TESTING THE ANALOGY BETWEEN LOCAL GOVERNMENT AND CONSUMER BEHAVIOR

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As evidenced by a large number of reports and articles on the subject of late, economists have directed a substantial effort towards investigating the effects of federal grant programs on local allocation decisions (see references).

Some studies have been purely theoretical; these have employed the classical economic model of the individual consumer in an effort to explain these local decisions. That is local officials' behavior is to be explained as maximization of a preference function subject to local resource constraints. Where local preferences are stable, therefore, changes in local choice of program level and mix are determined by price and income variations in the resource constraint. In this framework federal grants naturally are regarded as manipulations of the local budget constraint; an unconditional grant as a general increase in local resources, an open ended but conditional (or matching) grant as a change in prices, and a limited (or closed and) conditional grant as either an income or a price change (the first if local expenditures exceed matching requirements, the second if local expenditures just meet those matching requirements.)

Other studies have been empirical; these consist largely in regression analyses to explain state/local expenditures as dependent on federal grants. One striking feature of the empirical work is that little effort has been made to exploit the richness and variety of the consumer model as an explanatory vehicle. The crucial issue at stake in the analysis of inter-governmental grants is not merely whether (and by how much) grants-in-aid stimulate local effort, but more importanly how they do so. More specifically do grants-in-aid provide local officials an effective price incentive to substitute among programs, or do such grants only transfer resources and operate on local decisions only via the income effect? This question is complicated by the fact that local governments have a variety of options for defeating the purpose of federal grants-in-aid. Thus we do not know, a priori, how grants-in-aid effectively alter the local budget constraint. Accordingly alternative specifications of the structure of local decisions will be required in econometric analysis.

LOCAL OPTIONS FOR DEFEATING THE SUBSTITUTION EFFECTS OF CONDITIONAL GRANTS

The existence and magnitude of price effects is crucial to measurement of the effective incentives provided by grants-in-aid. Thus, it is desirable to know where it may prove impossible in practice, for the federal government to employ conditional grants-in-aid as a price incentive despite legal matching requirements.

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One case where this is impossible is quite simple; the preference structure of the local leaders may defeat substitution effects of price manipulation. If local officials had sharp cornered indifference maps such as would result from perfect complementarity between programs, there would be no difference in outcome between conditional open-ended grants, and pure, budget supplementing, transfer grants. A preference structure which eliminates substitution effects thwarts any extra incentive effects from price subsidies. (In fact, in this case price subsidies may be viewed as concealed income transfers and may be recognized and implemented as such). Given a majority rule voting system and the consequent threshold effects operating on elected officials, the assumption that zero marginal evaluations of various programs exist (at the combination selected by the official) is not far fetched.

Another condition under which local officials may circumvent or thwart the stimulative purpose of a federal subsidy will arise when the local leaders can trade the subsidized good on the "market"; for by doing so, they will reconvert a conditional subsidy to a general income supplement. Subletting of rent supplemented housing, or sales of food stamps to others are examples at the level of the individual. Sales of the output of a subsidized public facility (say water or waste treatment) to another local authority will accomplish the same purpose. Similarly, if a local government sells the subsidized public facility to its own citizens the community will collectively thwart price incentive effects of the subsidy--provided the facility has alternative uses. Where direct sales of the subsidized output are physically impossible or legally prohibited, then other indirect forms of transfer may be accomplished. If the local government possesses an equivalent, saleable good, the price incentive of the federal subsidy is circumvented when that different but equivalent good were sold. For example, suppose the federal government were to subsidize the procurement or preservation of open space in cities; then a local government which sold open land or put to other use open land presently in its possession, would effectively convert the specific federal subsidy into resources in general.

Nor is it necessary that the local authority actually sell an asset to convert conditional to unconditional resources. To a certain extent local authorities may react to federal manipulation not by selling more or less substitutable goods but by renting them out or imposing user charges. Suppose for example, a state were willing to pay its share of the cost of a new highway only provided it could recover its costs on road tolls. If the federal-state highway cost-sharing regulations prohibited charging user fees, the state might nevertheless accept the federal aid, and initiate or increase user fees elsewhere in its state highway system. To the extent that non-residents contribute user fees, the highway has in effect been converted back to fungible resources.

There are other ways in which the local community might effectively trade the subsidized good received from the federal government for general resources. One way trades can be made is through time. Where a local government plans to purchase durable goods according to some schedule in the future, a one time subsidy offer or uncertainty over the continuation of the offer by the federal government may provide sufficient incentive for the local government to borrow money for present construction, thereby effectively using the federal cost share to reduce future tax loads. The local agency, of course, may not have to borrow on the open market from private citizens; instead the borrowing may be internal to the local government with one agency therefore reducing its present expenditures and transferring funds to another with an agreement to reverse the process years in the future.

Another possibility for converting specific to general resources occurs when the benefits of a public facility appear in the form of increased profits to local firms, or increased monetary incomes of local citizens. In such a case the local government will recover a portion of the subsidy as local taxes.

Lastly, possibly the greatest opportunity exists for defeating intended substitution effects occurs when grants-in-aid are supposed to apply only to increases in local output over current levels. Local decision makers may then easily be able defeat the price effect of those grants by understating or reducing "normal" funding to the subsidized programs. The federal bureaucracy in this case might institute specific legal "countermeasures" the best "countermeasure" however may well be completely to the abandon efforts to restrict subsidies to incremental, or "above-normal" local outputs. This particular problem would vanish if instead a flat subsidy rate were paid for the entire outlay on the function in question. Although this policy might generate greater explicit federal transfers, it would have a number of salutory effects in directing local efforts towards overall systems planning and decision, and away from the socially useless effort of establishing what the "normal" non-subsidized outlay would be.

INCORPORATING PRICE AND INCOME EFFECTS AND LOCAL PRICE EVASION IN EMPIRICAL ANALYSIS

As mentioned above regression analyses have attempted to measure the "stimulative effects" of federal government grant-in-aid programs on state and local expenditures. These efforts have in common that they do not distinguish price and income effects of federal grant expenditures. Several authors, for example, report on regression studies of total state/local per capita expenditures (including grants) on a particular function "i", T^i, against explanatory variables such as:

(1) Population density, y_1.
(2) Percent of population which is urbanized, y_2.
(3) Per capita income, y_3.
(4) Per capita federal aid to function i, F^i.
(5) Per capita federal aid to all other functions than i, G^i.

One author using 1960 data, and states as observations,[1] finds that:

$$T^{Total} = 13.86 - .061y_1 + .416y_2 + .099y_2 + .099y_3 + 1.760F^{Total}$$

This has been interpreted to mean that one dollar of federal aid on the average will increase local expenditure by $1.76 and hence local taxes (or borrowings) by $0.76.

The same author also found that:

$$T^{Welfare} = 17.70 + 0.003y_1 - 0.023y_2 + 0.011y_3 + 1.683F^{Welfare}$$

This has been interpreted to mean that a dollar's federal aid to welfare stimulates local spending by $0.68.

Another author[2] using substantially the same data, derived:

$$T^{Education} = -66.24 + .041y_3 + 5.11F^{Education} + .52G^{Education}$$

and concluded from this estimate that a dollar grant to non-education aid stimulates $.52 in local expenditure on education. In this case the author held that in general the federal government may be able to stimulate local expen-

diture on one function indirectly by aiding an entirely different local activity, and that these two methods therefore constitute policy alternatives.

These findings, however, have been challenged on the grounds that federal aid may not be truly independent of state/local expenditures, that aid payments may depend on expenditures, or that each may depend on the other simultaneously.[3] Finally, one author in the course of building an explicit utility maximizing model, with simultaneous equations to represent this interdependence, claims that federal aid must stimulate local expenditure on the function aided unless local officials have "unusual wiggles" (tisk, tisk) in their utility functions.[4] In all these examples, it should be noted, federal grants, "F" figure as an income variable rather than a price variable.

But as argued above more than a simple distinction between price and income effect is required to appraise the influence of these grants. In view of the variety of options for local manipulation of federally imposed constraints, particular care must be devoted to discovering or inferring the constraints actually bearing on local decisions and the degree to which "conditional" grants are effectively conditional. That is, we should be especially concerned to discover whether local officials react to effective price changes, or in practice convert conditional to unconditional receipts. Since we know rather little about what constraints are operationally effective in sub-national decision making, restricting our view to one particular assumption for interpretation of the data seems unwarranted, as are a priori assertions about the stimulative impact of federal grants. What is called for in this situation is the development and estimation of alternative explanatory models and structural equations.

For any given functional expenditure category or group of categories, state or local government expenditure data will show time series of (1) total expenditures on that category, (2) total grants from higher levels of government for that category, and (3) total local expenditures for all other items. In interpreting such data as the result of local government optimizing behavior, three alternative "pure" hypotheses seem plausible.

1. Neither Income Nor Price Effects

If could be that, legal formulas for state/local effort to the contrary notwithstanding, federal grants have no influence on local budget mix decisions at all -- that federal funds for specified purposes increase total outlays for those purposes by the exact amount of the federal funds. Figure 1 shows a hypothetical pattern of local and total expenditures which would suggest this structure. Local expenditures from internal funds on programs X and Y increase smoothly with income, showing a regular income consumption path, while total empenditures vary erratically. The appropriate equation to fix in this case would be of the form:

$$F^i + L^i = f(\bar{L}^1)$$

where

L^i = Local expenditures from local funds on the i^{th} function

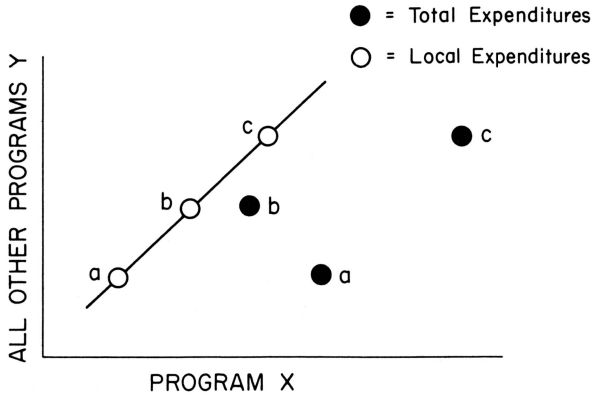
(L^i) = Local expenditures from local funds on all functions including the i^{th}

$\bar{L}^1 = (L^i) - L^i$; F^i = Federal grant to i^{th} function.

2. Pure Income Effect

As a second example, it could be that federal funds are absorbed in local budgets and treated as completely fungible with local internal resources. Because of the variety of ways local officials may have of substituting federal

FIGURE 1


● = Total Expenditures
○ = Local Expenditures
ALL OTHER PROGRAMS Y
PROGRAM X
a
b
c
a
b
c

for local funds, (already discussed) there is no reason to reject this a priori because of federal laws to the contrary. Figure 2 shows a pattern of data which would support this hypothesis. The more plausible income consumption path follows the line of total expenditure mix observations. In this case the correction equation to fit is:

$$F^i + L^i = f[L^{-1}, \sum_i (F^i)]$$

where $\sum_i (F^i)$ = Total grants in aid to all functions.

3. Pure Price Effect

Lastly, as a pure case, it may be that local decision makers view contingent grants as a price change, and do in fact react as we imagine the ordinary consumer to do accepting prices as given. One problem in verifying this hypothesis is that no independent information on the effective price to the local decision maker may be available to the analyst. For example, if the realized federal subsidy to a certain function in any particular year is F^i, and the ex post local expenditure on the same program in the same year is L^i, the only measure of price available may be

$$\frac{F^i}{L^i}$$

In this case the form of equation is

$$L^i = f[L^{-1}, (F^i/L^i)]$$

where the hypothesis to be tested is that the price ratio, (F^i/L^i), was in fact a fixed number for the year and place to which the observations L^i and F^i refer. Figure 3, illustrates a pattern of observations consistent with this hypothesis. Observations are grouped into classes, in which local resources (or hypothesized price ratios) are the same. Within each class, variations in expenditure pattern due to differences in price ratios (or local resource levels) are examined. Then where the local officials respond to conditional grants as a consumer does to price changes, the patterns of expenditure within each grouping should diverge from the patterns for other groups (as drawn in Figure 3). On the contrary if the local officials treated the federal subsidies as effective income grants, one pattern common to all groupings should emerge. (Not shown).

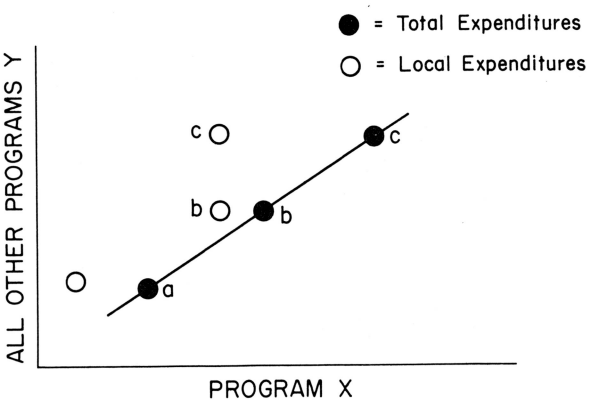
A GENERAL FORMULATION INCORPORATING PRICE INCOME AND EVASION EFFECTS

Local government may be able to use a portion (but only a portion) of federal grants as a pure, revenue supplement, while devoting the remainder to a specifice purpose, at the cost of meeting some nominal matching requirement. This situation would arise when the local government can economically circumvent a part of its legal matching requirement or when both types of grants exist. If we suppose that the local government can transfer, a fraction "α" of the specific grant it receives to general purposes, and that the local government acting with complete foresight makes an optimal allocation of resources to the subsidized program, then the proper equation to fit is of the form

$$F^i + L^i = f[L^{-1} + \alpha F^i], [(1-\alpha)\frac{F^i}{L^i}]$$

For example, fitting

FIGURE 2


● = Total Expenditures
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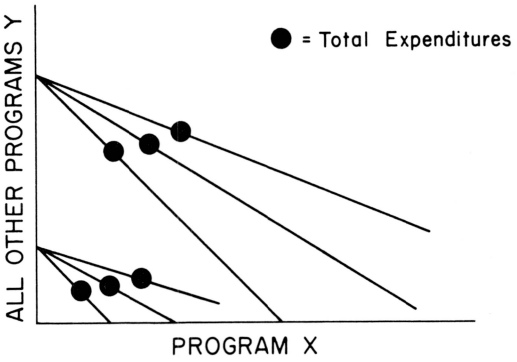
ALL OTHER PROGRAMS Y
PROGRAM X
c
b
a
c
b

FIGURE 3



$$L^i = a_o + a_1 \overset{-1}{L} + (a_1\alpha - 1)F^i + a_2 (1-\alpha) (F^i/L^i)$$

will result in coefficients

a_o = intercept

a_1 = marginal propensity to "consume" program i

$b_1 = a_1\alpha - 1$; hence $\alpha = (b_1+1) / a_1$

α = income supplementing fraction of F^i

$b_2 = a_2 (1-\alpha)$; hence $a_2 = \frac{a_1 b_2}{a_1 - b_1 - 1}$

a_2 = price responsiveness of local expenditures.

This general formulation will allow for all three "pure" cases illustrated by figures 1-3, and of course for intermediate outcomes. The three pure cases would be implied by the following results.

Neither Income Nor Price Effects: $b_1 = b_2 = 0$

Income Effects Only: $b_1 = a_1$, $b_2 = 0$

Price Effects Only: $b_1 = 0$, $b_2 = a_2$

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FOOTNOTES

[1]Sacks and Harris [10] p. 83.

[2]Osman [8] p. 366.

[3]Pogue and Sgontz [9] ; and Oates [12].

[4]Gramlich [4] p. 123, reaches this conclusion by assuming (1) that grants-in-aid are close-ended and produce only "income effects" in local decisions as to program mix and (2) that no inferior or superior goods exist in the local programs.