

*Paul Gary Wyckoff is an economist at the Federal Reserve Bank of Cleveland. The author would like to thank John Beck and Ronald Fisher for helpful comments on an earlier draft.*

## Revenue Sharing and Local Public Expenditure: Old Questions, New Answers

by Paul Gary Wyckoff

During his first four years in office, President Reagan has been an active reformer of the structure of American federalism. In the Omnibus Budget Reconciliation Act of 1981, the President achieved a sweeping reform of the nation's system of categorical grants to state and local governments, consolidating many of these programs into block grants and reducing overall funding levels.

A second major Reagan initiative, a "swap" in which the federal government was to take complete responsibility for Medicaid (which provides medical care for the poor) in exchange for the states' pledge to take over Aid to Families with Dependent Children (AFDC) and food stamps, failed to win the approval of state and local leaders and has been shelved.

Now the Reagan administration proposes to further trim federal assistance to state and local governments by deleting the general revenue sharing program from its latest budget. Even if supporters manage to continue funding for one more year, the program's future is highly uncertain, since its authorizing legislation expires on September 30, 1986.

The evaluation of such a sweeping reform calls for detailed knowledge of the workings of the recipient governments. To answer the questions of the efficiency, equity, and political acceptability of this proposal, a model of local expenditure decision-making is required. Fortunately, there is a rich literature in economics on the effect of lump-sum, general-purpose aid on local spending; the question has become a focal point for the theoretical analysis of local public choice, shaping investigators' viewpoints on larger questions about the nature and efficiency of the local public sector.

The empirical results in this field, however, pose a serious challenge to the generally accepted models of 10 to 20 years ago, and have broken down rather than built consensus among economists. Thus, existing literature offers no unified framework from which to judge the Reagan proposal.

*1. Here, I am abstracting from any considerations as to the relative permanence of these different kinds of income. If a wage gain is considered a permanent increase in income, while a capital gain is considered transitory, this will affect the consumer's savings-consumption decision and perhaps may affect the type of durable goods purchases that he will make.*

In this paper, I provide some theoretical background to the current public policy discussion on revenue sharing. In section I, the nature of the economists' previous consensus is explored, along with the empirical irregularities that broke down that consensus and invited new approaches to local public choice. Section II reviews the various ways in which economists have tried to amend or replace their previous notions in light of these empirical results. Section III offers a critique of these efforts. A new model to explain these empirical facts is summarized in section IV, along with a description of an empirical test of this model. The concluding section contains a few preliminary comments on the public policy ramifications of this new model.

## **I. Flypaper Effects**

Two approaches have dominated the literature on modeling local public expenditure decisions. The first approach, exemplified in the work of Henderson (1968), Inman (1971), Ehrenberg (1973), Gramlich and Galper (1973), and Deacon (1978), applies standard consumer theory to this sector. Without specifying either the actors in the local decision-making process or their preferences, local governments are assumed to behave as if they are maximizing a well-behaved utility function over public and private goods, subject to a budget constraint that the total income of the community (intergovernmental grants as well as private income) must not exceed the total amount spent on private spending and local public goods.

Although it is seldom made clear in these studies, this approach implicitly assumes that the city's budget is under the control of some individual or party within the city, since a well-behaved utility function for the community will not exist unless this is the case (Arrow 1950). Subject to certain legal limits on the type of taxes collected, this controlling party determines the type and quantity of local public goods produced and the total amounts

spent in the public and private sectors of the economy.

Remarkably, even this very unrestrictive approach, in which the identity of the controlling party is left unspecified, carries implications for local expenditure behavior that are inconsistent with the empirical work in this field. Since the controlling party can tax local private income at will, this model acts as if all intergovernmental aid, as well as all private income, were under the control of this anonymous decisionmaker. Just as the choice for a consumer between new furniture or a new car is independent of the composition of income between wages, capital gains, dividends, and interest, so the controlling party's division of resources between private consumption and public goods should be independent of whether the community's money comes from private income or from intergovernmental aid? If all that concerns the city is to maximize some utility function over private consumption and public services, the source of the money used to pay for the city's budget is irrelevant. Therefore, the expenditure effect of a one-dollar increase in revenue sharing ought to be the same as that resulting from a one-dollar increase in aggregate private income in the community.

In his review of the early econometric work on this question, Gramlich (1977) noted that this equivalence was consistently rejected by the data. "Whether half or all the revenue-sharing money goes into higher expenditures, however, at this point all empirical studies indicate long-run responses appreciably greater than would be implied by the response of expenditures to changes in income . . ." (Gramlich [1977], p. 230). This pattern of behavior has come to be known as the flypaper effect: money originally from the public sector (intergovernmental grants) sticks in the public sector and is spent on public goods, while money originally from the private sector (local taxes on private income) sticks in that sector and is spent on private consumption.

The second major approach to modeling local public expenditure decisions retains the

framework of consumer theory but also specifies the identity and preferences of the controlling party. Early writers in the theory of voting (see Hotelling [1929], Bowen [1943], and Black [1948]), showed that whenever binary choice is involved (two political parties, two candidates, or two sides of an issue), a position at the median of the community's preferred spending levels will generate the greatest electoral support. This result ensures that competitive political processes will always produce median outcomes. Drawing on this theoretical foundation, numerous empirical studies have utilized the assumption that local governments behave as if they were maximizing the utility of the median voter in each community (see Bergstrom and Goodman [1973], Borcharding and Deacon [1972], Ladd [1975], Lovell [1977], Perkins [1977], Inman [1978], and Pack and Pack [1978]). Under further assumptions about the demand function for local public goods and the distribution of income and wealth in the community, the income and the tax

price facing the median voter can be calculated, and the response of *individuals* to changes in their public and private good budget constraint can be estimated.

Even before this approach was well developed, however, Bradford and Oates (1971) showed that it did not explain flypaper effects. They made their argument with the help of a simple graph, reproduced here as figure 1. The median voter's budget constraint between private goods and public expenditures is displayed, with a slope equal to the negative of the median voter's tax share (here labeled  $T$ ). A lump-sum, general-purpose grant of amount  $A$  (which I will refer to later as simply a lump-sum grant) shifts out the budget constraint in parallel fashion. Since the budget constraint is a straight line, an income increase of amount  $TA$  ought to generate the same final budget constraint as under the aid increase, and hence the same equilibrium amounts of private goods and public expenditures. Thus, under the median voter model, an income increase of amount  $TA$  is *equivalent* to an aid increase of amount  $A$ .

Another way to think about this result is to note that the median voter controls a share of the lump-sum aid equal to  $TA$ . Since the median voter is the dominant actor in local politics, he or she can move this bundle of resources in and out of the public sector as desired. If, for example, the median voter decides to use none of the lump-sum aid for public expenditures, the money would be used to lower taxes and the median voter would receive a rebate in the amount  $TA$ . Under the median voter model then, the voter's "public income" ( $TA$ ) can simply be added to his or her private income ( $Y$ ) to derive the total income ( $Z$ ):

$$Z = Y + TA.$$

It follows that under the median voter model an increase in the median voter's share of lump-sum aid ( $TA$ ) ought to have the same expenditure effect as an increase in his or her private income ( $Y$ ).

**Fig. 1 Aid in the Median Voter Model**  
 Equivalence of a Lump-Sum Grant of Amount  $A$  to an Income Increase of Amount  $TA$

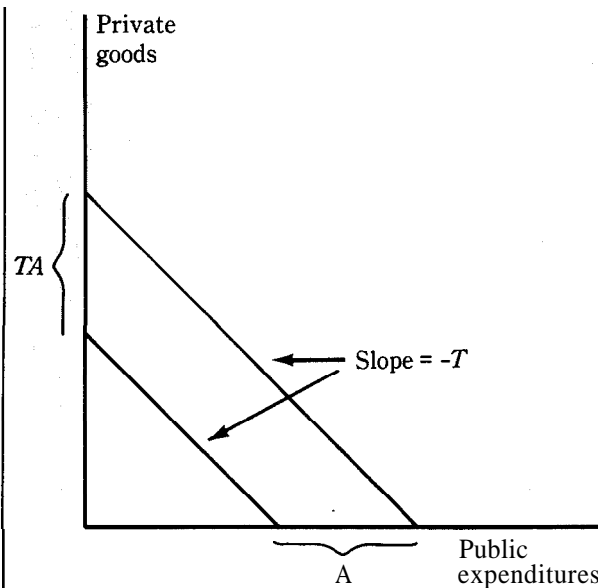


Table 1 (reproduced with permission from Fisher [1982]) shows the results of a recent survey of tests of the flypaper effect in both the median voter model and in the older

expenditure-as-utility-maximization literature. For each study, the first column shows the expenditure effect that would be predicted for lump-sum aid if flypaper effects were

**Table 1 Estimates of the Flypaper Effect**

Study	Predicted by theory	Estimated	Error <sup>a</sup>
<b>Total local government expenditures</b>			
Gramlich-Galper (1973)	$0.03 \leq dE/dA \leq 0.05$ $0.06 \leq dE/dA \leq 0.10$	$dE/dA = 0.25$ $dE/dA = 0.43$	\$0.20 - \$0.22 0.33 - 0.37
Inman (1971) <sup>b</sup>	$0.02 \leq dE/dA \leq 0.04$	$dE/dA = 1.00$	0.96 - 0.98
Ehrenberg (1973) <sup>b</sup>	$0 \leq \epsilon_{E,A} \leq 0.08$	$\epsilon_{E,A} = 0.22$	0.14 - 0.22
Study	Predicted by theory	Estimated	Error <sup>a</sup>
<b>Education</b>			
Feldstein (1975) <sup>b</sup>	$0 \leq \epsilon_{E,A} \leq 0.05$ $0 \leq \epsilon_{E,A} \leq 0.05$	$\epsilon_{E,A} = 0.21$ $\epsilon_{E,A} = 0.06$	0.16 - 0.21 0.01 - 0.06
Inman (1971) <sup>b</sup>	$0 \leq \epsilon_{E,A} \leq 0.06$	$\epsilon_{E,A} = 0.71$	0.65 - 0.71
Ladd (1975)	$0 \leq \epsilon_{E,A} \leq 0.05$	$\epsilon_{E,A} = 0.03$	—
Inman (1978)	$0 \leq \epsilon_{E,A} \leq 0.06$ and $0 \leq \epsilon_{E,A} \leq 0.08$	$\epsilon_{E,A} = 0.23$ and $\epsilon_{E,A} = 0.40$	0.15 - 0.34
Olsen (1972) <sup>b</sup>	$0.02 \leq dE/dA \leq 0.04$	$dE/dA = 0.27$	\$0.23 - \$0.25
Weicher (1972) <sup>b</sup>	$0 \leq dE/dA \leq 0.001$	$0.41 \leq dE/dA \leq 0.58$	\$0.41 - 0.58
Gramlich-Galper (1973)	$0.01 \leq dE/dA \leq 0.02$	$dE/dA = 0.10$	\$0.08 - 0.09
Johnson (1979) <sup>b</sup>	$0.004 \leq dE/dA \leq 0.006$	$0.38 \leq dE/dA \leq 1.61$	\$0.37 - 1.60

a. Reported in cents per dollar of grant for studies measuring marginal effects and in points for studies measuring elasticities.  
b. These works do not appear in this article's reference list. They can be found in Inman (1979) and Fisher (1982).  
SOURCE: Used with permission from Fisher (1982). For references, see Inman (1979) and Fisher (1982).

absent, based on that study's estimate of the expenditure effects of income. The second column displays the actual effect of aid on expenditures, while the last column shows the discrepancy between the actual and predicted effects.

In the case of studies reporting marginal effects, the expenditure effect of lump-sum aid ranged from \$0.20 to \$1.60 larger than predicted by the theory. For those studies reporting elasticities, the expenditure effects were from zero to 71 percent larger than expected. As table 1 makes clear, although these effects are not ubiquitous (see, for example, Gramlich [1982]), the vast majority of studies support the idea that flypaper effects are significant and in need of explanation. Moreover, flypaper effects results occurred across a wide variety of data sets and empirical methodologies, as discussed below.

## II. Previous Explanations of the Flypaper Effect

In examining the theoretical literature on flypaper effects, I begin with six conservative approaches. These six explanations, while modifying the theory briefly outlined above, retain the assumption that local expenditure decisions can be modeled as the choice of a single, rational decisionmaker such as the median voter. These studies blame flypaper effects on misinformation, arguing 1) that previous investigators have missed salient features of the problem in modeling the response of communities to grants-in-aid, or 2) that the median voter himself is mistaken about the effects of grants on his budget constraint.

Chernick (1979) and Fisher (1979) assert that previous analysts have classified much government aid as lump-sum although it does not properly belong in that category. Chernick notes that, if lump-sum aid is con-

strued to include project grants, this money may represent the outcome of utility-maximizing decisions by the bureaucratic agency that administers the program. This creates two problems in estimating the effect of aid on expenditures.

First, the process of awarding grants appears to be influenced by the number and dollar amount of previous grant applications, so that actions of the community influence the amount of grants it receives. If these grant applications are correlated with community expenditures, a simultaneous equations bias exists in which expenditures affect aid and aid affects expenditures.

Second, in a more fundamental argument, Chernick says that grant determination is a complex process that involves the bureaucrat's utility benefit from additional expenditures in that community and the community's willingness to share in the costs of the new project. Therefore, both grant amounts and local expenditures are endogenous variables in the model; they are not related by any consistent function that can be compared to the effect of income on expenditure. Depending upon the level and rates of change of the truly exogenous variables in the model, any combination of grant and local expenditure levels can occur.

Fisher argues that, when lump-sum aid includes revenue sharing, the frequent inclusion of tax-effort factors into the distribution formula for this money creates what amounts to a price effect as well as an income effect on local government spending. A community's tax effort is usually defined as the compound fraction formed by taking the ratio of the community's tax revenue, divided by its tax base, to the tax revenue of the entire nation or state, divided by the tax base of this larger political unit.

When such a factor is included in a revenue-sharing formula, it creates an incentive for local governments to raise taxes and expenditures in order to raise their tax effort and re-

ceive more aid from higher levels of government. In other words, the price of another unit of expenditure by the community is reduced by the effect of this spending on its tax effort and revenue-sharing collections. Because of this price effect, Fisher argues, we ought not to expect revenue sharing to have the same effect as an equivalent amount of private income.

In a related but more complex argument, Moffitt (1984) examines the role of closed-end matching grants on the budget constraint of the median voter. In many cases, these grants have been considered lump-sum aid on the grounds that, once the program's upper limit has been achieved, the cost of each additional unit of the good is unaffected by the grant.

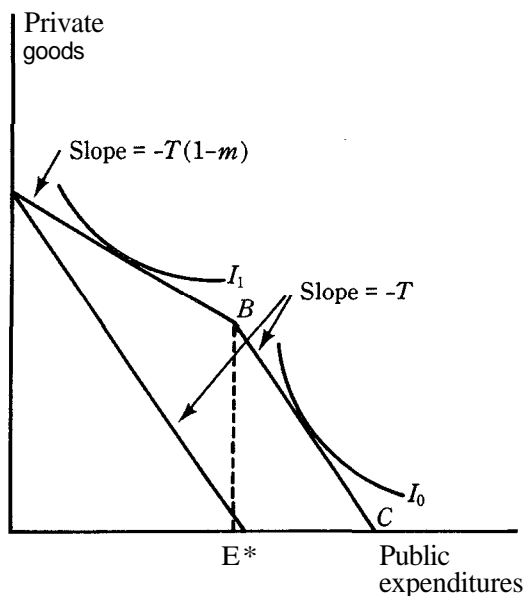
This effect is shown in figure 2, which depicts the median voter's budget constraint with and without the program. When the community's expenditures are supplemented by the program, the slope of the voter's budget constraint is  $-T(1-m)$ , where  $m$  is the federal government's matching rate, up to some

limit  $E^*$ . Above that level of expenditures, the grant amount remains unchanged, and the slope reverts to  $-T$  (as in figure 1). For any community locating between  $B$  and  $C$ , the budget constraint is shifted by the program, but its slope remains the same.

Moffitt argues that when the budget constraint becomes nonlinear, estimation becomes much more complicated and previous techniques yield biased results. For example, suppose that the functional form used in estimation implies a preference function that includes indifference curve  $I_0$ , but that communities have diverse preferences so that median voters in some cities have indifference curve  $I_1$ . Then the variation in preferences will be picked up by the error term. Notice, however, that the change in preferences implies a change in the equilibrium price faced by the voter so that the error term and the price variable are correlated. This contemporaneous correlation will lead to bias in the estimated coefficients. Moffitt also presents suggestive evidence (using a more sophisticated estimating technique, but employing an ad hoc demand equation to test for flypaper effects) that, in the case of AFDC grants, flypaper effects disappear when these nonlinearities are accounted for.

Hamilton (1983) believes that previous analysts were fooled because they failed to realize that, in many cases, private income represents both a pool of resources for consumption and a surrogate for certain unobserved factors in the production of local public goods. His case is strongest with respect to local education: not only does increased income in a community make possible increased spending on schools, but educational studies show that children from families with higher income and educational levels tend to learn more rapidly than other children. Thus, as income increases, expenditure increases may be held down by the fact that children from higher-income homes require fewer educational resources to achieve a given level of educational achievement. This effect will again cause lump-sum

**Fig. 2 The Case of Closed-End Matching Grants**



2. It should be noted that Oates' model includes a budget-maximizing bureaucrat, and in that sense his model replaces rather than reforms the standard median voter model. However, the bureaucrat in this model derives his power solely from the voter's misperception of the marginal cost of local public goods. For that reason, I have included it in this section.

aid to have a greater expenditure effect than income increases.

Courant, Gramlich, and Rubinfeld (1979) and Oates (1979) argue that it is the voter, and not the analyst, who is being fooled by the effect of intergovernmental grants.<sup>2</sup> Specifically, since the typical voter has little information about the extent of grants to his community, the voter estimates the unknown marginal cost of public goods using other known variables. By taking the ratio of his tax payments to total expenditures in the community, the voter can determine the average cost of public goods and use this as an approximation for their marginal cost. When lump-sum aid is present, however, the use of this proxy will cause the voter to err in his estimate of marginal cost. If the lump-sum aid is used to finance additional expenditures, total expenditure will increase while the median voter's tax payments will remain unchanged, thus driving down the average price of public goods and leading the voter to mistakenly demand more public goods. Because of this "fiscal illu-

sion:' these writers argue, lump-sum aid has a price as well as an income effect and we should not expect the aid to have an expenditure impact that is equivalent to the effect of an income increase.

In contrast to these six arguments, Romer and Rosenthal (1980) and Filimon, Romer, and Rosenthal (1982) insist that a more radical revision of the model is needed to explain flypaper effects. In these papers, the authors remove the median voter from his preeminent position in local decision-making and replace him with a bilateral monopoly model in which both the voter and a budget-maximizing bureaucracy are important actors. Flypaper effects occur, they say, because of the influence of this bureaucracy. This influence springs from the agencies' superior knowledge as compared to that of the median voter and/or the bureaucrats' ability to control the agenda of the decision-making process.

The "asymmetric information" model presented in Filimon, Romer, and Rosenthal is straightforward: the median voter is simply

### A Primer on Aid Types

Intergovernmental aid can be classified according to two criteria. The first involves restrictions placed on the recipient government about how the money is to be used. The second way of classifying aid is by determining how closely the amount of aid is tied to the recipient's expenditures. Grants are usually identified according to their positions along these two dimensions.

At one end of the spectrum of restrictions placed on recipient governments are *categorical grants*, which can be used only for a single, well-defined purpose. Federal grants for highways are of this type. Many categorical grants are of the *project grants* type, in which money is awarded for a specific undertaking (usually a capital project) at the discretion of the federal agency administering the program. Urban development action grants fit under this category. Somewhat less restrictive are *block grants*, which allow state and local governments to use aid for a broad class of activities. Examples include the federal government's community development block grant, social service block grant, and elementary and secondary education block grant. At the other end of this spectrum lies *general purpose aid*, which can be used for whatever the recipient govern-

ment wants, including lowering taxes. *Revenue sharing* is an example of general purpose aid.

Along the second dimension, *matching aid* requires that the recipient government spend its own money as well as funds from grants on the aided goods. Typically, as in the aid to families with dependent children (AFDC) program, this takes the form of a cost-sharing arrangement; the federal government pays a percentage of program costs. Matching aid can be closed- or open-ended, depending upon whether the grantor government sets a ceiling upon the amount each recipient can receive (closed-ended), or if aid is available at the matching rate for whatever level of expenditures the recipient chooses (open-ended). At the opposite end of this dimension of grants is *lump-sum aid*, which is entirely independent of the expenditures of the recipient government. Revenue sharing is typically categorized as lump-sum aid, although strictly speaking it has some features of a matching grant if tax effort considerations are used in distributing these funds (see text). In this paper, the term lump-sum aid has also been used as shorthand for the more cumbersome term *lump-sum, general purpose aid*.

unaware of the presence of lump-sum grants in his community (even its impact on the average price of public goods) and the well-informed bureaucrat simply uses all the lump-sum aid for additional expenditures.

The "agenda control" model presented in both Romer and Rosenthal and in Filimon, Romer, and Rosenthal is more complex and more specialized. This model deals only with the case in which voters approve or disapprove local expenditures through a referendum, a situation which is not uncommon in local education. If the school board's request is not approved (and subsequent proposals are also turned down by the voters) the school district's expenditure will be set to a "reversion" level of spending, which is usually mandated by the state. The bureaucrat's power in this situation springs from his ability to determine what proposal, if any, is brought before the voters, who must choose between the board's request and the reversion level. For high reversion levels, the bureaucrat will bring forth no budget at all and will allow the state's reversion level to take effect. For very low (and hence unattractive to voters) reversion levels, the bureaucrat will propose the largest budget which will give the voter the same utility as the reversion level.

The comparative statics of this model are quite complex and depend critically upon the relationship of the reversion level of spending to the median voter's preferred level of spending. Under certain circumstances, however, the model will generate flypaper effects. Suppose for example that the reversion level is very large so that the bureaucrat simply accepts the reversion level. Then increases in income will have no effect on expenditures since it is the exogenous reversion level, not voter preferences, that determines spending. On the other hand, since most states require that aid be included in the reversion level, an increase in lump-sum aid increases spending by the full amount of the grant.

Thus, in this stylized example, a flypaper effect equal to the amount of the grant will occur (based upon the expenditure effect of income, the grant should have no effect on expenditure, but expenditure increases equal to the grant are observed). In other situations, in which the reversion is less than, or in the neighborhood of, the median voter's preferred level, flypaper and even anti-flypaper effects (income generating larger expenditure effects than grants) can occur, depending upon the nature of the voter's preference map.

### **III. A Critique of Previous Explanations**

The explanations outlined above offer only limited descriptions of the flypaper effect that are confined to particular institutional situations, to particular kinds of grants, or to particular government services.

For example, Hamilton develops his argument that income is a proxy for inputs into the production of local public goods in a general way, but is able to offer examples only for local education and police protection. Romer and Rosenthal's "agenda control" model applies only to the case of local direct (not representative) democracy. Chernick's work applies only to project grants, not revenue sharing. Fisher's arguments apply only to revenue sharing that is distributed according to a tax effort formula. Moffitt's model is relevant only for closed-end grants, particularly those with more than one matching rate (such as AFDC) where the applicable rate depends upon the community's expenditures.

In a more subtle way, the fiscal illusion model and the "asymmetric information" model of Filimon, Romer, and Rosenthal are also limited; without further modification, they are confined to the institution of direct democracy. In these models, voters are misinformed about the fiscal situation facing their community and so make incorrect choices. But voters are typically represented by elected officials who know the extent of aid to their communities



3. *Fisher's point might continue to have some relevance because most states do have a program of revenue sharing or grants for general relief, although these programs are usually small in dollar value. Some of these programs include effort considerations.*

(it is a prominent part of each annual budget) and who therefore know that marginal costs are unchanged by lump-sum aid. Moreover, since the decisions made by the voter in the fiscal illusion and asymmetric information models will be suboptimal, elected officials will have a political incentive (in order to maximize their chances of reelection) to both act on this information about the true cost of public goods and to release it to the general public.

For example, if voters would be happier with a smaller public sector and a reduction in local taxes, ambitious politicians have an incentive to give it to them. Thus, in a representative democracy, these models require one of two unpalatable modifications: either elected officials ignore even the most basic elements of their city's financial situation or political competition in the city has completely broken down.

The limited scope of these explanations contrasts sharply with the comprehensive nature of flypaper effects, which appear across a wide range of data sets, local public goods, and empirical methodologies. This means that, for every explanation given above, a study can be found that is beyond the scope of that argument but that still finds evidence of flypaper effects.

For example, Hamilton's hypothesis about income as an input leads to the conclusion that flypaper effects should occur primarily in education and public safety, but Gramlich and Galper (1973) report flypaper effects for social services (health and hospitals, and housing) and urban support (sewers, sanitation, highways, and parks and recreation) as well, while Inman (1971) reports additional flypaper effects for sanitation, sewers, parks and recreation, transportation, libraries, and welfare.

These two studies also carefully separate project grants from their lump-sum aid variable to obviate Chernick's arguments about the exogenous nature of project grants. In a similar way, Wyckoff (1984) removes all categorical grants of any kind from his lump-sum aid

variable, thus ensuring that the arguments of Moffitt do not apply.

Since the subject of all the studies in table 1 was representative democracy, none of the arguments that rest on direct democracy (Romer and Rosenthal's agenda control model; Filimon, Romer, and Rosenthal's asymmetric information model; and the fiscal illusion model) are applicable. In addition, Fisher's tax effort considerations are probably not relevant to these results, since those studies took place before the onset of federal general revenue sharing and/or involved independent school districts that do not receive federal revenue sharing money.<sup>3</sup>

It is perfectly possible that flypaper effects are due to a combination of the theories just discussed, with each explanation being more important in a particular place and time. If this were the case, however, we might expect more variation as to the presence or absence of flypaper effects across empirical studies than illustrated in table 1. Without a unifying theory, we are forced to conclude that 10 out of the 11 studies in table 1 happened by chance to choose data sets and empirical techniques that led, through many distinct mechanisms, to flypaper effects.

While this multiple-cause explanation certainly cannot be ruled out, table 1 at least suggests that a more general explanation of flypaper effects might be useful, one which is not tied to a particular public service, institutional situation, or empirical specification. If such a theory existed, it would be easy to explain the consistencies noted in that table. For this reason, the next section summarizes a new attempt to explain flypaper effects, based on institutional features of government that, it is hoped, are more universal than the factors that underlie the explanations given above.

#### **IV. A New Theory of Flypaper Effects**

Wyckoff (1985) details a new model of flypaper effects, based upon two basic ideas. First, local public goods are produced by pub-

lic employees (bureaucrats) whose interests do not always match those of the community. Second, this bureaucracy has influence over city council because it knows more about the true cost of producing public goods than the council does. Because of his or her professional training and day-to-day contact with these matters, the head of each department is assumed to have an advantage over council members in knowing both the production function for public goods (what inputs are needed for a particular level of output) and the minimum cost for these inputs.

To highlight the influence of these two notions, the model uses three simplifying assumptions. Local decision-making is assumed to be a simple two-way struggle between city council and a single, well-informed bureaucrat. Due to political competition, the preferences of city council are taken to accurately reflect those of the median voter in each community. Following Niskanen (1971), the bureaucrat is assumed to be solely interested in increasing the size of his budget, because this budget is systematically related to variables of direct interest to him: salary, fringe benefits, professional prestige, and power over others. Use of this third assumption means that the resulting model is an application and extension of Niskanen's model.

According to the public choice literature on bureaucracy, the bureaucrat's information advantage has an effect on public expenditure, allowing him to expand the city's budget beyond what the median voter would prefer. To increase his budget, the bureaucrat submits the largest request he thinks council will approve. In reviewing this request, city council is hampered by its lack of knowledge of the effects of marginal changes in the budget; since it doesn't know the true cost of public goods, it doesn't know what budget changes will mean in terms of changes in output. A risk-averse city council will therefore tend to avoid making changes in the bureau's budget request.

Moreover, an expansion-oriented bureaucrat will compound the council's timidity in making budget changes by acting strategically. Not only does the bureaucrat have no incentive to reveal correct information about the true cost of public goods, he will try to release distorted information and respond to budget cuts by cutting the most popular programs first ("cutting the meat instead of the fat"). Another budget-increasing tactic is to respond to council's tendency to cut all budget requests by a certain proportion by inflating requests so as to maintain desired spending levels even after allowance is made for token budget-cutting.

By using his information advantage this way, the bureaucrat in this simplified model will push the city council to the point where the median voter is indifferent between the budget that is finally approved and doing without the local public services (and the taxes that go to pay for them) entirely. This is a standard proposition of the Niskanen model. However, the local government case differs fundamentally from the central government case (the subject of Niskanen's study) because city residents have a stronger "exit" option (to use Hirschman's [1970] term) than do citizens of a nation. If he becomes dissatisfied with his community, the voter can always move.

Two standard comparative static results from the Niskanen model carry over to the model in Wyckoff (1985). First, the community's demand function for public goods, as filtered by negotiation with bureaucrats, will always be cost-elastic. Second, a dollar of lump-sum aid to this community will always generate more than a dollar of additional expenditures (for proofs of these two propositions, see Wyckoff [1984]).

Since it is set in the local context, however, the model has additional consequences that explain flypaper effects. The intuition behind these results is that the median voter's bargaining position with respect to the bureaucrat is not the same when he gets lump-sum aid as when he receives an increase in his private income.

When the voter receives an increase in private income, he can use this extra income

both in his present circumstances and in any alternative city he moves to. The increase in the income (and hence the utility) of the voter's next best alternative is of prime importance for the model: this effect leads to greater credibility in the voter's threat to leave if the bureaucrat goes too far. An increase in the value of the voter's alternative helps constrain the bureaucrat's demands and reduces the equilibrium size of the community's budget.

An increase in lump-sum aid, by contrast, improves the voter's current circumstances but cannot be moved to a new location with the voter—it is tied to his current city. Hence there is no corresponding increase in the value of the voter's threat to move in the case of an increase in intergovernmental aid. It is this asymmetry in bargaining position that creates flypaper effects.

The situation facing city council and the bureaucrat is similar to that facing the management of a company and its labor union. During labor negotiations, the wages and working conditions that are eventually agreed upon depend not only on current circumstances, but on each side's alternative situation if an agreement is not reached. For example, if management can creditably assert that it does not really need the plant due to, say, the possibility of filling orders from overseas production, then the perceived value of its next best alternative will be high, and it will be able to more effectively restrain the wage demands of the union.

To continue this analogy, consider management's bargaining position with respect to the union in two situations: 1) an increase in profitability in this one plant due to a reduction in the local price of materials; and 2) an increase in the profitability in the entire company due to a worldwide increase in demand for the product.

The former situation, which parallels the effect of lump-sum aid in the case of local governments, improves management's profit picture in the current situation (with this plant open) but not in any other situation (overseas

supply). The latter situation, which is analogous to the effect of private income on local decision-making, increases management's profits in current as well as in alternative production schemes. Because management's threat to move production overseas is more credible in the latter situation than the former, workers will demand higher wage increases when the profit increase is localized to their own plant.

This new model of flypaper effects was tested using 1977 expenditure data from 115 small cities in Michigan. Using a single-equation, double-logarithmic functional form, expenditure was regressed on to population, the median voter's tax share, total income ( $Z = Y + TA$ ), the share of total income from lump-sum aid ( $TA/Z$ ), non-revenue-sharing aid, and several additional demographic variables.

In testing this bureaucratic model against the standard median voter model, a joint hypothesis test involving two coefficients was employed. First, the coefficient on population was included because of population's role in influencing the cost to the median voter of local public goods. Since the model retains the primacy of the median voter vis-à-vis other citizens in the local decision-making process (so that the preferences of other voters don't matter), if the median voter's tax share is held constant, the only effect of increasing population in a community is crowding of public facilities. If public goods are defined in terms of the resources available to each individual resident (for example, park space per capita), then, *ceteris paribus*, this crowding raises the cost of providing a uniform level of these goods to the median voter.

Second, the coefficient on the share of income from lump-sum aid was also utilized to test for the presence or absence of flypaper effects. If flypaper effects are absent, the composition of the median voter's income between private income and aid should have no effect on expenditures; the coefficient should be

4. *With regard to the restriction under the Niskanen model that a one dollar increase in lump-sum aid generates more than a one dollar increase in expenditures, this hypothesis applies only to total (current plus capital) expenditures. It may be worth noting, however, that the data appeared to fulfill this restriction of the model. Evaluated at sample medians, a one dollar increase in unrestricted aid generated an extra 56 cents of current expenditures and an increase of 75 cents in capital spending, for a total increase of \$1.31.*

5. *The observations of Nathan, Manuel, and Caulkins, however, do not by themselves constitute an explanation of flypaper effects. Although they explain why revenue-sharing money might be used for capital rather than operating expenditures, their arguments fail to show why the money is not used to reduce local taxes — why does the money stick in the public sector? If city councils are in charge of the budget and are responsive to the voters, this should not happen.*

zero. If flypaper effects are present, expenditures should increase with the share of total income coming from lump-sum aid.

Thus, under the bureaucratic model, demand must be cost-elastic and the coefficient of population on total expenditures must be negative. In addition, the coefficient on the share of income from lump-sum grants must be positive, reflecting flypaper effects. By contrast, under the median voter model, there is no restriction at all on the population coefficient, but the coefficient on  $TA/Z$  must be zero.

The regressions contained in Wyckoff (1985) show that, when operating expenditures only are the dependent variable, the bureaucratic model is rejected by the data, while the median voter model is not rejected. When capital expenditures are employed, the opposite is true: the median voter model is rejected by the data, but the bureaucratic model is not rejected?

The results suggest that a dichotomy exists with respect to local governments' operating and capital expenditures: the bureaucrat has a great deal of influence on the latter and not much on the former. This is not an implausible result, since in the real world city councils may not be as helpless as portrayed in the simplified model above. Council members can often employ monitoring devices that, although costly in terms of time or money, yield information about bureau performance and the true costs of producing public goods. For example, strict budgeting and expense reporting techniques may be used, cost and output data can be compared with those of other communities, and feedback from citizens and the news media can be cultivated. It is entirely possible that these monitoring devices work well in one context but not in another. The complexity of capital expenditures, along with their ability to be financed by debt, may make it easier for the bureaucrat to press his demands there rather than in operating expenditures.

In addition, as pointed out by Nathan, Manvel, and Caulkins (1975), city councils may be more willing to accede to the bureau-

crat's demands in the capital expense area because of a fear that revenue-sharing money might eventually be cut off by the federal government. Rather than using revenue sharing to fund new operating expenditures, which would have to be funded by increased taxes if revenue sharing was discontinued, local governments often chose to channel the revenue sharing money into one-time capital projects such as highway and sewer repairs.<sup>5</sup>

Moreover, the dichotomy of spending patterns between capital and operating expenditures observed in these cities suggests that the bureaucratic model may prove superior to the other explanations of flypaper effects discussed above, although no empirical tests of this hypothesis were undertaken. None of these previously mentioned theories suggest such a dichotomy. In fact, differences between current and capital expenditures are wholly inconsistent with many of these models. For example, if flypaper effects are caused by fiscal illusion, the voter ought to be fooled for both kinds of expenditures. If, on the other hand, fiscal effort provisions in revenue sharing are causing flypaper effects, these effects ought to show up in both capital and operating expenditures. And, finally, if bureaucrats are able to hide grants from voters, this should be registered in both types of spending.

## V. Conclusions

The previous discussion ought to establish one important point: any evaluation of proposals to change the current system will be strongly influenced by our model of how the local public sector works. For example, proponents of the Reagan cutbacks have argued that reductions in aid to state and local government will be offset by the increases in state-and-local-government-taxable private income that results when tax and deficit burdens on the economy are reduced. Suppose for the sake of argument that private income does increase just enough so that, in the absence of flypaper effects, local expenditure in each community would be unchanged. If we accept the argu-

ments of Moffitt and Chernick that observed flypaper effects are due to the peculiarities of project grants and closed-end matching grants, the proposed cuts in revenue sharing (which does not share these unique features) will indeed be balanced by an appropriate increase in private income. According to the arguments of Filimon, Romer, and Rosenthal, of Romer and Rosenthal, and of Wyckoff, however, flypaper effects are endemic to the local decision-making process, and it would take very large increases in private income to offset the spending cuts caused by the loss of the revenue-sharing program.

The model of Hamilton, on the other hand, implies a subtle and interesting position on this question. Flypaper effects do occur, he acknowledges, and we ought to expect that the substitution of private income for intergovernmental aid will reduce total state and local government expenditure, but we ought not to conclude from this that the total output of the local public sector has declined. If income enters the local production function for public goods, then, even if purchased inputs (which is what is measured by the local budget) have declined, the increase in income may increase the (unmeasured) output of local public goods in the community.

Perhaps surprisingly, the model in Wyckoff does not have unambiguous public policy implications with regard to economic efficiency. Despite the bureaucrat's expansion of the local budget, the model does not show that the local public sector is either productively or allocatively inefficient in a welfare sense. Because the effective demand function for local public goods is always cost-elastic, the bureaucrat can only maximize his budget by operating at minimum cost, and hence there is no productive inefficiency (see Wyckoff [1984]). And although the budget is larger than the median voter would like, there is no reason to presume that what the median voter desires is allocatively efficient. In fact, two studies have argued that, if the median voter model

is operating in the local public sector, the output of that sector is probably suboptimal (see Barlow [1970] and Bergstrom and Goodman [1973]).

The model does have predictions about the likely effects of a repeal of the revenue-sharing program and the political dimensions of such a move. First, as noted above, we ought to expect large cutbacks in state and local expenditures because of this change. Second, the chief opponents of such a cutback would not necessarily be the citizens of each state and local government, since the satisfaction of the median voter in each community is determined not by the amount of aid received by his or her state or local government, but by the utility of the voter's next best alternative community. The aid raises local expenditure levels without increasing his satisfaction with his current community. This result may help explain both the widespread discontent of citizens with state and local governments and the fact that the chief proponents of aid programs are often the employees and managers of these governments.

## References

- Arrow, Kenneth J. "A Difficulty in the Concept of Social Welfare:" *Journal of Political Economy*, vol. 59, no. 4 (August 1950), pp. 328-46.
- Barlow, Robin. "Efficiency Aspects of Local School Finance:" *Journal of Political Economy*, vol. 78, no. 5 (September/October 1970), pp. 1028-40.
- Bergstrom, Theodore C., and Robert P. Goodman. "Private Demands for Public Goods:" *American Economic Review*, vol. 63, no. 3 (June 1973), pp. 280-96.

Black, Duncan. "On the Rationale of Group Decision Making," *Journal of Political Economy*, in Kenneth J. Arrow and Tibor Skitovsky, eds., *Readings in Welfare Economics*. Homewood, IL: Richard D. Irwin, Inc., 1969, pp. 133-46.

Borcharding, Thomas E., and Robert T. Deacon. "The Demand for the Services of Non-Federal Governments:" *American Economic Review*, vol. 62, no. 5 (December 1972), pp. 891-901.

Bowen, Howard R. "The Interpretation of Voting in the Allocation of Economic Resources:" *Quarterly Journal of Economics*, vol. 58 (November 1943), pp. 27-48, in Kenneth J. Arrow and Tibor Skitovsky, eds., *Readings in Welfare Economics*. Homewood, IL: Richard D. Irwin, Inc., 1969, pp. 115-32.

Bradford, David F., and Wallace E. Oates. "The Analysis of Revenue Sharing in a New Approach to Collective Fiscal Decisions:" *Quarterly Journal of Economics*, vol. 85, no. 3 (August 1971), pp. 416-39.

Chernick, Howard A. "An Economic Model of the Distribution of Project Grants," in Peter Mieszkowski and William H. Oakland, eds., *Fiscal Federalism and Grants-in-Aid*. Washington, DC: The Urban Institute, 1979, pp. 81-103.

Courant, Paul N., Edward M. Gramlich, and Daniel L. Rubinfeld. "The Stimulative Effects of Intergovernmental Grants: or Why Money Sticks Where It Hits:" in Peter Mieszkowski and William H. Oakland, eds., *Fiscal Federalism and Grants-in-Aid*. Washington, DC: The Urban Institute, 1979, pp. 5-21.

Deacon, Robert T. "A Demand Model for the Local Public Sector," *Review of Economics and Statistics*, vol. 60, no. 2 (May 1978), pp. 184-92.

Ehrenberg, Ronald G. "The Demand for State and Local Government Employees:" *American Economic Review*, vol. 63, no. 3 (June 1973), pp. 366-79.

Filimon, Radu, Thomas Romer, and Howard Rosenthal. "Asymmetric Information and Agenda Control: The Bases of Monopoly Power in Public Spending:" *Journal of Public Economics*, vol. 17, no. 1 (February 1982), pp. 51-70.

Fisher, Ronald C. "Income and Grant Effects on Local Expenditure: The Flypaper Effect and Other Difficulties:" *Journal of Urban Economics*, vol. 12, no. 3 (November 1982), pp. 324-45.

"A Theoretical View of Revenue Sharing Grants:" *National Tax Journal*, vol. 32, no. 2 (June 1979), pp. 173-84.

Gramlich, Edward M. "An Econometric Examination of the New Federalism," *Brookings Papers on Economic Activity*, 2:1982, pp. 327-60.

"Intergovernmental Grants: A Review of the Empirical Literature:" in Wallace E. Oates, ed., *The Political Economy of Fiscal Federalism*. Lexington, MA: Lexington Press, 1977, pp. 219-39.

and Harvey Galper. "State and Local Fiscal Behavior and Federal Grant Policy:" *Brookings Papers on Economic Activity*, 1:1973, pp. 15-58.

Hamilton, Bruce W. "The Flypaper Effect and Other Anomalies:" *Journal of Public Economics*, vol. 22, no. 3 (December 1983), pp. 347-61.