Interestingly enough, the index of interest rate changes had the theoretically expected negative effect of municipal as well as State borrowing, despite the absence of a simple association between the two in the time series data. The respective sizes of the rate change partial regression coefficients [9] for the two levels of government, when applied to levels of borrowing, imply much the same moderate effects of tight money as Frank Morris found for his study of combined borrowing classified by functional purposes. Tanzer's results also are not inconsistent with Morris', since the latter found outlays for education and sewer-water systems to be interest-rate insensitive and these purposes have a much larger weight in total municipal than in total State borrowing.

A defect in Tanzer's article is that he does not discuss an objection to his procedure: that capital outlays are influenced by borrowing as well as borrowing being influenced by capital outlays, and that the use of ordinary least squares model using unlagged outlays may consequently generate significant biases in the coefficients. There are answers to this objection, among which a long lead of borrowing prior to capital outlays—making current outlays insensitive to current borrowing—is appealing. But the objection needs to be discussed explicitly.

In a doctorial dissertation,[10] Charlotte Phelps used cross section data [11] to investigate the impact of interest rates on municipal capital projects at different points between initiation and completion. She was able to do this because she limited her study to municipalities keeping capital budgets. Her time period was a short one characterized by a tightening monetary conditions, 1956 and 1957. In the first stage of her regressions, actual interest rates paid were explained by bond quality attributes, size of issue, call status, level of government, and the long-term rate of U.S. Government bonds at time of issue. In the second stage, the gap between authorized and actual expenditures, as a percentage of the former, was regressed against only one variable, percentage changes in interest rates calculated from the first stage regression. Results of this second stage, as Miss Phelps emphasized, should be viewed cautiously because of the small number of her observations—21 municipalities—and associated problems of possible response bias—less than a fifth of the municipalities she had originally sent questionnaires to replied with data on authorized and actual capital outlays.

The second stage regression results state that a rise in the municipal bond rate induces a decline in actual but not in authorized expenditures. This follows because the dependent variable is the difference between lagged authorized and current actual expenditures, as a per-

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[9] A partial regression coefficient shows by how many units the dependent variable changes as a result of a unit change in the independent variable with which the coefficient is associated. For example, let the dependent variable be bond sales expressed in billions of dollars, one of the independent variables be the average interest rate paid on bonds sold, and the partial regression coefficient for the interest rate variable be an illustrative −0.8. This coefficient signified that a rise of 1 point in the interest rate; e.g., from 3 to 4 percent, will reduce bond sales by $0.8 billion. If other variables influencing bond sales are also changing during a period, as is usually the case, their joint impact on bond sales is measured by multiplying each of these causative variables by its own partial regression coefficient and summing algebraically the products of all such multiplications.

[10] For Yale University. The findings discussed in this paper are only those published in "Yale Economic Essays" (fall of 1961) and abridges in "Impacts of Monetary Policy" (Commission on Money and Credit, 1963).

[11] Cross section studies are those analyzing different units within a single time period.