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Unfolding the Flypaper: The Effects of Intergovernmental Grants in an Open Local Economy

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Abstract

Empirical studies of the effects of intergovernmental grants to localities do not support standard microeconomic predictions. Block grants have surprisingly large positive effects on public expenditures. Researchers have attributed this "flypaper effect" to imperfect information (fiscal illusion), bureaucratic self-interest (Leviathan motives), and flawed econometrics. In this paper, a three-sector, computable general equilibrium model of a local economy is used to explore the effects of block grants and matching grants. The paper demonstrates that without fiscal illusion or unresponsive bureaucrats, these grants can have large spending consequences. Fiscal adjustments, mobility, and capitalization effects explain the leveraged impact of intergovernmental grants.

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Summary

An empirical puzzle that has perplexed economic researchers is the so-called flypaper effect, that is, the unexpectedly powerful impact of grants on recipient government expenditures. Standard microeconomic models predict that some of the matching grants, should be returned to local citizens in the form of lower taxes, since the price elasticity of demand for local public goods has been found to be less than unity. Such models also predict that block grants (or general purpose grants) should be a less potent stimulant of expenditures and therefore lead to a somewhat large decrease in local taxes. However, empirical studies of the effects of intergovernmental grants do not support these predictions. Block grants have universally been found to have a significantly positive effect on local expenditures. In fact, there is little evidence that they induce a decrease in local taxes at all. Furthermore, matching grants are observed to be an even greater simulant of local government expenditures and appear to be accompanied by increased tax levels.

Since grants are an important policy tool of government, both domestically and internationally, the exact nature of their impact is significant. At least three explanations exist for the flypaper effect. One is that the empirical techniques used to measure the effects of grants are flawed--therefore, the flypaper effect does not exist in the first place. A second, known as fiscal illusion, asserts that misinformation regarding grants leads to the flypaper effect. The third, the Leviathan theory, holds that grants assist powerful bureaucrats in their goal of thrusting excessive expenditures on local residents. This paper challenges the microeconomic premise behind the flypaper effect.

The analysis employs a framework in which both firms and households are mobile and the government seeks to maximize the value of local land. This is fundamentally different from the assumption employed in previous studies of grants that government maximizes the utility of the representative consumer or the median voter. Since the potential or actual mobility of economic agents is an important influence on local government decisions, this model provides a much more realistic framework for examination of grants.

The results of this paper indicate that block grants lead to a significant increase in local government expenditures and a slight decrease in tax rates. Matching grants are found to increase local government expenditures by more than block grants, inducing an increase in tax rates. These results, therefore, provide a plausible explanation for the flypaper effect.

I. Introduction

Concerns with differences in local tax burdens and availability of public services, especially in the area of education, have led many states to adopt state-local grant programs. 1/ The purpose of grants is normally to augment local spending on various services that are deemed to be meritorious, and to provide tax relief to heavily taxed localities. However, the net effects of such grants are clouded by the economic effects of tax rate changes and budget adjustments that occur in response to grants. Adjustments by local governments prompt changes in the economic and locational behavior of households and firms; these in turn have a feedback effect on local policies (particularly via property value changes). Clearly, the final effects of a particular type of grant on a community involves intricate adjustments by local officials, households, firms, and property markets.

Much of the analysis of grants in the past has been carried out in a partial equilibrium framework. The most influential approach has envisioned government as choosing policies that maximize the utility of the representative resident (see, for example, Wilde (1971), Oates (1972), and Gramlich and Galper (1973)). 2/ This type of analysis enables the use of indifference curves to derive hypotheses regarding the impact of grants. These hypotheses in turn have been used as the basis of a rather extensive body of empirical work (see Gramlich (1977) or Mueller (1979) for a summary of these empirical studies). However, as Section II indicates, these hypotheses have not received empirical support. Specifically, grants have a much more powerful impact on recipient government expenditure levels than predicted. This empirical finding is commonly known as the flypaper effect.

Another area of research has investigated Tiebout's (1956) claim that a decentralized system of local government promotes efficiency. The key to efficiency in the Tiebout model is mobility of households and firms. Although relocation costs and such public policies as zoning and housing codes may hamper mobility, there is empirical evidence that households and businesses do respond to fiscal differences across

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1/ One third of the revenue of U.S. local governments came from intergovernmental grants in 1986 (U.S. Department of Commerce (1987)).

2/ There are a number of models to support the concept of maximizing the utility of the representative consumer. Provided that the community is static in terms of the number and composition of the residents, a one-consumer equivalent economy exists. A common approach in these studies is to use the median voter model and implicitly assume that nothing happens to change the identity of the median voter.

communities. Furthermore, there is evidence that local governments adjust their tax rates and mix of services to attract or repel certain types of households and firms. 1/

In an open economy where households and firms are mobile, the logical government policy objective is to maximize the value of the sole immobile factor--land. In the long run, land is what defines the community and there are strong political reasons to protect its value. This goal is fundamentally different from the objective of maximizing the utility of the representative consumer. A model that concentrates on a representative consumer implicitly rules out entry or exit of households--meaningful mobility alters the identity of the median voter or the characteristics of the average consumer. 2/

We believe that there are compelling reasons to analyze the effects of various grants within a framework that more completely captures the links between local government, households, and firms--one that allows each sector to optimally adjust to the grant. In this paper we analyze the effect of matching grants and block grants on local government expenditure and tax levels in a computable general equilibrium context. Our analysis is fundamentally consistent with the Tiebout model. Government is responsive to individual demands; households and firms are free to enter or exit a community as they see fit.

The results obtained herein indicate that the impact of grants, when the government's objective is to maximize property value (and the economy is open), bears little resemblance to the results obtained from a representative consumer analysis. However, the predictions of our model do provide an adequate explanation of the seemingly puzzling, empirically observed flypaper effect.

The paper is organized in the following manner. Section II reviews the previous work on the flypaper effect. Section III provides a description of the model. Section IV discusses the findings of the computable general equilibrium analysis. Section V provides some final comments and conclusions.

II. The Flypaper Effect Literature

One argument for local government autonomy is that it permits variety. In the United States, local governments have used their

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1/ Early empirical studies suggested that firms were not very responsive to fiscal differences, but more recent studies find greater sensitivity. For reviews of this literature, see Hewitt (1987) or Newman and Sullivan (1988).

2/ In our model, we in fact have identical consumers. However, there are two types of mobile entities, firms and households. Therefore mobility alters the composition of the community.

considerable autonomy to produce a rich array of taxing and spending patterns. 1/ However, higher level governments often want to influence the behavior of lower level governments via grants. The traditional analysis of the effect of grants envisions government as maximizing the utility of a static representative consumer (e.g., Wilde (1971)). This type of analysis leads to the following hypotheses.

1. Matching grants

Since matching grants reduce the effective price of the local public good in question, an increased level of provision (and subsequent consumption) is anticipated. If demand for the local public good is sufficiently elastic, total expenditure will increase by more than the grant--thus, increased local taxes will be required to cover expenditures. 2/ However, since empirical estimates of the elasticity of demand for local public goods lie within the 0.2 to 0.9 range, a decrease in taxes is predicted by the model.

2. Block grants

Since block grants do not directly distort relative prices, indifference curve analysis indicates that they are equivalent to any other autonomous income increase. Furthermore, public goods are widely accepted to be normal goods, and consequently the grant will induce increased public expenditures. However, the increased grant revenue will be split between increased public expenditures and decreased taxes, that is, increased consumption of private goods. In fact, if the local government merely maximizes the utility of the representative consumer, most of the money should find its way back to households in the form of lower taxes. Most empirical studies place the income elasticity of

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1/ Even towns within a small state like Connecticut vary considerably in their tax-expenditure patterns. Data compiled by the Connecticut Public Expenditure Council for FY 1984/85 show that equalized mill rates varied from 8.0 to 34.6 with a mean value of 17.7; in dollar terms, per capita current taxes ranged from US$252 to US$1,888 across the 169 towns, with a mean figure of US$710. On the spending side, mean per capita municipal expenditures (including education) were US$1,085, but across towns this figure ranged from US$486 to US$2,149. Even towns with similar per capita expenditures exhibited quite different service mixes. The towns of Farmington and Waterbury, for example, had per capita municipal expenditures that were almost identical to the state average, yet Farmington's per capita education expenditures (US$591) were 46 percent higher than Waterbury's (US$406). Such variations in local tax spending patterns exist even in the face of redistributive state aid, which ranged in Connecticut from US$50 to US$750 per capita, with a mean figure of US$250.

2/ Few localities employ debt financing.

demand for local public goods in the range of 0.5 to 1.0, while local government outlays are only a modest proportion of total household expenditures.

On the surface, these partial equilibrium hypotheses are appealing and, if adequately supported by empirical studies, might be a satisfactory guide for policymakers. Unfortunately, only some of the hypotheses described above have been supported. 1/ As the theory predicts, matching grants seem to stimulate local public spending more than block grants. But the price elasticities implied by estimates of matching grant effects are very large, sometimes in excess of 2.0, raising concerns about the accuracy of these results.

Even more controversial are the empirical estimates of block grant effects. Though smaller than the matching grant effects, block grants frequently seem to produce unexpectedly large increases in local public expenditures and smaller than anticipated tax reductions. Rather than using block grants to reduce taxes (increase private incomes), local officials apparently choose to use a considerable portion of the assistance to expand public output. If the purpose of the grant is to stimulate provision of public services, as opposed to simply reducing local tax burdens, this flypaper effect may be quite desirable from the viewpoint of the granting authority (e.g., the state), but it appears to contradict simple microeconomic analysis.

There is no shortage of attempts to explain this puzzle. Some see the flypaper effect as a product of misinterpretation, inadequate data, or econometric misspecification (e.g., Chernick (1979), Hamilton (1983), Moffitt (1984), Zampelli (1986), and Megdal (1987)). For others, this result highlights limitations of the assumption that the local government seeks to maximize the utility of the representative consumer or the median voter. In particular, two important theoretical explanations of these block grant effects have been offered. One of these, the fiscal illusion hypothesis, exists in various forms, but generally suggests that voters, or even local officials, have imperfect information about the nature and extent of intergovernmental transfers and cannot fully distinguish between matching and block grants. 2/ If so, the impacts of a block grant could resemble those of a matching grant. What the fiscal illusion hypothesis fails to adequately explain is why such large effects have been observed for both block and matching grants. Why are grants of both types such effective inducements?

1/ Gramlich (1977) provides a comprehensive review of the empirical studies to that date. More recent studies include Courant, Gramlich, and Rubinfeld (1979), Oates (1979), Fisher (1982), Winer (1983), Moffitt (1984), Stine (1985), and Hewitt (1986).

2/ See Courant, Gramlich, and Rubinfeld (1979), Fisher (1982), and Hewitt (1986) for different interpretations and more complete discussions of fiscal illusion.

The other important explanation of the flypaper effect is the Leviathan model. Articulated by Niskanen (1968), the Leviathan model assumes that bureaucrats will enhance their power through budget expansion, subject to certain limitations. 1/ Extreme versions assert that bureaucrats possess the power of a perfectly discriminating monopolist. Such officials not only will spend the entire grant, but will use the grant to increase taxes. This can be done if the expanded public services enable bureaucrats to extract additional consumer surplus from residents. 2/

The models described above achieve analytical simplicity by reducing a system of complex political and economic interactions to a choice problem facing a single agent: the representative consumer in the median voter-type model and the selfish bureaucrat in the Leviathan model. Each model provides simple testable hypotheses, but, given the simple structure of each, one should not be too surprised if neither model fully describes the observed behavior of local government, that is, the flypaper effect. Even the fiscal illusion approach, with its infusion of imperfect information and a measure of bureaucratic gamesmanship, is fundamentally a partial equilibrium model. There are some compelling reasons for a re-examination of the effect of grants in a computable general equilibrium framework where the full mobility of households and firms is considered.

First, grant-induced changes in local tax rates and spending levels affect the utilities of existing residents and the profits of local firms. Unless there are identical changes in utilities and profits in other communities, households and firms will be induced to enter or exit the recipient community. Even in grant programs where all communities are eligible for funds, there is no reason to presume that the disbursement formula and the local responses to these disbursements will generate identical changes in utilities and profits across communities. Unrestricted eligibility for grants is an insufficient reason to assume a fixed population or immobile capital. In a world of diverse communities, "open-city" migration of households and firms is both a likely outcome of any grant scheme and the mechanism for establishing a new long-run equilibrium.

Second, to allow for the possible diversion of grants to unintended uses, it is important to distinguish between alternative public goods. Many theoretical analyses of grants only permit substitution between a homogeneous public good and a composite private good. The model we present retains this public-private substitution, but also allows for substitution between two public goods: one that augments the household utility and another that enhances the productivity of local firms.

1/ Mueller (1979), pp. 163-70, lists some of the studies that adopt this theory.

2/ It is difficult to reconcile the extreme Leviathan model with the obvious fact of mobility of residents and firms.

Third, since property constitutes the primary tax base of local governments, endogenous determination of property values is a desirable, if not essential, element of a well-specified model of local government response to grants. This requires introducing an additional market for land that often is neglected in the analysis of intergovernmental grants, but it is a market where the linkages between households, businesses, and local government are apparent. Because of capitalization effects, the land market is also one that reflects changes in a community's taxing and spending policies.

Finally, apparent anomalies like the flypaper effect sometimes are resolved by considering long-run responses or feedback effects that partial equilibrium models ignore. We follow Wildasin's (1984) lead in applying general equilibrium techniques to the analysis of grants, but we focus more specifically on the flypaper effect with a model that departs from his closed-city model in certain important ways.

III. A Computable General Equilibrium Model of the Local Economy

Computable general equilibrium (CGE) models have been used in a variety of applied areas in economics. "Computability" is ensured only by keeping the models relatively simple and specifying restrictive functional forms. Despite these obvious limitations, the model herein has some redeeming features:

(i) Households, firms, and the local government display optimizing behavior;

(ii) The model endogenously determines activity within the local economy; the endogenous variables include the number of households and their consumption behavior, the number of firms and their production decisions, market rents for residential land and commercial land, local tax rates on residential and commercial property, and the mix of local government expenditures on residential and commercial public goods;

(iii) By introducing a zoning parameter, the model provides for local differences in the supplies of residential and commercial land, a factor that becomes important when alternative public goods are introduced and which has received little attention in previous studies of local government's response to grants; and

(iv) Despite these additional elements, the model is readily solved by standard numerical methods.

Our open-city model contains three sectors: households, businesses, and local government. All private agents are mobile in the long run. This means that the community must offer the level of utility ($\bar{u}$) available to families of similar income in competing communities, and the equilibrium profits of local firms must also match the outside norm ($\bar{\pi}$). The community has fixed amounts of land zoned for

residential use (z) and for commercial purposes (Z). 1/ With these constraints on developable land and some additional information about the land demands of individual households and firms, the open-city equilibrium conditions will endogenously determine the number of households (h) and the number of firms (F) in the community. 2/

Individual households derive utility (u) from a composite good (x), land (l), housing structure (s), and local government expenditures on a residential public good (g). The income of each household (y) is exogenous and must be fully expended on the three private goods (x,l,s) and a tax (t) on the value of housing (land and structure) consumed. No household that chooses to reside in the community can individually affect g or t; these are choices made by local officials. Formally, the choice problem of a household is to:

$$\underset{(x,l,s)}{\text{Maximize}}\ \Lambda = u(x,l,s;g) + \lambda[y - (1+t)(rl+ms) - px]\ , \qquad (1)$$

where λ is a Lagrange variable, r is the residential land rent, m is the price per unit of housing structure, p is the price of the composite consumption good, and other variables are defined as above. 3/ All prices are exogenous to the household; however, the price of residential land (r) becomes endogenous in the integrated model.

The above characterization of the household sector does not specify who owns the land and structure. This feature expands the applicability of the analysis. The community could be populated entirely by renters with the property owned by absentee landlords; alternatively the community could consist entirely of owner-occupied residences, or be a mixture of the two. 4/

1/ There is no provision here for a "mixed use" zone, and it is assumed that each single use zone is fully utilized. Heffley and Hewitt (1988) discuss the conditions for existence of vacant zoned land and the reasons for avoiding this complication in the mathematical formulation of the model.

2/ We generally reserve lower case notation for the residential sector and upper case notation for the business sector.

3/ All quantities in the model are flows and all prices are rental prices rather than asset values.

4/ The reader may find the model more intuitively appealing when applied to renters because of the fixed income and fixed utility properties. However, the model is still valid with owner-occupied dwellings. In the latter case, a significant increase in property values will change the character of a community. Thus the community in question may appeal to a different income level (i.e., change from middle-income to upper-income residents). However, even if the exogenous level of income and utility that is relevant for the community changes, the nature of the equilibrium does not.

The business sector is similarly structured. Each profit (π) maximizing local firm produces an externally marketed good (X) by combining commercial land (L), commercial structure (S), and other inputs (N). This production activity is enhanced by local government expenditures on a commercial public good (G). In addition to their purchases of private inputs (L,S,N), firms, like households, must pay a tax on the value of land and structure utilized. This commercial property tax rate (T) may differ from the residential tax rate, 1/ and both T and G (like t and g for the residential sector) are selected by the local government. The choice problem of the typical firm, then, is to:

$$\underset{(L,S,N)}{\text{Maximize}}\ \Pi = PX(L,S,N;G) - (1 + T)(RL + MS) - WN, \qquad (2)$$

where P is the product price, R is the commercial land rent, M is the price per unit of commercial structure, W is the price of other inputs, and other variables are defined as above. Again, all prices are parametric to the individual firm, with the price of commercial land (R) becoming endogenous only in the full model.

We endow the local government with a measure of sophistication (or at least the capacity to learn over the long haul). The government, like agents in the two private sectors, is an optimizer that incorporates information about the behavior of other sectors in its own choice problem (recall that government fiscal policies entered the choice problems of households and firms). In particular, the effects of its fiscal decisions on residential and commercial land rents and property tax collections are taken into account. We assume that local officials, serving the interests of landowners, select a mix of tax rates (t,T) and public expenditures (g,G) that maximize aggregate site rents (ASR), 2/ subject only to existing zoning provisions (z,Z) 3/ and the constraint that government revenues from taxes and grants cover the total cost of providing public services to residents and firms.

1/ Even in states like Connecticut, where communities are instructed to assess different classes of property at a common fraction of market value (70 percent) and where nominal mill rates must be nondiscriminatory, effective tax rates (our t and T) can differ within a community due to differences in actual assessment practices.

2/ In the open-city framework, utilities and profits can depart from outside levels only temporarily; even a non-Leviathan local government can do little to secure permanent consumption advantages for residents or production advantages for firms. Under these circumstances, maximizing the value of local land, the community's unique resource, becomes a plausible alternative that has some theoretical and empirical support (e.g., see Brueckner (1982, 1983)).

3/ Zoning is obviously another policy parameter available to the government. However, this is an entirely different issue analyzed in Heffley and Hewitt (1988).

This problem takes the general form:

$$\underset{(g,t,G,T)}{\text{Maximize}}\ \Gamma = zr(g,t) + ZR(G,T) + \rho[j(g,t) + J(G,T) + I - eg - EG] \quad (3)$$

where z and Z are the fixed areas of land zoned for residential and commercial purposes, r(g,t) and R(G,T), are the functions relating the equilibrium site rent for each type of land to the government's expenditure and tax policies; ρ is a Lagrange variable; j(g,t) and J(G,T) are functions relating property tax revenues from households and firms to expenditure and tax policies; I is lump-sum revenue, including any block grants; and e and E are the local government's shares of expenditures on residential and commercial public goods. For a categorical matching grant, either e or E will be less than unity; under a general matching grant, $e = E < 1$.

Before we discuss the solution to equation (3), it is important to understand the derivation of the site rent and property tax revenue functions that enter the government's choice problem. The typical household's behavior is described by the demand functions that follow from equation (2). The associated indirect utility function, when equated to the outside utility level ($\bar{u}$), can be solved for the equilibrium residential site rent (r). For example, when utility is Cobb-Douglas in form [$u = Al^{\alpha}s^{\beta}x^{\gamma}g^{\delta}$, $\alpha,\beta,\gamma,\delta \in (0,1)$], the equilibrium site rent is:

$$r(g,t) = (\alpha y^{\theta/\alpha}\ Vg^{\delta/\alpha})/(1+t)^{(\alpha+\beta)/\alpha}\ , \quad (4)$$

where $V \equiv [A(1/\theta)^{\theta}\ (\beta/m)^{\beta}(\gamma/p)^{\gamma}/\bar{u}]^{\ 1/\alpha} > 0$ and $\theta \equiv (\alpha+\beta+\gamma) < 1$.

Using this rent expression, the household's demand functions for land (l) and structure (s), and a residential land market clearance condition ($hl = z$), one can also derive an expression for the equilibrium level of residential property tax revenues. Again, in the Cobb-Douglas utility case:

$$j(g,t) = ht(rl+ms) = t(1+t)^{-(\alpha+\beta)/\alpha}\ zg^{\delta/\alpha}\ y^{\theta/\alpha}V^{(\alpha+\beta)}. \quad (5)$$

A completely symmetric procedure can be used in the business sector. For example, when the production function is also Cobb-Douglas [$X = BL^{\epsilon}S^{\phi}N^{\eta}G^{\mu}$, $\epsilon,\phi,\eta,\mu \in (0,1)$], the equilibrium commercial site rent is:

$$R(G,T) = (\epsilon DG^{\mu/\epsilon})/(1+T)^{(\epsilon+\phi)/\epsilon}\ , \quad (6)$$

where $D \equiv \{PB(\phi/M)^{\phi}(\eta/W)^{\eta}[(1-\Omega)/\bar{\pi}]^{1-\Omega}\}^{1/\varepsilon} > 0$ and $\Omega \equiv (\varepsilon+\phi+\eta) < 1$, and the level of commercial property tax revenues is:

$$J(G,T) = FT(RL+MS) = T(1+T)^{-(\varepsilon+\phi)/\varepsilon} ZG^{\mu/\varepsilon}D(\varepsilon+\phi). \quad (7)$$

Using (4)-(7) in (3), and manipulating the first-order conditions to eliminate ρ, four equations in (g,t,G,T) are obtained:

$$\beta\varepsilon t - \alpha\phi T = 0 , \quad (8)$$

$$g - [(\delta Vz/e)^{\alpha}y^{\theta}(1+t)^{-\beta}]^{1/(\alpha-\delta)} = 0 , \quad (9)$$

$$G - [(\mu DZ/E)^{\varepsilon}(1+T)^{-\phi}]^{1/(\varepsilon-\mu)} = 0 , \quad (10)$$

$$tzV(\alpha+\beta)[g^{\delta}y^{\theta}/(1+t)^{\alpha+\beta}]^{1/\alpha} + TZD(\varepsilon+\phi)[G^{\mu}/(1+T)^{\varepsilon+\phi}]^{1/\varepsilon} + I - eg - EG = 0 . \quad (11)$$

Once the government's fiscal policy is found by simultaneously solving (8)-(11), these optimal tax rates and expenditures can be substituted back into the households' and firms' behavioral functions to complete the general equilibrium description of the local economy. In the next section, after establishing a plausible benchmark equilibrium for a particular local economy, we investigate the effects of various types of grants on this equilibrium.

IV. Flypaper Effects Without Leviathan or Fiscal Illusion

CGE models can be used to illustrate the feasibility of certain outcomes. The inevitability of such outcomes cannot be demonstrated, of course, because specific functions and parameters must be adopted to solve such models. The primary purpose of this section is to show that the existence of a flypaper effect does not require a self-serving bureaucracy, fiscal illusion among voters or local officials, or econometric misspecification. This analysis does not negate the possibility that one or more of these alternative factors may contribute to observed flypaper effects; it simply illustrates that sizable block grant effects can occur in a model devoid of these commonly cited causes. In addition to making this central point about the effects of block grants, we also study the effects of various matching grants and compare our results with the partial equilibrium hypotheses discussed earlier. Externally-funded, as well as locally-funded (i.e., balanced budget), matching grants are considered (see below for the exact specification).

To facilitate comparison of the effects of different grants, we start from the same benchmark in each case and structure the relevant grant parameters (e or E or I) to produce a total grant increase of approximately US$500,000 (about 10 percent of initial exogenous income), after all general equilibrium adjustments have occurred. Census,

fiscal, and property assessment data for the Town of Guilford, Connecticut--a typical predominantly residential community--are used to calibrate the benchmark economy. These benchmark parameters for each of the model's three sectors are summarized at the top of Table 1. Any changes in grant parameters (e,E,I) in subsequent simulations are noted in the first three columns of the table. In the remaining columns, only endogenous variables of direct interest to our discussion are listed (e.g., demands of the typical household (x,l,s) and production decisions of the typical firm (L,S,N,X) are deleted). For the listed endogenous variables in each of the seven grant simulations, absolute and percent changes from the benchmark values are shown.

1. Block grants

As discussed earlier, some economists feel that Leviathan motives on the part of public officials are needed to explain the presence of unexpectedly large block grant effects on local public spending. These flypaper effects are interpreted as evidence of the difficulty of using block grants to reduce tax burdens and directly benefit the local populace--proponents of the Leviathan argument tend to view grant-induced increments in public spending as benefits to bureaucrats at voters' expense. Our first grant simulation, labeled BLOCK in Table 1, challenges this view.

In the BLOCK economy, only one benchmark parameter is altered: local government's exogenous (nonproperty tax) revenues (I) are increased by an annual block grant of US$500,000. The results contrast sharply with predictions of the simple representative consumer model. Rather than using the block grant primarily to reduce taxes, officials interested in maximizing community land values find it optimal to reduce residential and commercial property tax rates (t and T) only slightly (-2.7 percent). 1/ If one ignores the general equilibrium effects that this model includes, this block grant could have been used to reduce benchmark tax rates by 7.5 percent [$\Delta I/(j+J) = 500{,}000/6{,}698{,}419 = 0.075$], without diminishing public services. Since officials optimally reduce tax rates by a much smaller percentage, a large portion of the block grant is used to expand services. The nature of this expansion is interesting and helps to illustrate how apparent flypaper effects can occur without fiscal illusion or a Leviathan local government.

Note, first, that the spending increase is not proportional across the two types of public goods. Expenditures on the residential public good (g) increase by 7.2 percent, as compared to a 1.8 percent increase in spending on the commercial public good (G). This pattern is

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1/ In each simulation in Table 1, the percentage changes in t and T are equal. This equiproportional change in tax rates follows from one of the model's optimality conditions (8). We would not necessarily expect this property to hold for a more general class of underlying utility and production functions.

Table 1. General Equilibrium Effects of Alternative Grants

Benchmark parameters for
households: α = .068, β = .151, γ = .731, δ = .050, A = 1.0, n = 1.8, p = 1.0, y = 24760, $\bar{u}$ = 11449
businesses: ξ = .054, ϕ = .096, η = .750, μ = .030, B = 9975, M = 2.0, P = 1.0, W = 15000, $\bar{\pi}$ = 25000
government: z = 10650, Z = 350, I = 4992500, e = 1.0, E = 1.0

	Grant Parameters			Government Expenditures			Tax Rates		Property Tax Revenues			Aggregate Rents			Agents	
	e	E	I	g	G	gG	t	T	j	J	jJ	rz	RZ	ASR	n	P
BENCH	1.000	1.000	4992500	8981429	2709490	11690919	0.1578	0.1971	4467869	2230550	6698419	8791670	4074084	12865753	5743	361
BLOCK	1.000	1.000	5492500	+650556 +7.2%	+48964 +1.8%	+699520 +6.0%	-0.0043 -2.7%	-0.0053 -2.7%	+210914 +4.7%	-11394 -0.5%	+199520 +3.0%	+671807 +7.6%	+92237 +2.3%	+764044 +5.9%	+416 +7.2%	+7 +1.9%
MIX	0.953	1.000	4992500	+1675911 +18.7%	-160029 -5.9%	+1515882 +13.0%	+0.0417 +9.3%	+0.0184 +9.3%	+985890 +22.1%	+29097 +1.3%	+1014987 +15.2%	+1025563 +11.7%	-298528 -7.3%	+727036 +5.7%	+701 +13.1%	-21 -5.8%
MIF	1.000	0.866	4992500	-120728 -1.3%	+1022734 +37.8%	+902006 +7.7%	+0.0008 +0.5%	+0.0010 +0.5%	-40036 -0.9%	+441923 +19.8%	+401887 +6.0%	-124395 -1.4%	+781616 +19.2%	+657222 +5.1%	-77 -1.3%	+70 +19.4%
MIJ	0.962	0.962	4992500	+1302997 +14.5%	+103809 +3.8%	+1406806 +12.0%	+0.0120 +7.6%	+0.0149 +7.6%	+772423 +17.3%	+136669 +6.1%	+909092 +13.6%	+793974 +9.0%	-54775 -1.3%	+739200 +5.8%	+583 +10.2%	-1 -0.3%
MIP	0.950	1.000	4992500	+1035353 +11.5%	-217152 -8.0%	+818201 +7.0%	+0.0202 +12.8%	+0.0253 +12.8%	+780975 +17.5%	+36387 +1.6%	+817362 +12.2%	+363287 +4.1%	-403973 -9.9%	-40686 -0.3%	+342 +6.0%	-29 -8.0%
MIF	1.000	0.864	4992500	-766724 -8.5%	+970232 +35.8%	+203508 +1.7%	+0.0055 +3.5%	+0.0069 +3.5%	-259269 -5.8%	+462335 +20.7%	+203066 +3.0%	-788451 -9.0%	+679181 +16.7%	-109270 -0.9%	-490 -8.5%	+63 +17.5%
MIT	0.960	0.960	4992500	+643979 +7.2%	+57091 +2.1%	+701071 +6.0%	+0.0172 +10.9%	+0.0214 +10.9%	+554334 +12.4%	+151057 +6.8%	+705391 +10.5%	+121368 +1.4%	-150810 -3.7%	-29442 -0.2%	+166 +2.9%	-7 -2.0%

influenced by the initial composition of the benchmark economy. Under the joint consumption property of public goods, the number of agents (h and F) strongly affects the marginal community benefits of each type of spending. In a predominantly residential community of this sort, there may be a tendency to direct unrestricted block grants to the dominant sector. Obviously this tendency would be muted if the dominant sector's public good exhibits congestion effects, such that marginal community benefits are something less than the vertical summation of households' individual marginal benefits.

The second, and most striking, feature of the new equilibrium is that, even after providing mild tax rate relief to households and firms, the local government manages to increase its total spending (g+G) by US$199,520 more than the block grant [Δ(g+G) = 699,520]. The source of this additional spending is an increase in property tax revenues (j+J).

Although tax rates are reduced slightly, the tax base--the market value of property--increases, especially in the residential sector. Attracted by higher spending on g and lower residential tax rates, additional households enter the community (Δh = +416), bidding up the market value of residential land. Aggregate residential land rents (rz) increase by 7.6 percent (as does the amount of residential structure), more than enough to offset the 2.7 percent reduction in t. Consequently, property tax revenues from this sector rise by 4.7 percent, or US$210,914.

The results shown in Table 1 only report on alternative equilibria. The process of adjustment from one equilibrium to another potentially has enormous welfare consequences. In this case where the number of households increase and property values rise, the original landlords who purchased their properties prior to the change will receive a capital gain. However, the new landlords or residents of owner-occupied houses that enter after the policy changes will not benefit inordinately. The last entrant into the community will receive u exactly. However, the situation for the infra-marginal households may be quite different. In a shrinking community, the effective infra-marginal welfare is likely to be below average and in a growing community it is likely to be above average. 1/

A similar process occurs in the commercial sector, but on a much smaller scale (ΔF = +7) and with a different net effect on property tax revenues. Aggregate commercial land rents (RZ) and commercial structure increase by a smaller percentage (2.3 percent) than the cut in the commercial property tax rate (-2.7 percent), causing commercial property tax revenues to decline slightly (-US$11,394). This decline, however, is swamped by the increase in residential property tax revenues, and total property tax revenues rise by US$199,520.

1/ See Heffley and Hewitt (1988) for a technical analysis of this issue in a similar setting.

Recapping briefly, the block grant enables officials to expand public services and reduce tax rates. This change in the local fiscal mix encourages the entry of agents; land rents rise, increasing the property tax base; and, if this increase in the property tax base is large enough to offset the cut in tax rates, property tax revenues are enhanced and spending may increase by more than the initial block grant. Matching grants produce a somewhat different response, but this detailed description of the general equilibrium response to a block grant is helpful in understanding the sort of long-run adjustments that any grant can produce.

2. Externally-funded matching grants

Although the focus of this paper is the flypaper effect, which has been associated with block grants, our model is equally useful for analyzing and comparing the effects of various matching grants. We consider three different types of externally-funded matching grants: a matching grant for the residential public good (MGH), a matching grant for the commercial public good (MGF), and a uniform matching grant (MGU) that applies to both forms of local spending. In each of these three simulations, the total matching grant [(1-e)g + (1-E)G], after all adjustments, is approximately US$500,000; each grant is equally costly to the grantor. This bottom line equivalence, accomplished by iterative changes in the matching grant parameters (e,E), allows more meaningful comparisons of the different types of grants, including the block grant discussed above.

Even partial equilibrium analysis indicates that a matching grant may lead to an increase in public expenditures in excess of the grant. Our first three matching grant simulations (MGH, MGF, and MGU) in Table 1 reinforce this view. In each case, total local government spending (g+G) increases by substantially more than the matching grant; the additional increment is funded by an increase in both residential and commercial property tax rates. Although, total expenditures increase in each case, only in the uniform matching grant simulation (MGU) do both g and G increase. When the matching grant applies only to one type of expenditure, the subsidized component increases and the other component decreases, reflecting the change in the relative cost of providing each good.

The effects on aggregate rents (rz and RZ) and the number of agents (h and F) in the two sectors also are asymmetric: the matching grant for the residential public good increases rz and h and decreases RZ and F, and the matching grant for the commercial public good has just the opposite effects. As might be expected, the uniform matching grant (MGU) has effects which typically lie between those of the two categorical matching grants. An interesting exception to this pattern is the effect on aggregate site rents (ASR). All three matching grants boost ASR by more than 5 percent, but the largest increase is associated

with the uniform matching grant--a reasonable outcome, as this grant places fewer restrictions on local officials' use of the grant to pursue the assumed goal of maximizing aggregate site rents.

3. Internally-funded matching grants

Each of the above matching grants is externally funded--a net addition to the resources of the community. It may be of some interest to isolate more effectively the substitution effect of each matching grant by coupling the matching grant with an offsetting reduction in the local government's exogenous revenues (I). This exercise corresponds to a situation in which the grantor (e.g., the state) replaces an existing block grant to the community by a matching grant of equal magnitude. The final three simulations in Table 1 (MGH', MGF', MGU') are the compensated equivalents of the earlier set of matching grant simulations. In each case, the benchmark economy is altered by reducing I by US$500,000 and setting the appropriate matching grant parameter (e or E or both) to provide a post-equilibrium matching grant of approximately US$500,000.

In each case, the compensated matching grant has effects which are qualitatively similar to the effects of its uncompensated equivalent (e.g., compare MGH' with MGH). Note, in particular, that the offsetting reduction in lump-sum revenues does not eliminate the matching grant's stimulative effect on local public spending (g+G). The one exception to this qualitative similarity between the first and second sets of matching grants is the effect on aggregate site rents. ASR increases when the matching grant is externally funded, but decreases when the matching grant is internally financed through a reduction in lump-sum revenues. This decrease in ASR is not surprising, since the replacement of block grant money with a matching grant, in any of its three forms, places greater restrictions on local government.

V. Local Government: Time for a "Kinder and Gentler" View?

This paper has demonstrated that even block grants can have surprisingly large effects on local public spending. In empirical studies, such effects have been described as flypaper effects, suggesting that money received by the public sector is unlikely to be returned to the private sector via tax reductions. These effects raise fundamental questions about: (i) the capacity of voters or public officials to comprehend a complex system of intergovernmental transfers and to discern the differences between matching and block grants (fiscal illusion); and (ii) the extent to which bureaucrats pursue their own interests (Leviathan motives) rather than responding to the preferences of constituents. For fiscal conservatives, the flypaper effect is seen as evidence that the most effective way to benefit households and firms is to reduce higher level taxes rather than increase intergovernmental transfers.

We cannot show that fiscal illusion and Leviathan motives do not exist or that they are insignificant contributors to empirically observed effects of block grants on local spending. The general equilibrium model analyzed in this paper, however, demonstrates that sizable block grant effects can occur even when information is quite complete and governments faithfully serve the interests of local landowners by choosing tax rates and spending levels that maximize aggregate land rents. The explanation of these block grant effects, even in the absence of fiscal illusion and Leviathan motives, involves tax and expenditure adjustments by local government, microeconomic responses by households and firms, including relocation decisions, and capitalization effects of public policies in local property markets. Consequently, large block grant effects alone are not sufficient to conclude that local government is self-indulgent or that the electorate is ill-informed.

Sorting out and properly measuring the various determinants of block and matching grant effects requires an econometric specification that transcends the simple representative consumer model of local government behavior. The general equilibrium model of the local economy presented here can be improved in a number of ways, 1/ but its long-run equilibrium focus makes it quite appropriate for developing hypotheses for econometric analysis of cross-sectional, community level data. We would be glad if this initial study prompts theoretical refinements and efforts to develop empirical tests that can distinguish the popular, but largely negative, explanations of the flypaper effect from the more benevolent ones contained in this model.

Although the findings in this paper primarily focus on the situation in the United States, they have relevance for other countries as well. Wherever a federation exists within which households and businesses are mobile and autonomous decentralized governments have significant control over local policies, intergovernmental grants are an important policy tool. The implication of the results herein bode very favorably for the ability of central governments to materially affect local policies. The simulation results indicate that grants to regions, whether block or matching, can have a profound effect on government policy and the composition of communities.

1/ The model we have presented is ambitious in certain respects, especially the range of endogenous features, but very limited in other ways. The effects that we have illustrated in the earlier sequence of simulations may be sensitive to: (1) local officials' pursuit of goals other than maximization of aggregate site rents; (2) rivalry in the consumption of local public goods; (3) the degree to which households and firms respond to fiscal changes; (4) relocation costs that impede the mobility of households and firms; (5) the supply price elasticity of land in each sector and the availability of vacant land; (6) divergences between the tax base (assessed value) and the market value of local property; and (7) the availability of similar grants to competing communities. Each of these factors suggests logical extensions of this work.

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