The "Crowding Out" Effect of Federal Government Outlay Decisions: An Empirical Note

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The 'crowding out' effect of federal government outlay decisions: An empirical note

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1. Introduction

In a recent issue of *Public Choice,* Abrams and Schmitz (1978: 29) observe that there has been a sizeable '. . . effort . . . devoted to developing the conceptual framework and seeking empirical support for the "crowding out" effect of governmental expenditures.' These authors (1978: 29) also observe that there has been some attention in the literature (albeit very limited) '. . . directed to assessing the net effect of particular government expenditures on private spending behavior.' Abrams and Schmitz (1978: 29) then proceed to extend the latter literature by analyzing '...a particular category of governmental expenditures – social welfare transfers – and their effect on private charitable contributions.' Their overall finding supports the thesis that crowding out *does* in fact occur, but that it is *incomplete.*

The findings by Abrams and Schmitz (1978) are at odds with the initial studies on crowding out by Anderson and Jordan (1968) and Keran (1969) and (1970). The latter three studies conclude that central government spending *completely* crowds out *aggregate* private-sector spending [1] (i.e., total consumer spending plus total investment spending plus net exports). On the other hand, the results in Abrams and Schmitz (1978) are, in principle, entirely compatible with those found in Arestis (1979) and Zahn (1978). The latter two studies conclude that aggregate private-sector spending (consumption plus investment plus net exports) is crowded out by public spending, but the crowding out is *incomplete.*

The purpose of this note is not to criticize the Abrams and Schmitz study (19 78); quite to the contrary, theirs is a very sound paper. Rather, the purpose of this note *is* to extend the scope of the Abrams and Schmitz study (1978). In particular, this note examines the crowding out effect of aggregate federal government spending decisions upon purchases of new physical capital by private firms. While there obviously are other forms of private sector

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investment, e.g., net in ventory changes, such forms are omitted from this study . Like Abrams and Schmitz (1978), we thusly stress one particular category of crowding out effects. By limiting the analysis solely to private investment in new physical capital, the economic implications of crowding out for long-term inflation and short-term unemployment resulting from federal government expenditure decisions can be directly high-lighted. Such economic implications tend to be obscured in studies such as Anderson and Jordan (1968), Keran (1969) an d (1970), Zahn (1978), and Arestis (1979), where the crowding out effects of central government spending on consumption, investment , and net exports are all *aggregated* . By avoiding the excessive aggregation characterizing these four studies, we hope to derive — as did Abrams and Schmitz (1978) — some unique insights into the ramifications of federal government spending decisions.

2. A basic model

Tue empirical studies cited above either (a) measure crowding out indirectly through the examination of various multipliers (see, e.g., Arestis, 1979) or (b) measure crowding out directly by treating private-sector spending as a function of central governmen t deficits or spending levels per se (see Abrams and Schmitz, 1978).

This note provides an alternative means by which to determine whether crowding out occurs and, if so, to what degree. In particular, this study examines crowding out by determining to what degree the proportion of actual GNP that was devoted to private in vestmen t in new physical capital was affected by the proportion of actual GNP devoted to federal government spending. Hopefully, this new approach to the empirical dimension of crowding out will provide further insight into whether or not the crowding out issue is substan tive. Moreover, it will enable us to gain some unique insights into the ramifications of federal government spending decisions.

The initial model to be examined is given be:

$$\frac{I_t}{Y_t} = f\left(\frac{I_{t-1}}{Y_{t-1}}, \frac{G_t}{Y_t}, P_t\right) \qquad (1)$$

where

$\frac{I_t}{Y_t}$ = ratio of actual investment expenditures on new physical capital during quarter t to actual GNP during quarter t

$\frac{G_t}{Y_t}$ = ratio of actual aggregate federal government expenditures during quarter t to actual GNP during quarter t

P_t = consumer price index (CPI) during quarter t

The data in this regression (as well as in the others included in the present paper) cover the period from quarter 1 of year 1969 through quarter 3 of year 1978. This initial model, as well as the other model in this section of the paper, does not deal with lagged variables. A distributed lag model is introduced in the next section of the paper, however. As noted, the volume of 'investment' refers solely to purchases of new plant and capital equipment.[2]

If crowding out does occur, we would expect that the greater the proportion of GNP devoted to aggregate federal government spending, the lesser the proportion of GNP devoted to private investment in new physical capital, i.e., the greater the degree to which government spending crowds out such investment, *ceteris paribus*:

$$\frac{a(I_t/Y_t)}{a(G_t/Y_t)} < 0 \qquad (2)$$

The various possible mechanisms through which crowding out can occur are analyzed in depth in Carlson and Spencer (1975). This present note, which deals with *aggregate* federal spending does not address which such mechanism is most relevant; such an issue is beyond the scope of this note.

With regard to the price-level variable, P_t, it is argued here that a pattern of rising prices leads firms to expect future inflation. Future inflation in turn is argued to breed uncertainty, uncertainty as to whether revenues will grow rapidly enough to keep pace with (or outpace) rising production costs. This uncertainty acts to raise the risk associated with investment projects. Hence, it is argued that:

$$\frac{a(Ir/Y_t)}{aP_t} < 0 \qquad (3)$$

In order to test these two hypotheses empirically, the following linear regression is postulated:

$$\frac{I_t}{Y_t} = a_0 + a_1\frac{G_t}{Y_t} + a_2 P_t + a_3 \qquad (4)$$

where

a_0 = constant
a_3 = error term

Estimating (4) by OLS yields:

$$\frac{I_t}{Y_t} = +9.23579 - 0.03353\frac{C}{Y_t} - 0.011\,!SP_t, \qquad (5)$$
$$(-1.25) \qquad (-7.31)$$

DF = 36, R^2 = .66, F-ratio = 34.19254

investment, e.g., net inventory changes, such forms are omitted from this study. Like Abrams and Schmitz (1978), we thusly stress one particular category of crowding out effects. By limiting the analysis solely to private investment in new physical capital, the economic implications of crowding out for long-term inflation and short-term unemployment resulting from federal government expenditure decisions can be directly high-lighted. Such economic implications tend to be obscured in studies such as Anderson and Jordan (1968), Keran (1969) and (1970), Zahn (1978), and Arestis (1979), where the crowding out effects of central government spending on consumption, investment, and net exports are all *aggregated*. By avoiding the excessive aggregation characterizing these four studies, we hope to derive – as did Abrams and Schmitz (1978) – some unique insights into the ramifications of federal government spending decisions.

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The initial model to be examined is given be:

$$\frac{f_t}{Y_t} = \frac{f_t}{Y_t}\left(\frac{G_t}{Y_t}, P_t\right) \tag{1}$$

where

$\frac{f}{y}_t$ = ratio of actual investment expenditures on new physical capital during quarter t to actual GNP during t

$\frac{G_t}{Y_t}$ = ratio of actual aggregate federal government expenditures during quarter t to actual GNP during quarter t

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If crowding out does occur, we would expect that the greater the proportion of GNP devoted to aggregate federal government spending, the lesser the proportion of GNP devoted to private investment in new physical capital, i.e., the greater the degree to which government spending crowds out such investment, *ceteris paribus*:

$$\frac{o(I/Y)}{o(G/Y)} < 0 \tag{2}$$

The various possible mechanisms through which crowding out can occur are analyzed in depth in Carlson and Spencer (1975). This present note, which deals with *aggregate* federal spending does not address which such mechanism is most relevant; such an issue is beyond the scope of this note.

With regard to the price-level variable, P, it is argued here that a pattern of rising prices leads firms to expect future inflation. Future inflation in turn is argued to breed uncertainty, uncertainty as to whether revenues will grow rapidly enough to keep pace with (or outpace) rising production costs. This uncertainty acts to raise the risk associated with investment projects. Hence, it is argued that:

$$\frac{o(I/Y)}{\partial P} < 0 \tag{3}$$

In order to test these two hypotheses empirically, the following linear regression is postulated:

$$\frac{I}{Y} = a_0 + a_1 \frac{G}{Y} + a_2 t + a_3 \tag{4}$$

where

a_0 = constant
a_3 = error term

Estimating (4) by OLS yields:

$$\frac{I}{Y} = +9.23579 - 0003353 \frac{G}{Y} - 0.01115 P, \tag{5}$$

(-L25) (-7.31)

DF = 36, R^2 = .66, F-ratio = 34019254

where terms in parentheses are t-values.

In equation (5), both coefficients have the expected negative signs. Th.e coefficient on the government spending variable is significant at about the .I 0 level, providing evidence , albeit rather weak , that federal government spending 'crowds out' private-sector investmen t in new plant and equipment. The coefficient on the price-level variable is significant at well beyond the .01 level, providing very strong support for the hypothesis that the uncertainty created by an inflationary environment acts to markedly discourage private-sector investment. The R^2 of .66 implies that the model explains two-thirds of the variation in the dependent variable.

Although the results in (5) do lend some support to the crowding-out thesis, this support is not especially strong, i.e., a coefficient with a .10 significance level is not sufficiently convincing. In an effort (a) to provide a 'more complete ' model of investment and (b) to try to provide yet further insigh t into the crowding-out phenomenon , the following model is now offered :

$$\frac{I_t}{Y_t} \quad b_0 + b_1 \frac{G_t}{Y_t} + b_2 P_t + b_3 D_t + b_4 \tag{6}$$

where

b_0 = constant
b_4 = error term
D_t = an index for quarter t of expected versus actual selling prices and retail trade; these data are an indication of the degree to which businessmen 's actual selling prices and retail trade fell below their expected selling prices and retail trade ; the data are based upon a Dun and Bradstreet survey of 250 businesses [3]

In this system, D_t is a measure of the degree to which businesses' selling prices and retail trade fall below expectations. As a form of 'disappointment index,' it follows that the greater the degree to which selling prices and retail trade fall short of expectations that is, the greater the value of D_t - the lower the degree of optimism firms are likely to hold toward *new* investment projects. In other words, disappointment over the selling prices and retail trade associated with the existing capital stock is lilrnly to breed skepticism about the expected profitability (DPV) of new physical capital. *Ceteribus paribus* , then, it is expected that :

$$\frac{a(I_t / Y_t)}{aD_t} < 0 \tag{O)}$$

The OLS estimation of (6) is given by:

$$\frac{I_t}{Y_t} = +9.18261 - 0.04362\frac{G_t}{Y_t} - 0.01068P_t - 0.02435D_t, \quad (8)$$
$$(-1.88) \qquad (-7.88) \qquad (-3.34)$$

DF = 35, R^2 = .74, F-ratio = 32.91343

In equation (8), all three coefficients have the expected signs. Moreover, all three coefficients are significant at beyond the .05 level. The R^2 of .74 implies that the model now explains essentially three-fourths of the variation in (I_t/Y_t). As in regression (5), the F-ratio is significant at well beyond the .01 level.

The coefficient on the price-level variable is, as was the case in estimation (5), significant at well beyond the .01 level, implying that an inflationary environment acts to significantly discourage private investment in new physical capital. Similarly, the coefficient for the D_t index is significant at beyond the .01 level, implying that when firms' selling prices and retail sales fall short of expectations, a disincentive to undertake additional investment in new physical capital is created.

The coefficient on variable (G_t/Y_t) is statistically significant at beyond the .05 level. This lends strong empirical support to the crowding out thesis and, since the coefficient in (8) – like that in (5) – implies *incomplete* crowding out, these results are consistent with Arestis (1979), Abrams and Schmitz (1978), and Zahn (1978).

3. A distributed lag model

In the estimations above, there are no time lags introduced. In addition, both of the above models neglect to include a measure of firms' actual profits. Finally, neither of the above models includes a variable to allow for the effects on investment of the various phases of the business cycle, i.e., neither includes a variable which would explicitly allow for the effects on investment of changes in real GNP (that occur over the cycle). In an effort to allow for these considerations, the following regression is estimated:

$$\frac{I_1}{Y_t} = c_0 + c_1\frac{G_1}{Y_1} + c_2P_{t-1} + c_3D_t + c_4 n_{t-2} + c_5 Yf_{t-2} + c_6 \quad (9)$$

where

c_0 = constant
c_6 = error term
n_{t-2} = corporate profit rate, after taxes, in quarter $t-2$, expressed as a percentage rate of return on stockholders' equity[4]
Y_{t-2} = real GNP level in quarter $t-2$[5]

It is argued here that the greater the corporate profit rate, the greater the pool of funds potentially available for internally financed investment and the greater the firms' level of optimism. For either or both of these reasons, it may be argued that the greater the profit rate in a given quarter – given the time lag in investment decisions – the greater the investment undertaken two quarters later, *ceteris paribus*:

$$\frac{\partial (I_t / Y_t)}{\partial \pi_{t-2}} > 0 \tag{10}$$

Finally, the variable Y_{t-2} is included to allow for the impact that changes in real GNP exercise over investment in new capital. As real GNP rises, in accord with the 'conventional wisdom,' firms become willing to undertake more investment; on the other hand, a declining real GNP acts to discourage investment. Hence, it follows that:

$$\frac{\partial (I_t / Y_t)}{\partial Y^*_{t-2}} > 0 \tag{11}$$

Inclusion of this lagged variable directly allows for the effects of the various phases of the business cycle on investment behavior.

Aside from lagging the profit and real GNP variables, the price-level variable has been lagged (one quarter, in this case). It was found that a variety of other lag variations yielded much the same results as those in the OLS estimation below:

$$\frac{I_t}{Y_t} = \underset{}{+8.45116} - \underset{(-2.43)}{0.22217}\frac{G_t}{Y_t} - \underset{(-5.03)}{0.00784 P_{t-1}} - \underset{(-4.01)}{0.03010 D_t}$$

$$+ \underset{(+2.28)}{0.00817}\pi_{t-2} + \underset{(+1.89)}{0.08436}\, Yf_{t-2} \tag{12}$$

$$DF = 33, \quad R^2 = .79, \quad \text{F-ratio} = 27.51314$$

All five of the estimated coefficients have the expected signs and are statistically significant at the .05 level or beyond. The R^2 is .79, so that the model now explains nearly four-fifths of the variation in the dependent variable. Finally, the F-ratio is significant at well beyond the .01 level.

As in estimation (8), the inflation and selling price/retail sales variables both act to significantly discourage private investment. The profit and real GNP variables both act here as significant factors in stimulating private investment, as hypothesized. Finally, we once again find strong empirical support for crowding out. In fact, the coefficient for (G_t / Y_t) in (12) is much larger than in either of the earlier cases; moreover, its significance level also is much higher. Nevertheless, the evidence in (12) indicates that

although crowding out is of considerable magnitude, it is still *incomplete;* this is compatible with the finding by Abrams and Schmitz (1978: 36) of '. . . less-than-total crowding out . . . for society as a whole.' As was the case in Abrams and Schmitz (1978), each dollar of federal outlays *(in the aggregate)* reduces private investment by roughly 22 cents.

4. Summary and conclusions

This note has addressed the empirical issue of crowding out by examining the proportion of GNP devoted to private investment in new physical capital as a function of the proportion of GNP devoted to federal government outlays. Three alternative models were estimated, all of which found evidence of (a) a definite pattern in which private investment is crowded out by government spending and (b) only partial, i.e., incomplete, crowding out. These findings are, in principle, compatible with the studies by Arestis (1979), Abrams and Schmitz (1978), and Zahn (1978).

We may infer at least two important policy implications from the above findings. First, federal government decisions which act to raise federal outlays tend to diminish private-sector investment in new physical capital. To the degree that this form of crowding out occurs, private sector unemployment is generated. This clearly acts to weaken the stimulatory direct effects of the increased federal spending. Second, to the extent that federal government spending decisions lead to diminished investment in new physical capital, the rate of capital formation is diminished. This tends to worsen long-term inflation by cutting down on the ability of aggregate productive capacity to keep pace with aggregate demand.

The two implications stated above cast potentially grave doubts upon the wisdom of federal government decisions that lead to increased federal outlays. Ideally, at the very least, each such spending decision should be scrutinized for its particular impact on investment in new physical capital. Clearly, although federal government expenditures *in the aggregate* lead to diminished private investment, certain specific forms of federal spending may not change private investment at all, whereas other forms of federal spending may even lead to increased investment. The latter could well be characteristic of federal outlays for new highway construction. Thus, there appears to be a pressing need to disaggregate according to federal spending type.

NOTES

1. Related to the theoretical issue of *complete* net crowding out, see Carlson and Spencer (1975).
2. Data sources for *It. Yt, Gt,* and *Pt* were *The Economic Report of the President*, various issues.
3. The data were obtained from *The Business Conditions Digest*, February, 1979, and October, 1979.
4. Data source: *The Business Conditions Digest*, September, 1979.
5. Data source: *Economic Report of the President*, various issues.

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