger, 2003).

The interest rate/budget deficit literature for the U.S. has most commonly focused upon the yields on Treasury bills, Treasury notes, and Treasury bonds, although occasionally the yield on other bonds (such as Moody's Aaa-rated or Baa-rated corporate bonds) has received attention. In recent years, however, the deficit impact on long-term mortgage interest rate yields has received only limited formal attention in this literature. Accordingly, the purpose of this study is to provide current evidence as to the effect of the U.S. federal budget deficit on the interest rate yield on long-term mortgage interest rates. The study period begins at the end of 1970, just before the ending of the Bretton Woods Agreement and concludes at the end of 2008, just before the escalation of federal budget deficits into magnitudes exceeding $1 trillion per year and Federal Reserve policies known as "quantitative easing," QE1, QE2, and QE3, were implemented.

Section 2 provides the framework for the empirical analysis, a loanable funds model. Section 3 defines the variables in the empirical model and describes the data. Section 4 provides the empirical results, whereas an overview of the study findings is found in Section 5.

2. The Basic Framework

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

$$ND_{t+1} = ND_t + G_t + F_t + AR_t X ND_t - T_t \quad (1)$$

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 (TD_t) is simply the difference between ND_{t+1} and ND_t:

$$TD_t = ND_{t+1} - ND_t = G_t + F_t + AR_{tX}ND_t - T_t \quad (2)$$

Based in principle on Hoelscher (1986), Barth, Iden, and Russek (1985) and Cebula (1988, 1997, 2007), to explain the determination of the long term mortgage interest rate yield (MORT) including the impact of the budget deficit on same, a loanable funds model is adopted in which the long-term interest rate yield is determined by an equilibrium of the following form:[1]

$$D = S + TD \quad (3)$$

where:

D = real domestic demand (inclusive of commercial banks) for long term bonds

S = real domestic supply of long term bonds

TD = real net government borrowing, as measured by the federal budget deficit

In this framework, it is expected that:

$$D = D (PE, MORT, Y, COST...),\ D_{PE} < 0,\ D_{MORT} > 0,\ D_Y > 0,\ D_{COST} < 0 \quad (4)$$

$$S = S (PE, MORT...),\ S_{PE} > 0,\ S_{MORT} < 0 \quad (5)$$

Variable PE_t is the expected annual inflation rate in year t [of the CPI, consumer price index]. $MORT_t$ is the average annual interest rate year on 30 year fixed-rate yield on new mortgages in year t. The variable Y_t is the actual annual percentage change in real GDP over year t. Finally, the variable $COST_t$ is the average

annual cost of funds at commercial banks in year t. Of course, as shown in equation (2), TD_t is the total federal budget deficit in year t.

It is expected that, in principle paralleling Barth, Iden, and Russek (1984, 1985), Cebula (1988, 1997, 2005), Cebula and Cueller (2010), and Hoelscher (1986), the real domestic demand for long term bonds [mortgages, in this case] is a decreasing function of the expected future inflation rate, whereas the real domestic supply of long term bonds is an increasing function thereof. According to the conventional wisdom, the private demand for long term corporate bonds is a increasing function of Y, *ceteris paribus*, since as Y rises and the pace of real economic activity rises, and therefore economic agents are more willing and able to assume the risk associated with such bonds, as well as more able to afford to pay for same (Hoelscher, 1986; Cebula & Saltz, 1998; Cebula, 2005). Next, the higher the cost of funds to commercial banks in year t, $COST_t$, the higher the mortgage interest rate banks charge on mortgage loans. Finally, the demand for long term bonds is an increasing function of their interest rate yield ($MORT_t$), *ceteris paribus*, whereas the supply thereof is a decreasing function of that interest rate yield, *ceteris paribus* (conventional wisdom).

Substituting equations (4) and (5) into equation (3) and solving for MORT yields:

$$MORT = f (TD, PE, Y, COST) \quad (6)$$

such that $f_{TD} > 0$, $f_{PE} > 0$ $f_Y > 0$, $f_{COST} > 0$.

3. Variables and Data

The first step in the analysis is to develop an appropriate empirical measurement of *expected future inflation*. 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 Swamy, Kolluri, and Singamsetti (1990), rather than using the Livingston series, the study adopts a linear weighted average [LWA] lag model on actual inflation to construct the values for the *expected inflation rate,* PE_{t+1}, as follows:

$$PEt+1= (3P_t + 2P_{t-1} + P_{t-3})/6,$$

where P_t, P_{t-1}, and P_{t-3} are *actual* annual inflation rates of the CPI in years t, t-1, and t-2.

Based on the framework expressed above, the following model is to be estimated:

$$MORT_t = a_0 + a_1 TD_t + a_2 PE_{t+1} + a_3 Y_{t-1} + a_4 COST_t + a_5 AR_{t-1} + a_6 AR_{t-2} + u_t \quad (7)$$

where a_0 is a constant; AR_{t-1} and AR_{t-2} are autoregressive terms to correct for serial correlation; and u_t is a stochastic error term.

The budget deficit is scaled by GDP; this is because the size of the deficit should be judged relative to the size of the economy (Evans, 1985; Hoelscher, 1986; Cebula, 1997, 2005; Holloway, 1986; Ostrosky, 1990). Expressing the deficit variable as contemporaneous with the interest rate variable is common in this literature (Evans, 1985; Hoelscher, 1986; Ostrosky, 1990; Cebula, 1997, 2005); it should also be observed that MORT is treated as contemporaneous with PE and COST. The data were obtained from the Council of Economic Advisors (2010) and the Board of Governors of the Federal System (2013).

4. Empirical Results

In equation (7), the interest rate variable ($MORT_t$) is contemporaneous with the variables, TDY_t, PE_t, and $COST_t$. In order to avoid simultaneity bias, the analysis undertakes a 2SLS (two stage least squares) estimation. The instrumental variable for TD_t is the two-year lag of the average annual unemployment rate

of the civilian labor force, UR_{t-2}; the instrumental variable for $COST_t$ is the two-year lag of the prime rate of interest, $PRIME_{t-2}$; and the instrumental variable for PE_t is the two-year lag of the inflation rate of the CPI, P_{t-2}. The choice of these instruments is based on the finding that each is highly correlated with TDY_t, $COST_t$, and PE_t, respectively, while not being correlated with the error terms in the system.

The 2SLS estimate of equation (7) for the 1970-2008 study period is provided in equation (8):

$$MORT_t = 3.12 + 0.53\ TD_t + 0.31\ PE_t + 0.161\ Y_{t-1} + 0.423\ COST_t + 1.17\ AR_{t-1} - 0.47\ AR_{t-2}$$

$$(+2.68) \quad (+3.24) \quad (+2.48) \quad (+4.98) \quad (+6.91) \quad (-2.77)$$

$$J = 14.03,\ DW = 1.98,\ Rho = 0.01 \qquad (8)$$

where terms in parentheses are t-values.

In equation (8), all four of the estimated coefficients exhibit the expected signs, and all four are statistically significant at the five percent level or beyond. Based on the DW and *Rho* values, there is no sign of an autocorrelation problem. Finally, the J statistic is statistically significant at beyond the one percent level, attesting to the overall strength of the model.

Based on the results shown in equation (8), the nominal interest rate yield on 30 year fixed-rate mortgages is an increasing function of expected inflation (at the one percent statistical significance level), the cost of funds to banks (at the one percent statistical significance level), and the percentage growth rate of real GDP (at the two percent statistical significance level)

Finally, the estimated coefficient on the budget deficit variable is also positive and statistically significant at the one percent level. Thus, it appears that after allowing for a variety of other factors, the higher the federal budget deficit (as a percent of GDP) the higher has been the nominal interest rate yield on 30 year fixed-rate home mortgages. This finding is consistent with a variety of empirical studies of earlier periods, including Al-Saji (1992, 1993), Barth, Iden and Russek (1984, 1985, 1988), Barth, Iden, Russek, and Wohar(1989), Cebula (1988, 1997), Cebula and Belton (1993), Cebula and Cueller (2010), Findlay (1990), Gissey (1999), Hoelscher (1986), Johnson (1992), Cebula & Saltz (1998), Tanzi (1985), and Zahid (1988).

5. Conclusion

The conventional wisdom argues that, *ceteris paribus*, the federal budget deficit acts to elevate the 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 adopts a loanable funds model estimated by 2SLS and adopting autoregressive terms to adjust for serial correlation and finds that the nominal interest rate yield on 30 year fixed-rate home mortgages in the U.S. is an increasing function of expected future inflation, the growth rate of real GDP, and the average cost of funds to commercial banks. Furthermore, in contrast to the arguments in Ricardian Equivalence, it also is found that the greater the federal budget deficit (relative to the GDP level), the higher the *ex ante* real interest rate yield on Baa-rated corporate bonds.

Naturally, these results apply to the 1970-2008 study period. Whether these results would apply to the period beginning in 2009, where the budget deficit has exceeded $1 trillion in each and every year to date and the Federal Reserve has pursued unorthodox quantitative easing policies (QE1, QE2, and QE3) is yet to be investigated.

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Notes

Note 1. Assuming other markets are equilibrated.