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## **Crowding Out and Government Spending**

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## **Introduction**

Economists have not reached yet a consensus about the nature of the relationship between budget deficits and interest rates. The contradictory results of their empirical analyses prohibit a conclusive edict on whether interest rates provide a significant link between budget deficits and private investment, or whether an alternative mechanism must be sought, or even if a relationship does exist.

Understanding the relationship between budget deficits and interest rates is very important because a better understanding will help to promote faster economic growth since policy makers will be able to apply more effective economic policies by taking into account factors which may have been disregarded in the past. Most empirical work that investigates this relationship supports one of the two main views: the Neo-Classical View and the Ricardian Equivalence View.

According to the Neo-Classical School, increases in budget deficits cause increases in interest rates. Thus, budget deficits "crowd out" private spending since the private sector will borrow less at higher interest rates. Taking into account some basic links among macroeconomic factors, budget deficits could lead to slower economic growth and reduced living standards in the U.S. The adverse causal chain starts with an increase in interest rates which, according to the Neo-Classical View, brings about crowding out. The "crowding out effect" reduces economic growth because it causes capital stock to grow less than it would have grown had private investment been higher. Less capital stock means that the economy will be following a lower growth path for both output and marginal productivity of labor. Given that the marginal productivity of labor equals the real wage in a profit maximizing environment, we can anticipate that a decrease in private investment could potentially have a negative impact on the level of real wages thus adversely affecting the living standards of workers. If these macroeconomic links operate as Neo-Classical theory predicts, increases in budget deficits would be undesirable. Policy makers would have to take these links into account and find tools to prevent the budget deficit from having harmful effects on private investment.

The purpose of this paper is to provide a better understanding of the relationship between budget deficits and private investment and to contribute to the discussion of whether or not such a relationship exists. We test the robustness of Cebula's (1985) model by extending the time period, by testing the model using a proxy for one of the variables, and by de-trending the variables.

## **Literature Review**

The existence of a causal relationship between budget deficits and investment requires a transmission mechanism between these two variables. Several authors such as Cebula, Hung and Manage (1995), Cebula and Belton (1992), and Cebula and Scott (1991) point to a positive relationship between budget deficits and interest rates. The existence of a relationship suggests that interest rates are that transmission mechanism. On the other hand, researchers such as Evans (1985, 1987), and Kormendi (1983) find no relationship between budget deficits and interest rates which suggests the existence of an alternative transmission mechanism between budget deficits and private investment if one truly does exist.

These empirical studies support two opposing views in the relationship between budget deficits and interest rates: the Neoclassical view and the Ricardian Equivalence view. According to the Neoclassical view, budget deficits crowd out private investment through having a positive relationship with interest rates. Positive budget deficits cause an increase in the demand for loanable funds which leads to an increase in interest rates. Under the Ricardian Equivalence view there would be no crowding out of private investment when the government borrows money because people will reduce consumption and increase savings in order to offset the increase in future tax liabilities which they foresee as a result of government spending deficits.

From a Neoclassical point of view, Cebula and Belton (1992), investigate the relationship between budget deficits and interest rates by using an open economy IS-LM framework empirically. An important feature of their study is that they differentiate between structural and cyclical deficits. In order to relate the variables to the size of the economy every variable is taken as a proportion of GDP. Average real interest rate movements are explained in terms of the changes in government spending, total federal budget deficit, money stock, and balance of trade. The model is tested using quarterly data for real interest rates generated from Moody's Aaa rated corporate bonds, Moody's Baa-rated corporate bonds, three year Treasury notes, and inflation as measured by the consumer price index. They find a significant positive relationship between budget deficits and real rates of interest.

Cebula and Scott (1991) also find a significant positive relationship between budget deficits and interest rates. However, they adjust the value of the public debt to allow for debt service payments because they think that the "size of the current deficit per se effectively overestimates the magnitude of net federal borrowing from the credit markets" (Cebula and Scott 867).

Cebula and Hung (1992) tested the impact of the federal government budget deficit on nominal long term interest rates in the United States (U.S.) and Canada. They modeled interest rates as a function of the expected future inflation rate, the GNP growth per capita, the expected real short term interest rate, real net purchase of securities by the central bank, and net capital inflows into the nation from abroad. The only difference between the model used to test the budget deficit-interest rate relationship in the case of

the U.S. and in the case of Canada is that Cebula and Hung took into account the cyclical and the structural budget deficits separately in the U.S. model, while they used total federal government deficit in the case of Canada. They concluded that federal budget deficits increase nominal long term interest rates.

Cebula, Hung, and Manage (1995) also find support for the Neoclassical view. They used a simplified savings model to examine the effect of future deficits on expected future tax liabilities. The authors took into account separately the structural and cyclical components of the budget deficit. They define the cyclical deficit as the difference between the actual deficit and the structural (expected) deficit which automatically varies with economic fluctuations.

These authors also include in their model the age and income effects which are characteristics of a standard life-cycle model. According to the Ricardian Equivalence view, people should anticipate an increase in future taxes due to an increase in present government spending. However, contrary to this view, these authors conclude that households do not discount for future tax liabilities associated with the cyclical deficit. Cebula, Hung, and Manage test their model using quarterly data from 1955 up to 1991. The relationship between personal savings rate and the structural deficit is found to be positive and statistically significant. However, the relationship between personal savings rate and the cyclical deficit, although signed negative, is not statistically significant.

Cebula, Hung, and Manage conclude that the savings rate responds positively to the structural deficit while it is unresponsive to the cyclical deficit. This conclusion contradicts the conventional Ricardian equivalence view which hypothesizes a positive response to the total deficit. Thus, the authors of the article argue that the Ricardian equivalence view provides an incomplete picture because there is a partial offset of the effect of the federal budget deficit in the economy. A coefficient closer to 0 than to one, as these authors find, implies the existence of partial crowding out.

Other studies, however, reject the existence of a positive relationship between budget deficits and interest rates. These studies support Barro's Ricardian equivalence according to which households respond to government deficits by increasing their savings in order to meet future tax liabilities. For example, Evans (1985) analyzed the relationship between budget deficits and interest rates in three periods during which the federal deficit exceeded 10% of national income: during the Civil War, during World War I and during World War II. He used short term interest rates in his analysis and arrived to the conclusion that "over a century of U.S. history, high interest rates have never been associated with large deficits (Evans 86)." Evans states that the explanation for the results of his regression is that "savings" increased by the same amount as deficits. Evans accepts that this assumption is not very realistic. However, he states that economists should not judge the Ricardian equivalence view based on its feasibility but based on its explanatory power (Evans 85).

Another study supporting the Ricardian equivalence view is Vitaliano (1990). He analyzed the effect of servicing the public debt on private capital formation by using a

life-cycle model. Vitaliano did not consider interest rates to be the transmission mechanism between public debt and private saving and investment. Instead, he examined a different transmission mechanism: the positive wealth effects of debt interest and the negative wealth effects of the taxes levied to pay that interest in periods subsequent to the initial borrowing.

According to conventional economic theory, the public debt has two effects on the private sector: a positive wealth effect caused by debt interest (citizens who receive interest payments will increase their wealth), and a negative wealth effect caused by taxes that are created in order to service the debt in the future (all citizens have to pay more taxes therefore, their wealth decreases). The Ricardian equivalence view argues that both effects cancel each other out because people will save more in the present in order to be able to pay higher taxes in the future.

Vitaliano (1990) took into account in his model Barro's argument that people do not regard government bonds as net wealth. He found that the marginal propensity to consume out of government bonds is approximately zero (0.03) and that the net effect of public debt on capital stock is positive or non-existent. The results show that public borrowing brings about an increase in private capital stock of twenty-one cents per dollar of domestic debt and zero cents per dollar of foreign held debt. Vitaliano concluded that the economic reason for these results is that the fall in savings caused by bond-wealth is less than the rise in savings caused by the negative effect of taxes levied to service the debt on private wealth.

Using the Consolidated Approach which models private sector consumption-saving behavior based on the rational evaluation of the consequences of government fiscal policy, Kormendi (1983) also finds support for the Ricardian equivalence view. Kormendi talks about a standard approach in the analysis of the private sector consumption-saving behavior. According to Kormendi this approach entails that government spending has no effect on private sector consumption while current taxation, corporate retained earnings and government interest payments do. In contrast, Kormendi models a new approach: the Consolidated Approach. Kormendi consolidates the public and private sectors and formulates a model in which the private sector accounts for the effect of government fiscal policy. Under the Consolidated approach, government spending affects private consumption, but taxes, corporate retained earnings, and government interest payments do not affect private consumption. This would follow the Ricardian equivalence view that government debt is not net wealth and will, therefore, not affect the private consumption-saving decision.

Evans (1987) also found empirical support for the Ricardian equivalence view by analyzing whether or not interest rates are more related to future deficits rather than to present and past deficits. Evans develops an intertemporal model in which interest rates are explained as a function of current and past government spending, budget deficits, and interest rates. Some of the results show a significantly negative association between budget deficits and interest rates. Evans concludes that interest rates are not related to past, present or future deficits.

## Empirical Analysis

In the empirical section we analyze the relationship between budget deficits and investment by testing the robustness of Cebula's (1985) model. His model relates the aggregate investment/GDP ratio to the budget deficit/GDP ratio, the inflation rate, the rate of corporate profits, and to an index of expected versus actual selling prices and retail trade.

In our analysis, we did not use the expected versus actual selling prices and retail trade variable because the data was not available. We constructed a proxy for this variable by taking the difference between the fitted and the actual values of the Standard and Poor's (S & P's) Composite Index. The fitted S&P's results from autoregressing this variable upon itself lagged one and two quarters.

The equation to be estimated is:

$$\left(\frac{I}{Y}\right) = a_0 + a_1 \left(\frac{D}{Y}\right) + a_2 P_{t-2} + a_3 \Pi_{t-2} + a_4 F_{t-2} + \mu$$

where

$\left(\frac{I}{Y}\right)$  = change in the ratio of aggregate investment in new plant and equipment in quarter t to GDP during quarter t.

$\left(\frac{D}{Y}\right)$  = ratio of the aggregate government budget deficit in quarter to GDP during quarter t.

$P_{t-2}$  = inflation rate (of the CPI) during quarter t-2

$\Pi_{t-2}$  = corporate profit rate (after taxes) in quarter t-2

$F_{t-2}$  = Errors in Standard and Poor's Composite Index

This equation tests if a relationship between investment and budget deficits exists without including interest rates in the model in order to neglect the existence of a transmission mechanism between budget deficits and investment. The model tries to test whether a transmission mechanism exists.

The Neo-Classical view would predict a strong negative relationship between these two variables, especially in the 1980's since the large deficits in this period would have caused a decrease in investment. On the other hand, the Ricardian Equivalence view would predict that budget deficits did not have any effect on investment since they would have had no influence on savings.

The model takes into account investment and budget deficit relating them to GDP. The variables  $P$ ,  $I$ , and  $F$  are lagged two quarters in order to account for the time it takes the inflation rate (as measured by the CPI), the ratio of corporate profits (after tax) to stockholder's equity, and the fitted Standard and Poor's Composite index to have an effect in the economy. These variables "allow for expectation factors" that might have an effect on aggregate investment (Cebula 134).

The regression was run using quarterly data from two sample periods: Cebula's original sample period (1970-1982) and an extended sample period (1970-1997). The later sample period is very interesting to analyze because there were distinct conditions in this period such as the large budget deficits during the 1980's and deregulation. The data was obtained from the Economic Report of the President (1970-1997) and from the National Income and Product Accounts Report.

In addition to these regressions, we run two more regressions in which we de-trended the independent variables because we were still concerned with the possibility that the regression was catching growth over time instead of the true relationship between budget deficits and investment. We de-trended the independent variables by taking first differences.

### Empirical Results

The results are:

Sample 1: 1970:2 - 1982:2

$$\left(\frac{I}{Y}\right)_t = -0.003 - 0.034\left(\frac{D}{Y}\right)_t - 0.20P_{t-2} + 0.06I_{t-2} + 0.001F_{t-2}$$

(-2.29)\* (-2.04) (-5.05)\*\* (0.06)\*\* (0.25)

$$R^2 = 0.3623; \text{ Adjusted } R^2 = 0.288; \text{ D-W} = 1.989; \text{ F-statistic} = 4.88$$

Sample 2: 1970:2 - 1997:3

$$\left(\frac{I}{Y}\right)_t = 0.001 - 0.035\left(\frac{D}{Y}\right)_t + 0.07P_{t-2} + 0.06I_{t-2} + 0.012F_{t-2}$$

(1.06) (-2.10)\* (-2.45)\*\* (1.07)\*\* (2.74)\*\*

$$R^2 = 0.1622; \text{ Adjusted } R^2 = 0.122; \text{ D-W} = 1.988; \text{ F-statistic} = 4.029$$

Deficits are negative and significant at the 5% level. Thus, these results corroborate the Neo Classical View because they show that there was partial crowding in both time periods. The adjusted  $R^2$  is low, however, this does not relevance of study because the purpose of the model is not to predict the level of investment in the economy but to test whether a relationship between budget deficits and investment exists or not. It is interesting to notice that in the extended sample period the model explains 12% of the variation of the dependent variable while it explains almost two time of this variation in



the first sample period. This suggests that there were special conditions during the 1980's and 1990's which the model is not taking into account.

The de-trended results are:

Sample 1: 1970:2 - 1982:2

$$\left(\frac{I}{Y}\right)_t = -0.0001 - 0.071\left(\frac{D}{Y}\right)_t - 0.13P_{t-2} + 0.004II_{t-2} + 0.004F_{t-2}$$

(0.63) (-2.27)\* (-2.34)\* (2.08)\* (0.88)

$$R^2 = 0.298; \text{ Adjusted } R^2 = 0.236; \text{ D-W} = 1.989; \text{ F-statistic} = 4.78$$

Sample 2: 1970:2 - 1997:3

$$\left(\frac{I}{Y}\right)_t = 0.0003 - 0.04\left(\frac{D}{Y}\right)_t - 0.08P_{t-2} + 0.009II_{t-2} + 0.013F_{t-2}$$

(-0.63) (-1.21) (-1.67) (1.50) (3.05)\*\*

$$R^2 = 0.1312; \text{ Adjusted } R^2 = 0.098; \text{ D-W} = 1.99; \text{ F-statistic} = 4.00$$

The first regression in this set corroborates the Neo-Classical View because it gives evidence of crowding out since the coefficient of the budget deficit/GDP is negative and statistically significant. However, the coefficient of the deficit/GDP ratio is not significant in the second regression. Thus, these results do not corroborate the Neo-Classical View. In addition, the drop of the R<sup>2</sup> in the second regression shows that the choice of sample period affects the explanatory power of the model.

## Conclusion

The results of the first set of regressions corroborate the Neo-Classical View: an increase in budget deficits will crowd out private investment. Thus, budget deficits would negatively affect living standards in the U.S.A. However, since we lose significance on the coefficient of the deficits/GDP ratio in the last regression, the results obtained for the whole sample period with the second model suggest that Cebula's model is not robust when the variables are de-trended over the whole time period. Therefore, we should be cautious about using Cebula's model in order to make inferences about the effect of deficits on investment behavior.

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