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THE LOCAL DECISION TO TAX: EVIDENCE FROM LARGE U.S. CITIES

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ABSTRACT

The structure of local taxation is an important determinant of the fiscal performance of decentralized public economies. In contrast to our understanding of local government spending, however, we know surprisingly little about how cities and states set taxes. This study specifies and estimates a model of the institutional, political, and economic determinants of the local decision to tax. Redistributive politics is an important determinant of local tax policy, at least for this sample of 41 large U.S. cities during the period 1961-1986. The results cast serious doubt on the validity of the "representative" or average taxpayer approach to behavioral modeling of fiscal policy for large, income diverse governments. The results allow us to predict the effects on local financing of removing federal tax deductibility of local taxes, an issue of current importance in the United States.

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The Local Decision to Tax: Evidence From Large U.S. Cities

There is no more hotly contested political issue in large United States cities than the setting of the rates of local taxation--and for good reasons. Local taxes determine both the levels of a city's public services and exactly who pays for those services. As an economic issue, local taxation is important too. From the perspective of economic efficiency, local taxation may have significant consequences, both for resource allocation within the city between taxed and untaxed activities and for the location of economic activity across communities.[1] Economic fairness may be influenced as well, particularly since local taxes take a significant share of household income and such local government services as education, health care, and housing can be important determinants of long-run economic opportunity.[2] With increasing policy interest in the possible advantages of decentralizing the United States public economy, it is important--perhaps now more than ever--that we understand the economic and political forces which shape these local decisions to tax.

One contemporary issue in particular has heightened interest in the process of local revenue choice among U.S. economists and policy-makers: the possible removal of the deductibility for state and local taxes when calculating U.S. federal taxable income. The debates surrounding the 1986 Tax Reform Act focused in large measure on the advantages and disadvantages of dropping local tax deductibility. Removal was thought to be an important source of new federal revenues which could support broad reductions in overall tax rates. Removal might also increase the progressivity of the federal tax code and eliminate an inefficient subsidy to the local public sector. Opponents contended that removal would not generate new revenues and might well reduce tax fairness and allocative efficiency.[3] To resolve the issue it is

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[1]Wildasin (1986) provides an excellent introduction to this literature.

[2]For a discussion of fairness in the local public economy, see Inman and Rubinfeld (1979).

[3]Supporters include the initial proponents of broad-based tax reform; see McLure and Zodrow (1987) and Courant and Rubinfeld (1987) for the arguments. Analyses which question these arguments can be found in Chernick and Reschovsky (1986) and Feldstein and Metcalf (1987).

important to understand just how state and local taxes might be affected. Unfortunately, most of the research which did address this question was forced to *assume* an elasticity of local taxes with respect to federal deductibility. At the time, there simply were no compelling empirical studies available on the determinants of local tax policy.

This paper seeks to provide such a study. Two ingredients are necessary: a model of local revenue choice and a data base with sufficient variation in the institutional, political, and economic variables of interest to estimate the model. Section II describes the model. In contrast to the usual model of local fiscal choice which focuses on a single representative voter, this study seeks to explicitly consider the redistributive nature of local revenue choice. Section III estimates the model. In contrast to one year cross-section studies of local revenue choice whose estimated coefficients may be biased because of omitted government-specific "fixed effects" (see Hausman and Taylor (1981)), this study develops a large panel data base of 41 cities over twenty-five years which allows unbiased estimation of the model's coefficients. A "fixed-effect" or "within-group" estimator is employed. Section IV then addresses the effects of removing deductibility on taxation in our sample cities: what is likely to happen to local revenues, local spending, and federal tax receipts with the loss of deductibility? Section V offers a concluding observation on this research.

II. The Analytics of Local Revenue Choice

A. The Basic Structure

Within larger U.S. cities, the local decision to tax is a decision made subject to constraints. First, local taxation must be decided within the bounds of a local political process. Competing coalitions within the city--the rich, the middle class, the poor, and local business interests--all seek to influence the final decision to tax. Second, the mobility of resources within the local and regional economy limit the ability of the city to raise revenues; taxable resources may simply leave the taxing jurisdiction or, for those residents who remain, the taxed activity may be curtailed. Third, state law may restrict the local community to the taxation of only well-defined activities or resources, often further limited to a pre-specified rate of taxation. This section outlines a model of local taxation which embodies these political, economic, and legal constraints.

The model assumes an elected city executive--the mayor--responsible for coordinating competing interests over the level of local taxes and fees. Pressures come from three sources: 1) a city council interested in providing core government services with the lowest tax rate possible; 2) city agencies interested in providing agency services with the lowest agency fee possible; and 3) competitive taxpayer coalitions interested in shifting the aggregate burden of local services from themselves to other taxpayers.[4] City council is responsible for approval of the city budget and uses broad-based taxes--for example, property, income, and general sales--to finance what we usually view as the primary local public services--for example, police and fire services, education, public health, and public infrastructures. City agencies use user fees or selective commodity taxes to finance all or a portion of what may be viewed as the local government's "private" service budget--for example, airports, parking facilities, tourism and conventions, hospitals, public housing, sewerage, and sanitation. Fiscal cross-subsidization between the budgets of the two political bodies is possible. City council can raise revenues from general taxes sufficient to cover its own activities as well as subsidize agency activities when user fees and selective taxes fail to cover the agency's average costs. Alternatively, the agency may set its user fees or taxes above average costs, earn a profit, and then transfer these dollars to the council's general budget. Left to their own devices, city council and agencies would prefer to maximize the cross-subsidy from the other to their own budget. Finally, taxpayers' interests in the distribution of the aggregate city burdens across individual taxpayer coalitions must be

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[4] I make no effort to formally model the local political process which might balance these competing interests, though recent work by Coughlin (1986) provides one model which might be used to motivate the empirical specifications used here. That model involves an election between two candidates in which candidates cannot perfectly infer voter preferences over the distribution of incomes. Coughlin shows that such elections do have stable outcomes over redistributive policies and that the final policies chosen correspond to those which would maximize the sum of voter utilities. If voters have underlying preferences both over the levels of tax rates and the final distribution of burdens, then this paper's equation (5) would follow from a Coughlin specification of electoral politics.

respected; these pressures will be specified here by a mayoral preference for "tax fairness." It is the elected mayor's responsibility to balance these competing claims.

More formally, the mayor proposes a budget which maximizes the simple sum of each political agent's--council's, agency's, mayor's--respective interests. The city council has preferences over the level of local public goods it can supply (denoted g) and the *net* average tax rate (denoted $\tilde{r}$) specified as the gross uniform tax rate (denoted r) net of state and federal tax relief paid at an average (over household) rate τ: $\tilde{r} = (1 - \tau) r$. The deductibility of local taxes from taxable federal and state income is the most prominent form of subsidy in the United States; local tax credits, exemptions, or tax-based matching aid (called "tax-effort" aid) may also be part of τ. Council preferences over g and $\tilde{r}$ are specified as $v(g, \tilde{r}; Y_g)$, where the vector Y_g defines the exogenous determinants of constituent preferences (specified below) for the level of core government services. Core services g may be uniformly or differentially distributed across households, but for this study that distribution is taken as exogenous. I assume that the city council prefers to offer more government services and to assess a lower net tax rate ($\partial v/\partial g > 0$, $\partial v/\partial \tilde{r} < 0$) but that the political returns to these activities diminish as g rises and as r falls ($\partial^2 v/\partial g^2 < 0$, and $\partial^2 v/\partial \tilde{r}^2 < 0$).

The administering agency has preferences over the level of the goods it can supply (denoted q) and the net fee (denoted $\tilde{f}$) that it can charge consumers. The net fee equals the gross uniform fee (f) net of any state or federal government consumption subsidies paid at a rate θ: $\tilde{f} = (1 - \theta) f$; Medicare and Medicaid reimbursements is the most prominent U.S. example of such a subsidy. Agency preferences over q and f are specified as $w(q, \tilde{f}; Y_q)$, where the vector Y_q represent exogenous determinants of constituent preferences for the level of (now, "private") government services (Y_q). Like city council, the agency prefers to offer more services and to assess lower charges ($\partial w/\partial q > 0$, $\partial w/\partial \tilde{f} < 0$), but both activities yield diminishing political returns to the agency ($\partial^2 w/\partial q^2 < 0$, and $\partial^2 w/\partial \tilde{f}^2 < 0$).

Finally, the mayor has preferences over the distribution of total fiscal burdens amongst the competing taxpayer groups within the city.[5] If β_i represents the share of all taxpayers' burdens borne specifically by taxpayer(s) i ($i = 1, \ldots, N$), then the mayor's own preferences over taxes and fees can be represented by $m(\beta_1, \ldots, \beta_{N-1}; X)$, where the omitted taxpayer N's share is implicitly included (since $\sum_{i=1}^{N} \beta_i \equiv 1$) and where the vector X includes those exogenous variables (specified below) which define the mayor's preferences over the relative distribution of the aggregate burden of local financing.

In specifying the burden shares (β_i), I assume that the burdens of local taxes and fees are borne in proportion to each taxpayer's local consumption of the taxed or priced commodity. Workers bear the full burden of a local income tax (inelastic labor supply), homeowners and renters as consumers of housing bear the full burden of local property taxation (perfectly elastic supply of housing services), and consumers bear the full burden of general sales and commoduty-specific taxes and fees (perfectly elastic supply of locally produced goods and services including fee-based local services).[6] For each taxpayer group, therefore, β_i will be specified as:

$$\beta_i = \frac{r_y(1-\tau_i)y_i + r_s(1-\tau_i)s_i + (r\alpha_i)(1-\tau_i)b_i + f(1-\theta_i)q_i}{\sum_{i=1}^{N}\{r_y(1-\tau_i)y_i + r_s(1-\tau_i)s_i + (r\alpha_i)(1-\tau_i)b_i + f(1-\theta_i)q_i\}},$$

where r_y and r_s are city's uniform tax rates on income (y_i, for taxpayer i) and local general sales (s_i, for taxpayer i) respectively, r is the uniform local property tax rate on property (b_i, for taxpayer i) adjusted for possibly differential taxpayer property assessment at rate α_i (> 1, if property is over-assessed relative to the city average, $= 1$ if equally assessed, and < 1 if

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[5]In principle, I could also include mayoral preferences for the *levels* of government services and the *levels* of tax rates. Such an extension would add nothing of substance to this analysis, except to "clutter" the notation. I omit the extension.

[6]Perhaps the only possibly controversial assumption here is that regarding the incidence of property taxation. In effect, I am assuming the city is a small part of an open regional economy in which land and other inputs can move freely into and out of city housing production. I am also assuming that the demand for city housing is downward sloping--that is, the city has some unique attribute which residents value, for example, access to the CBD. See Wildasin (1986, pp. 98-109) for a more complete discussion of the incidence of property taxation.

under-assessed), f is the uniform fee charged for commodity q (q_i, for taxpayer i), and $(1-\tau_i)$ and $(1-\theta_i)$ are taxpayer i's own rate of subsidy for local taxation and fees.[7] It is possible to show as a first-order approximation that a taxpayer's share in total burdens (β_i) rises with an increase in a particular tax rate or fee (e.g., r_y) if the taxpayer's share in that tax's subsidy adjusted tax base (e.g., $y_i(1-\tau_i)/\Sigma y_i(1-\tau_i)$) is greater than the taxpayer's share in aggregate burdens (β_i). Conversely, β_i falls with an increase in a given rate or fee if the taxpayer's share in adjusted base is less than his or her share in aggregate burdens.[8] The mayor can therefore control the distribution of aggregate burdens across the politically relevant taxpayer groups by manipulating aggregate tax rates and fees.[9] I shall assume that the mayor has a target distribution for fiscal burdens denoted by the target share, β_i^* (i = 1, ..., N-1), and that deviations from these targets are politically costly and increasingly so: $\partial m/\partial(\beta_i-\beta_i^*) < 0$ and $\partial^2 m/\partial(\beta_i-\beta_i^*)^2 < 0$.[10] The mayor's target β_i^*'s are defined by the relative political influence of each taxpayer, specified here by the vector X of the exogenous "influence" variables: $\beta_i^* = \beta_i^*(X)$. Elements of X might well include the percent of voters of type i. The balance between competing council, agency, and mayoral interests is specified here by the maximization of the simple sum of each agent's preferences:[11]

[7]The rate of subsidy for local taxes or fees can be different for different taxes or commodities as well, a subtlety I ignore here but do include in the empirical analysis.

[8]Let N be the numerator and D the denominator for the definition of β_i above: $\beta_i = N/D$. Then for a rate (r_y, r_s, r) or fee (f) change, calculate $\partial\beta_i/\partial(\cdot) = 1/D\,\{\partial N/\partial(\cdot) - \beta_i\,\partial D/\partial(\cdot)\}$ for $(\cdot) = r_y, r_s$, r, or f. Note $\partial\beta_i/\partial(\cdot) \gtreqless 0$ as $(\partial N/\partial(\cdot))/(\partial D/\partial(\cdot)) \gtreqless \beta_i$. As a first-order approximation $\partial N/\partial(\cdot) \equiv$ taxpayer i's own net of subsidy base (e.g., for r_y, $(1-\tau_i)y_i$) and $\partial D/\partial(\cdot) \equiv$ the aggregate net of subsidy base (e.g., for r_y, $\Sigma(1-\tau_i)y_i$). The conclusions above follow.

[9]It should be noted that control may not be perfect in the sense that all possible combinations of the β_i's are possible. Generally, the mayor would need a separate tax for each of the $(N-1)$ relevant taxpayer group to have full control over the β_i's.

[10]For example, $m(\cdot)$ might be specified as a quadratic loss function of the deviations of the β_i's from their targets:

$$m(\cdot) = M - \Sigma(\beta_i - \beta_i^*)^2 .$$

[11]Different weights on each agent's preferences are certainly possible, but a full model of council-agency-mayoral bargaining would be needed to justify such weights in a compelling way.

$$V = v(g, \tilde{r}; Y_g) + w(q, \tilde{f}; Y_q) + m(\beta_1, ..., \beta_{N-1}; X) \ . \tag{1}$$

Maximization must occur with respect to economic and legal constraints.

There are two economic constraints. First, the revenue raised from any broad-based tax will be sensitive to the net, after-subsidy rate of taxation ($\tilde{r}$) on that base. For example, a property tax implies a higher effective rental cost of housing and business capital which will lower the rate of household and firm investment. Further a high net property tax rate may lead to the exit of households and firms from the taxing jurisdiction, again reducing the value of the available tax base. Similar arguments can be offered for local taxes on household income and firm profits or for taxes on local sales. Thus equilibrium revenues (denoted R) from any broad-based tax will equal the gross tax rate (r) times the aggregate tax base (denoted B) which, in equilibrium, is sensitive to the net, after-subsidy rate of taxation ($\tilde{r}$):

$$R(r) = r * B[\tilde{r}; \varepsilon_B(\tilde{r}, Y_g, Z)] \ , \tag{2}$$

where $\varepsilon_B(\cdot)$ is the elasticity of the tax base with respect to the net tax rate specified to depend on the demand for core public goods and a vector Z of exogenous "Tiebout" variables. In the case of property taxation, $B[\cdot]$ is a variant of the now familiar Oates (1969) "capitalization" equation. I allow the long-run equilibrium response of base to net tax rate changes to be negative ($dB/d\tilde{r} \leq 0$), though this equilibrium response may take several years because of lags in investment and resource relocation. In the short-run, it is possible that $dB/d\tilde{r} = 0$, a fact which has potentially important implications for local revenue choices.

The second economic constraint faced by the city imposes limitations on the city's ability to raise funds from fees and selective sales taxes. Fees and selective sales taxes are treated identically here, as gross user fees (f) above average cost (c) can be viewed as a per unit tax at rate (t): $f = c + t$. Agency "profits" in the case of user fees or agency "revenues" in the case of selective sales taxation can be specified identically as:

$$\pi(f) = (f - c) * q[\tilde{f}; \varepsilon_q(\tilde{f}, Y_q, Z)] \ , \tag{3}$$

where $\tilde{f}$ is the net fee to the residents after any state or federal subsidies, $\varepsilon_q(\cdot)$ is the price elasticity of demand for q by consumers purchasing q within the jurisdiction. The elasticity is again specified to depend upon demand (Y_q) and regional "Tiebout" (Z) variables. I assume $dq/d\tilde{f} \leq 0$, and that the equilibrium response of consumer demand for q with respect to changes in $\tilde{f}$ is instantaneous; that is, short-run and long-run elasticities are equal.

In addition to political and economic constraints, city officials also face state-imposed legal constraints. First, all cities are required to balance their budgets in each fiscal year. Revenues received from own taxes and fees plus dollars received as federal and state aid must equal current accounts spending on g and q and interest payments (I) due for previous borrowings. In the simple case of one public good g costing \$1/unit, one broad-based tax levied at the gross tax rate r, and one fee-based government service q costing \$$c$/unit and priced at \$$f$/unit, the government's annual budget constraint may be written, inclusive of exogenous federal and state aid (A) and matching grants for g at rate μ, as:

4) $$g + cq + I = rB + fq + A + \mu g \ .$$

Using the economic constraints in eqs. (2) and (3) and re-arranging eq. (4) gives a specification for government services, g, as a function of gross tax rates and fees:

4′) $$g(r,f) = \frac{[R(r) + A - I + \pi(f)]}{(1-\mu)} \ ,$$

where the exogenous determinants of $R(r)$ and $\pi(f)$ are understood.

While the specification of the city's budget constraint in eqs. (4) and (4′) generalizes easily to several broad-based taxes--r becomes a vector of tax rates and total revenue becomes the summation of individual tax revenues--a second, additional set of legal constraints makes this extension unnecessary for large United States cities. While U.S. cities are often allowed to use a variety of broad-based taxes, under state law only the local property tax remains solely under city fiscal control.[12] In all cities for my sample period (FY1961 to FY1986), local income tax rates

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[12]Even this tax may face legal constraints; see section II-B below.

and general sales tax rates are set by state policy.[13] Cities may use these taxes to raise revenues, but once chosen, their rates, and thus the level of tax revenues, are exogenously determined. To allow for the effects of local income and sales taxation on local finance, the exogenous level of such other tax revenue (now denoted $\overline{T}$) must be added to city revenue in the city's budget constraint in eq. (4′).

One final change in the budget constraint also seems appropriate, given that the mayor and city council are popularly elected and responsible primarily to the wishes of the voting residents. Council and mayor preferences will ultimately focus on *residential* tax burdens associated with any increase in the property tax rate. If so, property tax revenues should be denominated in residential dollars as $R^h(r) = (1-p)R(r)$, where $R(r)$ is total property tax revenues, p is the share of revenues from the commercial-industrial tax base, and $(1-p)$ the share from the household sector. Substituting $R^h(r)/(1-p)$ for $R(r)$ in the budget identity now permits us to examine the correspondence of local tax rates to local services from the perspective of voting residents.

Including $\overline{T}$ in city revenues and substituting $R^h(r)/(1-p)$ for $R(r)$ re-specifies the city's budget constraint as:

$$(4'') \qquad g(r,f) = \frac{\left[\left\{\frac{R^h(r)}{(1-p)}\right\} + A + \overline{T} - I + \pi(f)\right]}{(1-\mu)} .$$

Equation (4″) now captures all economic and legal constraints on the local tax choice. Together, the maximization of eq. (1) subject to the constraint in eq. (4″) formalizes the political, economic, and legal reality of the local decision to tax. Alternatively, eq. (1) can be specified inclusive of all economic and legal constraints as:

$$5) \qquad V(r,f) = v\{g(r,f), \tilde{r}; Y_g\} + w\{q(\tilde{f}), \tilde{f}; Y_g\} + m\{\beta_1(r,f), \ldots, \beta_{N-1}(r,f); X\} .$$

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[13]Except for small local adjustments in rates or eligible base, the state sets these tax rates; see ACIR (1974), chapters 3 and 4.

16.18.3

As specified here, the local decision to tax has now been reduced to an "as if" maximization of this constrained objective function $V(r, f)$.

The resulting first order conditions for an maximum are given by:

6) $$\frac{\partial V}{\partial r} = \left(\frac{\partial v}{\partial g}\right)\left(\frac{\partial g}{\partial r}\right) + \left(\frac{\partial v}{\partial \tilde{r}}\right)\left(\frac{\partial \tilde{r}}{\partial r}\right) + \left(\frac{\partial m}{\partial r}\right) = 0\,, \quad \text{and}$$

7) $$\frac{\partial V}{\partial f} = \left(\frac{\partial v}{\partial g}\right)\left(\frac{\partial g}{\partial \pi}\right)\left(\frac{\partial \pi}{\partial f}\right) + \left[\left(\frac{\partial w}{\partial q}\right)\left(\frac{\partial q}{\partial \tilde{f}}\right) + \frac{\partial w}{\partial \tilde{f}}\right]\left(\frac{\partial \tilde{f}}{\partial f}\right) + \left(\frac{\partial m}{\partial f}\right) = 0\,.$$

Equation (6) defines the preferred value of the local property tax rate (r), given f. The choice of tax rate involves a balancing of the political advantages of increased revenues for the purchase of council services against the political disadvantage caused by the resulting increase in the net property tax rate borne by all residents. In addition, changes in r can alter the distribution of local fiscal burdens which may benefit ($\partial m/\partial r > 0$) or harm ($\partial m/\partial r < 0$) the mayor. Equation (7) defines the preferred value for local fees (f), given r. Increasing fees offers the advantage that extra profits are earned for expenditure on council-provided services. Offsetting this advantage are the political losses from the reduced consumption of fee-related services and from the increase in net fees. As for taxes, changes in fees can alter the distribution of fiscal burdens, again to the political advantage ($\partial m/\partial f > 0$) or disadvantage ($\partial m/\partial f < 0$) of the mayor. Solving eqs. (6) and (7) for r and f, defines r and f as functions of the model's exogenous variables:

8) $$r = r\{(1-\tau), (1-p), (1-\theta), (1-\mu), c, A+\bar{T}-I; Y_g, Y_q; \varepsilon_B(Z), \varepsilon_q(Z);$$
$$r_y, r_s, \alpha_1 \ldots \alpha_{N-1}, (1-\tau_1) \ldots (1-\tau_{N-1}), (1-\theta_1) \ldots (1-\theta_{N-1}), X\}$$

and

9) $$f = f\{(1-\tau), (1-p), (1-\theta), (1-\mu), c, A+\bar{T}-I; Y_g, Y_q; \varepsilon_B(Z), \varepsilon_q(Z);$$
$$r_y, r_s, \alpha_1 \ldots \alpha_{N-1}, (1-\tau_1) \ldots (1-\tau_{N-1}), (1-\theta_1) \ldots (1-\theta_{N-1}), X\}\,.$$

In the end, tax rates and fees depend upon the economic, political, and legal environments which define local fiscal choices. Understanding how changes in these environments might alter the choice of r and f is the next task.

B. Comparative Statics

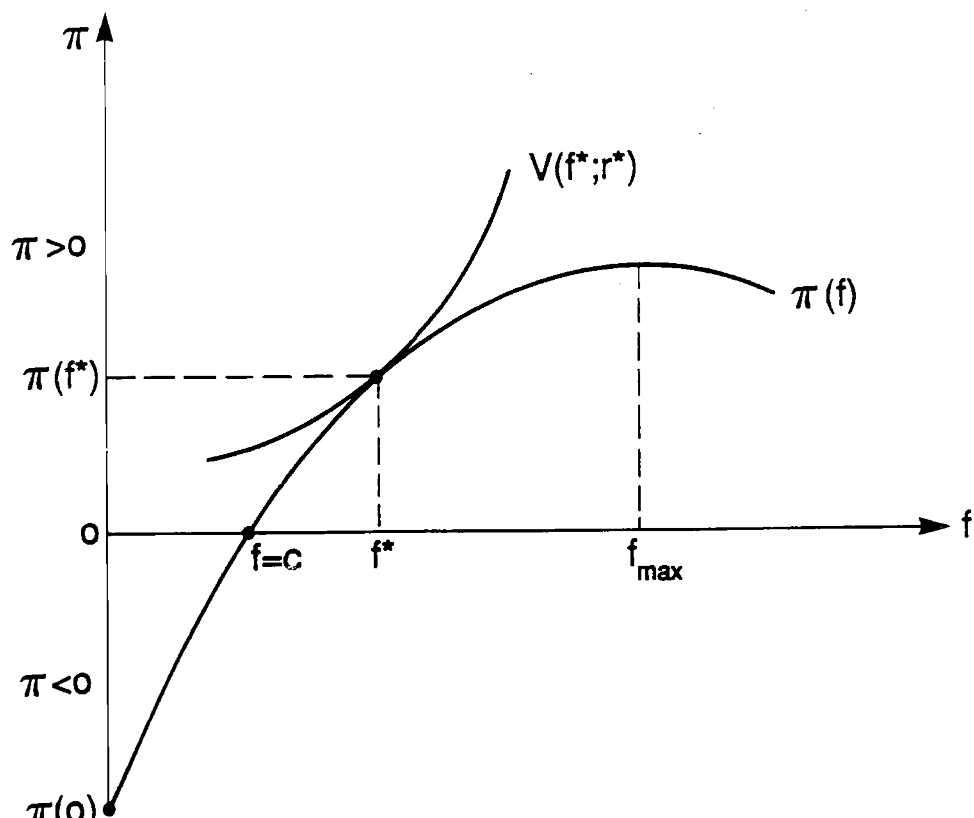
Figure 1 describes the equilibrium level of city fees, given the rate of property taxation. As defined by eq. (7) the mayor seeks to balance the virtues of fees generating positive profits against the political losses associated with the higher fees themselves. The curve denoted $\pi(f)$ is the city's profit function from fees; profits are negative when f is less than the (constant) average cost c of producing q and reach a maximum at f_{max} when marginal revenue equals c (= marginal cost). The upward bending indifference curve denoted $V(f*; r*)$ is one of a family of mayoral indifference curves balancing the gains from higher agency profits against the losses from higher user fees; the slope of this indifference curve--$(d\pi/df)_{\bar{V}}$ --is positive (f is a "bad" which must be compensated by π) and increasing in f because of (assumed) diminishing marginal gains to profits and increasing marginal losses to fees.

The tangency of $V(f*; r*)$ to $\pi(f)$ defines the preferred level of fees, given r, and is formally specified by:

$$(7') \quad \left\{ \frac{-\frac{\partial w}{\partial \tilde{f}} - \left(\frac{\partial w}{\partial q}\right)\left(\frac{\partial q}{\partial \tilde{f}}\right) - \frac{\partial m}{\partial \tilde{f}}}{\left(\frac{\partial v}{\partial g}\right)\left(\frac{\partial g}{\partial \pi}\right)} \right\}(1-\theta) = \left(\frac{d\pi}{df}\right)_{\bar{V}} = \left(\frac{d\pi}{df}\right) = q\left\{1 + \left(\frac{f-c}{f}\right)\varepsilon_q\right\} .$$

Eq. (7') is a slightly re-written version of the first-order condition in eq. (7), allowing that $d\tilde{f}/df = (1-\theta)$. The LHS term in { } is the MRS between profits and *net* fees $(\tilde{f})$; the numerator is the marginal loss from an increase in $\tilde{f}$ while the denominator is the "shadow value" of another dollar of profits to the city council's budget. This shadow value which I will denote hereafter as $\lambda(\pi; r)$ provides the crucial link between the setting of fees and the decision on tax rates. All else constant, higher tax rates (r) mean more public services, a diminishing marginal

Figure 1: Fees & Selective Sales



utility to core public services (since $\partial^2 v/\partial g^2 < 0$), and thus a lower "shadow value" to agency profits. Thus, $\partial\lambda/\partial r < 0$.

Figure 2 describes the equilibrium city property tax rate, given fees. The specification for the optimal property tax rate, given fees, is defined by eq. (6) and can be re-written as:

$$\left\{\frac{-\left(\frac{\partial v}{\partial \tilde{r}}\right) - \frac{\partial m}{\partial \tilde{r}}}{\left(\frac{\partial v}{\partial g}\right)}\right\}(1-\tau) = \frac{\partial g}{\partial r} = \left\{\frac{1}{(1-\mu)(1-p)}\right\}\left(\frac{dR^h}{dr}\right),$$

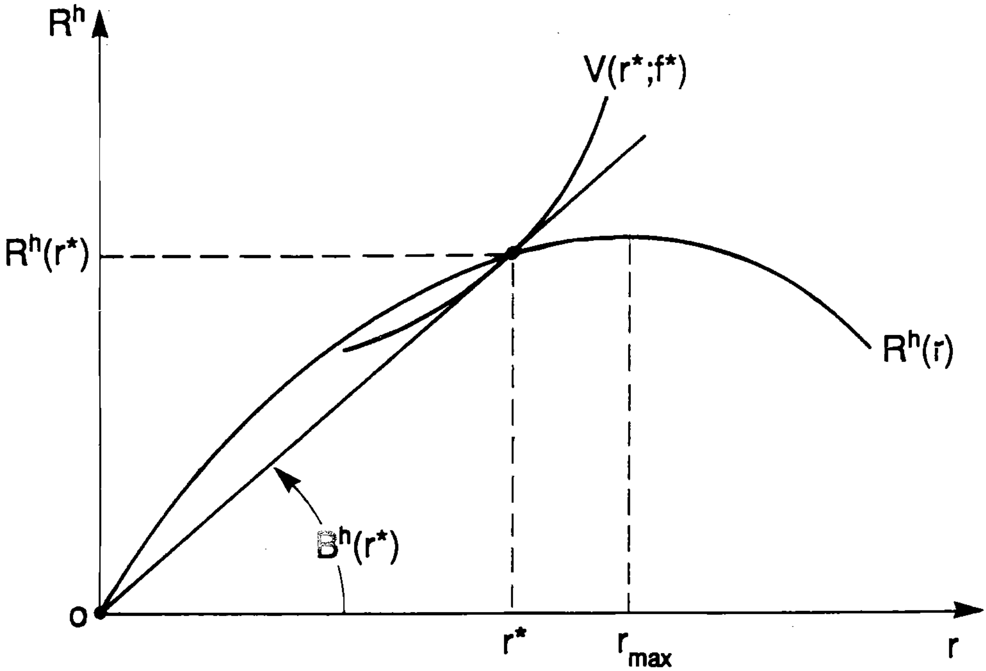
noting that $d\tilde{r}/dr = (1-\tau)$, or as:

$$(6') \qquad \left\{\frac{-\left(\frac{\partial v}{\partial \tilde{r}}\right) - \frac{\partial m}{\partial \tilde{r}}}{\left(\frac{\partial v}{\partial g}\right)}\right\}(1-\tau)(1-\mu)(1-p) = \left(\frac{dR^h}{dr}\right)_{\bar{V}} = \frac{dR^h}{dr} = B^h(1+\varepsilon_B) .$$

The expression on the left--$(dR^h/dr)_{\bar{V}}$--is the political MRS of the gross tax rate (r) for household revenues (R^h) and depends upon the political willingness to trade the net tax rate ($\tilde{r}$) for government services (g) multiplied by $(1-\tau)(1-\mu)(1-p)$, a deflator which turns household tax revenues into core government services. The right side of eq. (6') is the slope of the household revenue schedule with respect to the gross tax rate, allowing for adjustments in housing investment and the exit of residents as r increases. The peak of the revenue schedule occurs at r_{max}. The equilibrium property tax rate--denoted r^* in Figure 2--is that value of r which just equates the political gain of the extra revenue raised from an increase in r--$(dR^h/dr)_{\bar{V}}$—to the ability of r to raise this revenue--dR^h/dr.

Important is the specification of dR^h/dr. Do city politicians set r mindful of its long-run effects on tax base--that is, $dR^h/dr = B^h(1+\varepsilon_B)$, where $\varepsilon_B < 0$--or do they ignore the long-run consequences of rate on base and assume $\varepsilon_B = 0$ and thus $dR^h/dr = B^h$ alone? Figure 2 describes the tax rate equilibrium when politicians ignore the longer-run consequences of their tax decisions. In this case, the indifference curve $V(r*; f*)$ is tangent to a short-run revenue line

Figure 2: Property Taxation



with a slope equal to $dR^h/dr = B^h$, but the tangency must occur along the long-run revenue curve, $R^h(r)$ evaluated at r^*, to insure the political equilibrium is also economically feasible. Note that if local politicians responded to the long-run incentives created by their taxing decisions, then the equilibrium would be described by the tangency of a political indifference curve to the long-run revenue schedule; in Figure 2 a tax rate to the left of r^* would then be chosen (assuming diminishing marginal benefits from g). Note that this lower local tax rate would make local politicians better off (a higher indifference curve), *but only if they are still in office to enjoy the rewards associated with the rate induced increase in local tax base and revenues*. If the benefits of an expanded tax base come after the next election, this rate reduction may bring in too little revenue today (along the short-run revenue line with slope B^h) to be politically optimal. Local fiscal policy is exposed, therefore, to the dilemma of time inconsistency: what is politically optimal in the short-run may be non-optimal in the long-run. If there are no credible means of commitment to the preferred long-run tax rate, then city fiscal policy may be permanently inefficient. In fact, such an inefficient short-run tax rate equilibrium could occur even on the *downward* side of the local revenue-schedule; see Buchanan and Lee (1982).

While Figures 1 and 2 show separate equilibriums for fees and tax rates, the two are linked through the requirement that the optimal level of fees (f^*) in Figure 1 generate that level of profits which corresponds to the optimal property tax rate (r^*) in Figure 2. We have already observed that changes in the optimal local tax rate will alter the "shadow value" of agency profits, $\lambda(\pi; r)$, and thus change optimal fees; an increase in r^* lowers $\lambda(\pi)$ which steepens agency indifference curves in Figure 1 thereby reducing f^*. Increases in f^* have a similar negative effect on r^*. An increase in f^* raises agency profits which requires a larger purchase of core services g, for a given tax rate. The increase in g, given r, lowers the marginal value of government services which reduces the marginal value of tax revenues and increases $(dR^h/dr)_{\bar{V}}$. The "steeper" indifference curves in Figure 2 imply a new lower r^*. Here, Figures 1 and 2 are in "balance"--that is, as drawn f^* is optimal for r^*, and conversely.

Changes in the model's exogenous variables will alter f^* and r^*. Table 1 summarizes the comparative static predictions. Consider first the effects of an exogenous change in the city-wide average rate of federal or state subsidies for local property taxation, τ, for example through the removal of deductibility of local taxation when calculating federal and state income tax liabilities. The resulting reduction in τ implies an increase in $(1-\tau)$ and $(dR^h/dr)_{\bar{V}}$ for each value of r; see eq. (6′) above. Increases in the gross property tax rate are now politically more costly, requiring a larger increase in revenues as compensation. Steeper indifference curves means a lower preferred r^*. What happens to f^*? The lower value of r^* implies a higher shadow value for agency profits which flattens the indifference curves in Figure 1; see eq. (7′). A higher preferred level of fees results. Higher fees in turn "feedback" into the tax rate equilibrium and reduces r still further, while the new fall in r raises f again. We can conclude, therefore, that $dr^*/d(1-\tau) < 0$ and $df^*/(1-\tau) > 0$, as shown in Table 1.[14] A similar argument can be developed to show that an exogenous reduction in commercial-industrial tax base (lowering p) will also lower r^* and raise f^*; see Table 1.

Changes in the average rate of fee subsidies--for example, lowering θ through less federal or state residential subsidies for public housing or hospitals--will also alter r^* and f^*. Here a reduction in θ raises $(1-\theta)$ which increases $(d\pi/df)_{\bar{V}}$, the slope of the indifference curves in Figure 1. The added burden from gross fees with the fall in θ now requires increasing profits as compensation. Steeper indifference curves in Figure 1 imply a lower value of f^* and a reduction in agency profits. From the council's budget constraint the fall in profits reduces the level of g that is possible for each value of r. The fall in g raises the marginal gains from raising the local property tax rate; $\partial v/\partial g$ rises so $(dR^h/dr)_{\bar{V}}$ falls. The flatter indifference curves in Figure 2 imply an increase in r^*. The larger r^* "feedback" reduces to the shadow value of agency profits which further reduces f^*. Thus, $df^*/d(1-\theta) < 0$ and $dr^*/(1-\theta) > 0$ as shown in Table 1.

A change in the rate of subsidy for core service expenditures has ambiguous effects on r^* and f^*, however. For example, an increase in $(1-\mu)$ increases $(dR^h/dr)_{\bar{V}}$ as specified by eq. (6′)

[14]Corner solutions are possible, but in this discussion I assume $r^* > 0$ and $f^* > 0$.

Table 1: Comparative Statics

Exogenous Variable	Effect on: Property Tax Rate ($r*$)	Effect on: User Fees ($f*$)
$(1-\tau)$	$dr*/d(1-\tau) < 0$	$df*/d(1-\tau) > 0$
$(1-p)$	$dr*/d(1-p) < 0$	$df*/d(1-p) > 0$
$(1-\theta)$	$dr*/d(1-\theta) > 0$	$df*/d(1-\theta) < 0$
$(1-\mu)$	$dr*/d(1-\mu) \gtreqless 0$	$df*/d(1-\mu) \gtreqless 0$
c	$dr*/dc > 0$	$df*/dc > 0$
$(A+\overline{T}-I)$	$dr*/d(A+\overline{T}-I) < 0$	$df*/d(A+\overline{T}-I) < 0$
Y_g	$dr*/dY_g \gtreqless 0$	$df*/dY_g \gtreqless 0$
Y_q	$dr*/dY_q \gtreqless 0$	$df*/dY_q \gtreqless 0$
$\varepsilon_B(Z)$	$dr*/d\lvert\varepsilon_B\rvert \gtreqless 0$	$df*/d\lvert\varepsilon_B\rvert > 0$
$\varepsilon_q(Z)$	$dr*/d\lvert\varepsilon_q\rvert > 0$	$df*/d\lvert\varepsilon_q\rvert \gtreqless 0$
r_y, r_s	$dr*/dr_{y,s} \gtreqless 0$	$df*/dr_{y,s} \gtreqless 0$
α_i	$dr*/d\alpha_i \gtreqless 0$	$df*/d\alpha_i \gtreqless 0$
$(1-\tau_i)$	$dr*/d(1-\tau_i) \gtreqless 0$	$df*/d(1-\tau_i) \gtreqless 0$
$(1-\theta_i)$	$dr*/d(1-\theta_i) \gtreqless 0$	$df*/d(1-\theta_i) \gtreqless 0$
X_r	$dr*/dX_r \gtreqless 0$	$df*/dX_r \gtreqless 0$
X_p	$dr*/dX_p \gtreqless 0$	$df*/dX_p \gtreqless 0$
s	$dr*/ds < 0$	$df*/ds > 0$
$\overline{r}$	$dr*/d\overline{r} \geq 0$	$df*/d\overline{r} \leq 0$

above. Since government matching aid has fallen, each increase in r must now raise more *own* revenues to maintain g and political support. The steeper slope to the indifference curves in Figure 2 implies a fall in r^*. The fall in r^* means a higher shadow value for agency profits which stimulates an increase in fees and agency profits in Figure 1. Now, however, the rise in profits means an increase in g, given r^*, which in turn lowers $(dR^h/dr)_{\bar{V}}$ in Figure 2 acting to increase r^*. The initial effect of the fall in μ is now offset by the increase in π from the change in fees. Thus no predictions are possible, either for r^* or f^*; see Table 1.[15]

The final average "price effect" in the model occurs through exogenous changes in the average production cost of fee-based services. An increase in c lowers agency profits for each value of f, shifting the profit curve to the right and down along the horizontal axis in Figure 1. If, as assumed, fees impose an increasing marginal loss on the agency and the shadow value of profits increases as π declines, then the new fee equilibrium will involve higher fees, and (most likely) lower agency profits.[16] If so, the tangency of an agency's indifference curve to the new profit hill will therefore occur to the southeast of the equilibrium shown in Figure 1. For property taxation, the fall in agency profits means less g for each tax rate r and thus the slope $(dR^h/dr)_{\bar{V}}$ declines in Figure 2. Tax rates therefore rise. The increase in tax rates is not sufficient to offset the original fall in agency profits however, and therefore core services (g) decline.[17] The fall in g increases $\partial v/\partial g$ which flattens all indifference curves in Figure 1 (see eq. (7′)) further increasing fees. In equilibrium, therefore, $dr^*/dc > 0$ and $df^*/dc > 0$.

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[15]While clear predictions for the effects of tax and fee subsidies are possible in this model, no unambiguous conclusions follow from the comparative static analysis of a change in expenditure subsidies. These results should caution those who might use service price elasticities from expenditure studies to draw conclusions about the policy effects of revenue subsidies.

[16]In addition to the downward shift in the profit hill, the slope of the profit hill at each value of f may change as well. With a constant elasticity of demand for q, the slope of the profit hill will steepen at each value of f. This further encourages an increase in fees. It is possible that the steeper profit hill will encourage such a large increase in fees that final agency profits may increase over the level obtained in the initial equilibrium, even though the new profit curve is itself everywhere below the original schedule.

[17]The equilibrium at a new higher tax rate means the slope of the short-run revenue curve is flatter (i.e., equilibrium tax base is lower) and therefore the slope of the council's equilibrium indifference curve must also be flatter, or $(dR^h/dr)_{\bar{V}}$ is smaller in value. From (6′) this can only occur at higher tax rate if $(\partial v/\partial g)$is larger in value or, with diminishing marginal benefits, because g is smaller.

Changes in lump-sum federal and state aid (A), revenue from exogenous tax sources $(\overline{T})$, or interest payments (I) will affect r^* and f^* jointly. From the council's budget constraint, an increase in $(A + \overline{T} - I)$ implies more core services (g) for any given property tax rate. This reduces $(\partial v/\partial g)$ and increases $(dR^h/dr)_{\overline{V}}$ for each value of r; the steeper indifference curves in Figure 2 mean a lower r^*. The fall in r^* is not enough to offset the effect of more $(A + \overline{T} - I)$ on g, however.[18] The net increase in g lowers $\partial v/\partial g$ in eq. (7´), steepens the slopes of the agency indifference curves in Figure 1, and implies a lower equilibrium value of f^*. Thus $dr^*/d(A + \overline{T} - I) < 0$ and $df^*/d(A + \overline{T} - I) < 0$.

An increase in demands for public services (Y_g, Y_q) will have ambiguous effects on revenues. First, as a pure "taste" effect, an increase in the demand for government services will increase $\partial v/\partial g$ which will increase f^* and r^*. However, there may be offsetting effects if Y_g and Y_q also change revenue bases. For example, if increases in Y_q (Y_g) induce a parallel upward shift to the profit (tax revenue) curve, then fees (tax rates) will decline. Yet increases in Y_q and Y_g may also steepen the slopes of the city profit and revenue curves as exit to outside suppliers and residential locations decline. If so, the steeper profit and revenue curves may encourage fees and taxes. Which of these three effects dominates is not clear *a priori*.

Exogenous changes in the elasticities of the profit and tax revenue schedules--for example, because of increased Tiebout competition (Z) in the region--will also influence city revenue decisions. Larger (in absolute value) revenue base elasticities imply profit and long-run revenue schedules which are everywhere flatter and lower than the original schedules. (*Flatter* from the slope specifications in eqs. (6´) and (7´) and *lower* because the profit curve and the short- and long-run revenue curves will be "anchored" at $\pi(f = 0)$ and at $R(r = 0)$ respectively.) In Figure 1, the flatter slope to the profit curve will act to reduce fees and profits, but the concurrent downward shift in the profit curve acts to increase fees. Thus no clear prediction of the effect of ε_q on f^* is possible. Plausible arguments can be offered for an increase in tax rates, however. With a decline in agency profits, lower core services will be provided for each value of

[18]The argument is the reverse to that in fn. 17 above.

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r in Figure 2.[19] Thus increases in r are politically more valuable, the required revenue compensation $(dR^h/dr)_{\bar{V}}$ falls, and r^* rises. Similar arguments apply for an exogenous increase in ε_B to show that while r^* may fall (a "substitution" effect) or rise (a "revenue" effect), f^* must rise because of an equilibrium decline in tax revenues and a resulting rise in the shadow value of agency profits.

Comparative static arguments can also be offered to predict the effects of changes in the exogenous determinants of mayoral redistribution preferences. A precise specification of $m(\beta_1, ..., \beta_{N-1}; X)$ and the available redistributive policy instruments are needed, however. For example, if city officials have a tax instrument for each taxpayer (e.g., Lindahl prices) then the preferred redistributive burden can be obtained with each β_i equal to its target β_i^*. In this case, m is always at its maximum, $\partial m/\partial r = 0$ and $\partial m/\partial f = 0$, and uniform tax rate ($r$) and fees (f) become irrelevant as redistribution instruments. Without such a complete set of tax instruments however, $\beta_i \neq \beta_i^*$ (for at least some i) and $\partial m/\partial r \neq 0$ and $\partial m/\partial f \neq 0$ is likely. In this case, r and f do become useful redistributive policy instruments; see eqs. (6′) and (7′). Hence exogenous changes in β_i—e.g., through changes in r_y and r_s or the $(1-\tau_i)$'s, $(1-\theta_i)$'s, or α_i's--or exogenous changes in β_i^*—through changes in taxpayer influence, X--may increase or decrease $m(\cdot)$, alter $\partial m/\partial \bar{r}$ and $\partial m/\partial \bar{f}$, and change the first-order conditions for a fiscal optimum. Preferred rates and fees will therefore change. In general, however, no clear predictions are possible without further structure to $m(\cdot)$; thus Table 1 shows ambiguous predictions for the exogenous redistributive variables.

One plausible special case seems of interest, however, for it helps explicate the pattern and significance of redistribution changes which are empirically observed for large U.S. cities. Three coalitions of taxpayers are assumed: rich taxpayers, middle class taxpayers, and poor taxpayers. Each taxpayer wishes to minimize his or her share in total tax burdens, β_i, by influencing the choices of r and f. A typical finance structure in my sample cities is such that a

[19] Sufficient for a decline in equilibrium profits is that $\partial^2 q/\partial f^2 \leq 0$. Linear demand curves satisfy this restriction.

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rich taxpayer's β_i rises with an increase in fees (their share in the subsidy adjusted consumption of q is greater than β_i) and falls with an increase in r (their share in subsidy adjusted property tax base is less than β_i).[20] The pattern is just the opposite for a very poor household whose β_i rises as the city raises property tax rates and whose β_i falls as the city raises fees.[21] Middle class households have shares in property taxation and fees just about equal to their average burden share; their β_i's are therefore unaffected by small changes in tax rates or fees. In this environment, redistributive politics becomes a balancing of the interests of rich and poor taxpayers. Individual rich taxpayers favor property tax increases and fee reductions, while individual poor taxpayers prefer to reduce property tax rates and to raise fees.

What does such a distribution "game" imply for r and f if there are small changes in the model's exogenous redistributive variables? If a coalition's initial equilibrium share β_i is greater than or equal to the mayor's target share β_i^*, then any exogenous change which increases β_i will induce a policy response to return β_i closer to its target β_i^*.[22] Increases in r_y (the rich bear the larger relative burden of uniform local income taxes) or in $(1-\tau_i)$, $(1-\theta_i)$, and α_i for the rich all increase β_i for the rich. Such exogenous changes will induce compensating increases in r and

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[20]See p. 5 above. I have estimated values of β_i for my average sample city for households whose incomes are twice the community average. Assuming plausible consumption patterns (roughly one-half of all non-housing consumption is made within the city) and assessment rates ($\alpha_i = .8$ for rich households based on Inman and Rubinfeld (1979)) the rich's value of β_i equals 1.6 of the average residential tax burden. A rich taxpayer's share of adjusted property tax base is about 1.05 of the average adjusted base. Thus increases in r will lower β_i for a rich taxpayer.

A similar calculation for fees for a household with income twice the community average implies that the rich taxpayer pays about twice the average fee payment. Most residential fees are paid for sewerage and sanitation borne in proportion to housing consumption. Thus the taxpayer's share in the fee base is greater than his average β_i. Therefore, increases in fees will raise β_i.

[21]Poor households in my sample cities are assigned an income equal to half the city average, they are assumed to consume 90% of the non-housing consumption in the city, and they are given an assessment rate equal to 1.8 times the city average (Inman and Rubinfeld (1979)). Their estimated value of β_i is .75 of the average residential burden. The poor taxpayer's share of the adjusted property tax base is just about equal to the average adjusted base; this is so because of the poor's relatively high assessment rate and the fact that the poor do not deduct property taxation when paying federal and state taxes. The poor's share of the adjusted fee base is about .3 of the average share, however, because of housing subsidies and lower than average consumption of fee-based services. From the arguments above (pp. 4-5), therefore, the poor will prefer to increase fees and to lower rates.

[22]If the initial equilibrium share is less than the target share, then all the conclusions which follow from an exogenous increase in β_i are reversed.

reductions in f so as to lower β_i back towards its target.[23] Conversely, an increase in r_s (the poor bear the larger relative burden of general sales taxation) or in $(1-\tau_i)$, $(1-\theta_i)$, and α_i for the poor all increase the poor's β_i above the initial equilibrium value. There is now a compensating reduction in r and a compensating increase in f so as to lower the poor's share back to its target.[24] Finally, an increase in the relative political influence of the rich or the poor coalition (X) will lower their respective target shares, β_i^*, and stimulate adjustments in r and f. For example, if the percent of the electorate who are rich (PCR) increases, β_i^* for the rich may fall. If so, there will be pressure to reduce β_i for the rich taxpayer and thus, by previous arguments, r will rise and f will fall. Alternatively, if the percent of the electorate who are poor (PCP) increases, β_i^* for the poor may fall. If so, there will be pressure to reduce r and to increase f. These hypotheses for PCR and PCP--defined now as the elements of X--as well as those for r_y, r_s and $(1-\tau_i)$ will be tested when estimating the tax and fee equations. Table 2 will present empirical results generally consistent with the pattern of redistributive effects predicted here. The specific redistributive structure outlined above provides one rationale for these results. I have no doubt however, that other, perhaps equally plausible explanations, can also be constructed. The point here is a modest one: redistributive politics may well play an important role in local fiscal choice.

There has been one final change in the political-legal environment of the local decision to tax which we can also examine with the model here: the local property tax limitation movement. Two general forms of limitations are in force. The first--called "soft" limitations--places various voting and administrative barriers before local politicians as they seek to raise the rate of local property taxation. Typically, such soft limitations require a specific voter referendum for all tax rate increases above a certain annual rate of growth, often demanding a 2/3's rate of voter approval. The second form of limitation is an absolute restriction on the level of the local

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[23]In the context of eq. (7'), the term $(\partial m/\partial r)$ now becomes more positive as β_{rich} rises which in turn flattens the slope of the indifference curves in Figure 2 ($((dR^k/dr)_{\bar{V}}$ becomes smaller). The flatter slopes in Figure 2 imply higher preferred values of r. The rise in r lowers the shadow value of agency profits which reduces the use of fees. This effect on fees is reinforced by the fact that $(\partial m/\partial \bar{f})$ has now become more negative with the rise in β_i for the rich, further steepening the slope of all indifference curves in Figure 1 and further reducing fees.

[24]Formally, the argument is the reverse of that in fn. 23 above.

property tax rate applied either to market value (e.g., California and Massachusetts) or to assessed value (e.g., Ohio). With absolute limitations, the local property tax rate must satisfy the constraint: $r \leq \bar{r}$.[25] An Appendix details these limitations for the study's sample. The comparative statics of "soft" (denoted s) and "hard" ($\bar{r}$) limitations are straight-forward extensions of the analysis above. Soft limitations can be seen as increasing the marginal political costs of raising the local property tax by giving a more visible and politically effective forum to the tax's opponents.[26] This increases $(dR^h/dr)_{\bar{V}}$ in Figure 2 which in turn implies a reduction in r^*, an increase in the shadow value of agency profits, and a final rise in f^*. Thus, $dr^*/ds < 0$ and $df^*/ds > 0$, where increases in s imply a "tougher" constraint. Hard limitations simply act as a barrier--a vertical line at $\bar{r}$ in Figure 2 (not shown)--beyond which r cannot rise. If the constraint occurs to the left of r^*, then city rates must fall to $\bar{r}$. If the constraint is to the right of the preferred rate, then the constraint does not bind and rates remain at r^*. Thus $dr^*/d\bar{r} \geq 0$. If the constraint is binding and r^* must fall to $\bar{r}$, then the shadow value of agency profits is increased, and f^* will rise in Figure 1. If r is not binding, then f^* remains unchanged. Thus, $df^*/d\bar{r} \leq 0$. See Table 1.

It is instructive to compare the comparative static predictions developed here with those which might arise from the commonly used "representative" taxpayer model. Arnott and Grieson (1981) provide such a model for local government taxation.[27] Maximizing the indirect utility function of the representative taxpayer, familiar optimal tax rules for efficient--i.e., excess burden minimizing--local taxation are derived, allowing for the fact that local taxes may be exported

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[25]Limitations applied to assessed value may be less restrictive than market value limitations if the city retains control over the assessment process. Most states, however, have removed this degree of local discretion, giving the county or the state itself sole assessment power; see Inman and Rubinfeld (1979).

[26]For example, if the "soft" limitation requires 2/3 referendum approval and the limitation specifies a very low reversion (or "fall back") tax rate without approval, then r will settle at the preferred rate of the voter in 33% position in the distribution of voter preferences.

[27]Applications of the representative taxpayer model to the empirical analysis of local taxation include Inman (1979) in a study of property taxation alone, Feldstein and Metcalf (1987) in a study of state-local aggregate taxation, and Holtz-Eakin and Rosen (forthcoming) for their study of property taxation in middle size communities. Barro (1979) also uses the representative taxpayer approach, but rather than tax mix he examines the intertemporal distribution of tax burdens for a single tax. That analysis yields the now familiar "tax-smoothing" hypothesis.

(e.g., through deductibility) to non-residents. Local tax rates (or fees) are higher for locally consumed goods with low price elasticities of demand and for those goods where taxes can be shifted onto non-residents. The prediction that tax rates will be higher on those goods where taxes can be exported is consistent with the predictions here for the average revenue subsidies $(1-\tau)$, $(1-p)$, and $(1-\theta)$. Demand elasticities are also important in both models and again identical predictions can result.[28] The variables most capable of distinguishing between the two models are the redistribution variables (X, $(1-\tau_i)$, α_i, $(1-\theta_i)$, r_y and r_s), variables which have no independent role to play in the representative taxpayer model beyond their effects on average exogenous revenue $(\overline{T})$ or average revenue subsidies. Also important here, but arguably insignificant in the apolitical representative taxpayer model, is the variable measuring the presence of a "soft" tax limitation. The separate statistical significance of the redistribution variables and of s therefore provide a distinguishing test of the hypothesis that local taxation is determined in part by redistribution politics.

C. Econometric Specification

A revenue system for property taxation, user fees, and selective sales taxation will be estimated to test the comparative static properties of the revenue model. To do so, each of the exogenous variables in Table 1 must be specified.

The uniform subsidy rate $(1-\tau)$ for local property taxation is defined as the weighted average of the individual values of $(1-\tau_i)$ for taxpayers in each of the three income coalitions in the city: poor (for that household whose income corresponds to the 25th percentile income in the city), middle (for the median income household in the city), and rich (for that household which income corresponds to the 75th percentile income in the city). There are three sources of variation for each coalition's value of τ_i: whether in fact the coalition's taxpayers deduct property taxation from their federal and state income taxes, the coalition's taxpayer's marginal

[28]The redistribution model predicts any sign for the effects of changes in own-price elasticities (ε_B and ε_q), a result which is also possible in the representative taxpayer model as long as demands are not independent. Similarly, the variables $(A+\overline{T}-I)$, Y_g, Y_q, and $\overline{r}$ will give identical predictions within the two models.

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tax bracket on federal and state income taxes if the family does deduct, and homestead exemptions and property tax credits from the state available to the coalition's taxpayers. For this study the probability of deduction is taken to be each year's national rate of deductibility for each coalition's taxpayer's income level.[29] Federal and state tax codes define the marginal tax rate if the taxpayer does deduct; I use the marginal tax rate corresponding to the first dollar of deductions for each coalition income level. Property tax credits and exemptions were also estimated for each coalition and included in τ_i; generally such subsidies are limited to lower income households and available whether or not the household itemizes. The weights for the aggregation of the separate coalition τ_i's were .25 for the poor cohort, .50 for the median income cohort, and .25 for the rich cohort.

The uniform rate of subsidy to residential property taxation from commercial industrial property (p) is simply the share of commercial-industrial property in the city's assessed tax base. This rate of subsidy applies uniformly to all income cohorts.

The rate of subsidy for local user fees is limited to federal hospital and housing transfers for the poor and elderly; thus in any one year there will be no variation in $(1-\theta_i)$ across our cities. I allow for any year to year trend in this variable only crudely through the inclusion of a year time dummy variable (Time). A similar specification is adopted, for similar reasons, for the average cost of fee-based government services (c).

Federal and state government matching grants for local spending on core services, $(1-\mu)$, do vary across the sample cities, however. The two major programs are assistance for welfare spending on the current account (for those cities with this fiscal responsibility) and city capital outlays; estimates of these matching rates have been developed for city expenditure data and are included in this study as $(1-\mu_c)$ and $(1-\mu_k)$ respectively.

Federal and state government lump-sum transfer to U.S. cities are included in A, one major component of which is (now obsolete) revenue-sharing aid. Included in $(\overline{T}-I)$ are city

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[29] It would be preferable to use the probability of deduction within the individual city, but this data does not exist. For their study of aggregate state-local taxation, Feldstein and Metcalf (1987) were able to calculate deduction probabilities by states which is an improvement.

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revenues ($\overline{T}$) from the two major exogenously set tax sources--local income taxation and local general sales taxes-- less exogenously required interest payments on local government debt (I).

Included as *joint* measures of the political benefits from providing core public (Y_g) and private fee-based (Y_q) services are average resident income in the city (CINC, for residential demand), percent of the workforce who commute into the city (PCOM, for commuter and service-based business demand), the number of manufacturing sector jobs per capita (MANU, for heavy industry business demand). CINC, PCOM, and MANU are each expected to increase the political benefits from g and q service provision. Included in Y_g as unique measures of the political benefits of core service provision are the variables ED (= 1, if city officials are fiscally responsible for education, 0 if a fiscally independent school district is responsible) and REAG (= 1, for the fiscally conservative years of the Reagan presidency, 0 otherwise). It is reasonable to expect ED and REAG to have only "taste" effects (i.e., alter $\partial v/\partial g$ only). If so, then ED should increase r^* and f^*. Reagan's fiscal conservatism favored smaller government spending on core services and increased privatization; if these preferences carried over to local politics then r^* should fall and f^* may fall (smaller government) or rise (privatization) when REAG = 1.

Direct estimates of the tax base and user fee elasticities, ε_B and ε_q, are not available. It is reasonable to expect, however, that these elasticities increase (in absolute value) as the city's non-fiscal amenities decline and as the city's regional economy becomes more fiscally competitive. Such variables constitute the vector Z. Each regression will include city-specific dummy variables ('City') to control for across city differences in all non-fiscal amenities; the trend variable 'Time' will capture any uniform decline over time in such amenities. To measure regional fiscal competition I specify two variables: RCSI which measures the ratio of city to suburban average income and the variable $RCSI^2$. Values of RCSI near two appear to represent regions where suburban exit options for city households and firms are most abundant; see the Appendix. Very low (less than 1.0) or very high (above 4.0) values of RCSI indicate limited exit options for the average city resident, either because he or she is too poor (Newark) or too rich (Omaha or San Antonio today) for the suburban alternatives. Thus ε_B and ε_q should be largest in absolute value as the region's value of RCSI approaches the range 2-3, and smallest for very high or very low values of RCSI. This U-shape relationship of RCSI to ε_B and ε_q requires both RCSI and RCSI^2 in the regressions.

Measures of exogenous shifts in individual taxpayers shares, β_i, include the state-set rates of taxation on income (denoted $\bar{r}_y$) and on general sales (denoted $\bar{r}_s$). For large U.S. cities, an increase in $\bar{r}_y$ will increase the rich taxpayer's share in total burdens (β_i) and should, under the special case redistribution model outlined in II.B, increase r^* and reduce f^*. Conversely, an increase in $\bar{r}_s$ will shift more of the aggregate local tax burden onto the poor causing β_i for the poor to rise. If so, then under the special case redistribution model, r^* should fall and f^* should rise.

Measures of the exogenous redistribution variables $(1 - \theta_i)$ and α_i are not available by individual cities; the included city dummy variable ('City') should at least control for their omitted effects. More importantly, measures of the redistribution variables $(1 - \tau_i)$ are available city by city for each of the local taxes. However, their separate inclusion in each revenue equation along with the average subsidy for property taxation, $(1 - \tau)$, proved uninformative because the variables are so highly collinear. Therefore, only the property average rate $(1 - \tau)$ is included in the revenue equations. Now, however, its estimated effect must be interpreted as measuring the joint effects of both the average subsidy and the possible redistributive effects from variations in the individual $(1 - \tau_i)$'s; see section III below.

The political influence of the upper income cohort (X_r) is measured here by the size of the rich coalition, the percent of households in the city whose income exceeds the national 75th percentile income level (PCR). The political influence of the poor (X_p) is measured by the size of the city's poor coalition, the percent of city households whose income is below the national 25th percentile income level (PCP). Since political influence is a relative concept, the effects of these two variables on taxes and fees are measured relative to the residual influence of the city's middle class.

Finally, two property tax limitation variables are specified, one for "soft" limitations (s) and one for "hard" limitations ($\bar{r}$). For hard limitations the actual maximum tax rate available to the city is used. For cities facing a soft limitation, a simple (1,0) dummy variable is used, where

$s = 1$ if the city faces a specific election or administrative over-ride requirement before increasing rates, 0 otherwise.

The dependent variables for the empirical analysis are total property tax revenues--$R(r) = r{*}B(\tilde{r})$--and total fee-selective sales tax revenues--$F(f) = f{*}q(\tilde{f})$. While the model and the comparative static analysis has been constructed for tax rates and fees, accurate measures of r and f were not available for this study. The extension of the model to property tax and fee *revenues* is straightforward, however. Since the exogenous determinants of tax base and private service demands have already been included in the analysis of r and f, tax and fee revenue equations can now be specified as functions of the measured exogenous variables as:

(10s) $R = R\left\{(1-\tau), (1-p), \text{Time}, (1-\mu), \text{City}, A + \overline{T} - I, Y_g, Y_q, Z, X_r, X_p, \bar{r}_y, \bar{r}_s, s\right\}$,

and

(11s) $F = F\left\{(1-\tau), (1-p), \text{Time}, (1-\mu), \text{City}, A + \overline{T} - I, Y_g, Y_q, Z, X_r, X_p, \bar{r}_y, \bar{r}_s, s\right\}$,

for cities with no, or soft, limitations only, and:

(10$\bar{r}$) $$R = R\{\bar{r}, \varepsilon_B(\bar{r}, Y_g, Z)\} ,$$

and

(11$\bar{r}$) $F = F\left\{\bar{r}, (1-\tau), (1-p), \text{Time}, (1-\mu), \text{City}, A + \overline{T} - I, Y_g, Y_q, Z, X_r, X_p, \bar{r}_y, \bar{r}_s\right\}$,

for cities facing absolute property tax limitations.

The comparative static analysis for these F and R equations are also simple extensions of the original analysis. If the city's equilibrium values of r^* and f^* place the cities on the rising portions of their profit and revenue curves, then any change which increases (decreases) f^* or r^* will also increase (decrease) F and R. This added restriction seems a modest addition to the model's final set of maintained hypotheses.[30]

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[30]Recent empirical evidence supports the assumption that cities are to be found on the rising portion of their tax revenue curves; see Ladd and Bradbury (1988), Sexton (1987) and Holtz-Eakin and Rosen (forthcoming). The estimated long-run elasticities of property tax base with respect to tax rates range from -.15 to -.53; thus increases in tax rates will increase revenues.

(continued)

With the inclusion of city-specific dummy variables, revenue eqs. (10s)-(11s) and $(10\bar{r})$ – $(11\bar{r})$ define two "fixed effects" models, where the city dummy variables (City) control for all unmeasured city-specific determinants of tax rates and fees. Unbiased estimates of the coefficients for all remaining time-varying variables result; see Hausman and Taylor (1981). Further, the model's error structure is specified as additive and allows for possible first-order serial autocorrelation, heteroscedasticity, and the correlation of errors across the revenue equations. All dollar variables are measured in real (1967) dollars per capita.

III. Estimation and Results

A. Estimation

The revenue model was estimated for a sample of the forty-one largest U.S. cities for the fiscal years 1961-1986. Estimation was by generalized least squares and allowed for a possible lagged response of previous period revenues on current period financing. This one period dynamic specification is at best a crude approximation to the true dynamic structure of city revenue adjustments where tax rates and fees are likely to adjust relatively quickly while tax bases will adjust more slowly. The coefficients on lagged own revenues--R_{-1} and F_{-1} in the R and F equations--will be an "average" of these separate dynamic processes.[31]

To test for possible serial correlation of the equation errors, each revenue equation was initially estimated city by city using the 25 years of city specific data; the lagged dependent variable was excluded as a regressor. In all cases, the resulting Durbin-Watson test statistics were near 2 and the data could not reject the null hypothesis of no first-order serial correlation.

Demand studies for the major fee-based public services (hospitals, housing, and garbage collection) and selective sales taxes (hotels, cigarettes, liquor) typically show price elasticities which are also less than one. Thus increases in fees will increase total fee revenue.

[31]The specification used here might be motivated by arguing that the marginal effects of past changes in the model's exogenous variables decline geometrically with time--for example, if tax rates are adjusted quickly (a large "impact" effect) and tax base responds slowly (a diminishing long-run effect). Such a lag structure--called the Koyck geometric lag--would imply the specification adopted here; see Kmenta (1971, pp. 474-487). A theoretically more appropriate lag specification would allow for other than simple geometric adjustments--for example, a lag distribution which permits marginal effects to first be positive and then negative. Estimation of such lag structures for a few of the key policy variables would be a useful extension of this work.

Heteroscedasticity, however, is a potential problem in this sample; thus, weighted least squares estimation was employed with the inverse of city population used as the preferred weight. Further, when the tax and fee revenue equations were jointly estimated (three-staged least squares), the correlation of equation errors revealed no significant across equation correlations.

This observed error structure creates one final issue for model estimation. The dynamic specification which includes the lagged value of the dependent variable as a regressor may now involve a correlation between each equation's error and the lagged dependent variable; see Kmenta (1971, p. 479). To obtain consistent estimates of the model's coefficients, instrumental variables estimation was employed using current and lagged values of the exogenous variables of the model as instruments.[32] Results based upon this weighted instrumental variables estimation are reported in Table 2.

Table 2 reports parameter estimates for the two separate tax limitation regimes, as required by the revenue model's specification. Revenue equations were estimated for cities facing no, or only "soft", property tax limitations--eqs. (1s)-(3s) in Table 2 corresponding to eqs. (10s)-(11s) above--and also for cities facing absolute property tax limits of the form $r \leq \bar{r}$—eqs. (1r)-(3r) in Table 2 corresponding to eqs. (10r)-(11r) above. An F test as to the appropriateness of the regime split was performed; the null hypothesis that the two samples could be combined (i.e., no regime difference) was rejected at the .01 level for each revenue equation ($F(59, 956)$ = 12.82 (R), = 3.32 (Fee) and = 6.836 (SST)). Further, an F test for the exclusion restriction of the tax preference variables ($(1-\tau)$, $(1-p)$, X_r, X_p, $\bar{r}_y$ and $\bar{r}_s$) supports the hypothesized source of the regime difference; the null hypothesis that these variables can be excluded from the property

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[32]There is another possible source of simultaneity in this model, as noted by Feldstein and Metcalf (1987). The rate of subsidy from federal tax deductibility will depend upon the taxpayer's marginal tax bracket which depends upon taxable income which in turn depends the level of deductible state and local taxes. Such simultaneity can be avoided, however, if the rate of taxation used to estimate $(1-\tau)$ is based upon income before the first dollar of deductions. This is the procedure I have used here when estimating $(1-\tau)$.

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Table 2: Estimation

Independent Variables			Dependent Variables					
	s	$\bar{T}$	R	Fee	SST	R	Fee	SST
			(1s)	(2s)	(3s)	(1$\bar{T}$)	(2$\bar{T}$)	(3$\bar{T}$)
	Mean (s.d.)		66.62 (51.74)	54.78 (33.64)	11.86 (11.42)	63.84 (89.67)	68.51 (43.78)	8.67 (10.77)
City	(n.r.)	(n.r.)	(n.r.)	(n.r.)	(n.r.)	(n.r.)	(n.r.)	(n.r.)
Fiscal								
$(1-\tau)$	.866 (.049)	.877 (.036)	18.950* (11.154)	-12.314 (18.383)	-10.104* (3.226)	–	-94.884* (43.709)	-3.232 (11.931)
$(1-p)$	.640 (.105)	.628 (.104)	-13.589* (6.809)	18.585* (11.504)	0.551 (2.187)	--	8.454 (18.697)	3.112 (5.120)
$(1-\mu_k)$	.259 (.314)	.163 (.235)	-3.194 (2.145)	4.102 (3.592)	0.743 (.686)	8.094 (6.390)	5.797 (8.042)	-.563 (2.193)
$(1-\mu_c)$	.972 (.063)	.975 (.069)	45.199* (11.539)	47.633* (19.498)	-23.873* (3.737)	-131.83* (18.98)	-75.305* (26.969)	-29.133* (7.766)
$(A+\bar{T}-I)$	18.932 (15.372)	36.080 (30.534)	-0.141* (.035)	-0.086 (.059)	0.002 (.011)	.056* (.031)	-.003 (.066)	-.076* (.018)
Time	1973 (7.79)	1973 (7.79)	.106 (.222)	1.487* (.381)	.487* (.071)	-.969* (388)	.079 (.692)	.674* (.157)
Economic								
(Z)								
RCSI	1.446 (.768)	1.592 (.859)	-4.840 (3.382)	-27.291* (5.728)	-3.847* (1.088)	1.882 (6.692)	-36.868* (9.934)	-9.561* (2.702)
RCSI²	2.681 (3.235)	3.268 (3.448)	1.031* (.538)	4.540* (.983)	0.412* (.187)	-.327 (1.308)	7.516* (1.921)	1.174* (.527)
Political								
PCR (X_r)	23.768 (4.995)	21.293 (4.341)	-1.166* (.279)	-0.598 (.463)	-0.159* (.088)	–	1.275 (1.028)	.497* (.280)
$\bar{T}_y$	.008 (.025)	.015 (.029)	23.110 (22.481)	-22.603 (41.159)	-33.761* (7.365)	–	86.613 (79.270)	-14.923 (20.956)
PCP (X_p)	11.816 (4.152)	13.633 (4.342)	-1.327* (.386)	-0.383 (.651)	0.576* (.129)	–	.534 (.677)	.389* (.189)
$\bar{T}_s$	.007 (.025)	.015 (.033)	-42.581* (27.637)	-41.107 (50.425)	64.854* (9.162)	–	204.24* (53.68)	77.454* (14.793)
(Y_s, Y_q)								
CINC	3246 (640)	3283 (712)	0.009* (.002)	0.014* (.003)	-0.000 (.001)	.014* (.003)	.007* (.004)	.003* (.001)
ED	.164 (.370)	.282 (.451)	47.37* (6.856)	10.820 (11.449)	-2.347 (2.189)	43.681* (8.25)	9.839* (9.059)	-4.910* (2.489)
PCOM	37.721 (13.375)	41.137 (13.431)	-0.163* (.092)	0.218 (.155)	0.128* (.030)	.214 (.138)	1.428* (.274)	-.030 (.068)
MANU	.096 (.051)	.107 (.041)	2.234 (10.395)	-73.281* (17.609)	6.768* (3.334)	125.87* (55.16)	-354.39* (98.41)	12.408 (26.077)
REAG	.173 (.375)	.331 (.471)	-1.099 (1.683)	9.076* (2.850)	0.880* (.542)	1.937 (2.910)	-1.559 (3.689)	-.613 (.985)
Limits								
s	.312 (.463)	–	-4.569* (1.548)	4.282* (2.601)	-0.545 (.496)	–	–	–
$\bar{T}$	–	.014 (.005)	–	–	–	571.56 (543.32)	-1357.6* (703.2)	388.97* (190.19)
Lagged Dependent	--	--	0.437* (.022)	0.242* (.021)	0.457* (.020)	.514* (.029)	.593* (.042)	.436* (.049)
Sample Size	714	311		714			311	

n.r. = Not reported. Results available upon request.
* = Estimated coefficient exceeds its estimated standard error by 1.65 or greater.

16.18.1

tax equation for absolute tax limit cities cannot be rejected at the .01 level of significance (F(6, 227) = 2.12).[33]

Table 2 also reports separate econometric results for user fees and selective sales taxation, treated originally as a single endogenous variable. Since we are estimating revenue equations rather than price or selective tax rate equations, this natural correspondence is no longer appropriate. User fee revenues (denoted Fee in Table 2) equal $f*q(\bar{f})$ and measure *total* revenues from the service, inclusive of service costs ($= c*q(\bar{f})$). Selective sales tax revenues (denoted SST in Table 2) equal $t*q(\bar{f})$ and measure *net profits* from the taxed service, exclusive of service costs. Thus while the exogenous variables of the model should have the same qualitative effects on Fee and SST, the magnitude of the effects--i.e., the regression coefficients--will differ. A formal test of the hypothesis of identical regression coefficients rejects that hypothesis at the .01 level of significance for each tax regime (F(50, 1400) = 14.78 for no limit and F(26, 600) = 53.38 for limit regimes). Separate estimation of the two revenue equations is therefore appropriate.

Finally, the statistical significance of the lagged dependent variables in each estimated revenue equation suggests dynamics are important to local revenue choice. Other studies (e.g., Ladd and Bradbury (1988) and Sexton (1987)) suggest that property tax bases change only slowly in response to rate changes, and even then, the changes in base are modest. If so, then the dynamics observed here reflect lags in the political decision process over the choice variables r and f. The estimated coefficients imply that both fees and tax rates are adjusted rather quickly, reaching at least 80% of their new equilibrium rates within two years.[34]

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[33] A similar test for the no limit cities confirms that these tax preference variables do belong in that sample's property tax equation (F(6, 664) = 7.50).

There is an additional difference between the two regimes' property tax equations in the way that the jointly included exogenous variables influence R; see section III-C below.

[34] An exogenously induced \$1 change in R, Fee, or SST in the first fiscal year will eventually imply a \$1.78 (= \$1/(1 - .437)) equilibrium change in R, a \$1.32 (= \$1/(1 - .242)) equilibrium change in Fee, and a \$1.84 (= \$1/(1 - .457)) equilibrium change in SST. After two years the estimated changes are \$1.44 in R, \$1.24 in Fee, and \$1.46 in SST, each at least 80% of the way to their new equilibrium.

16.18.3

B. Results: The "Soft" Limit Regime

The estimated coefficients of eqs. (1s)-(3s) in Table 2 confirm the comparative static predictions of the soft-limit revenue model presented in Section II, *conditional* upon the maintained hypothesis that cities are on the rising portions of their revenue schedules. Of particular interest is the effect on revenues of the average tax subsidy variable, $(1-\tau)$. An explanation for $(1-\tau)$'s perhaps counter-intuitive effects is offered below; it draws upon this model's distinction between efficiency and redistributive motivations for local fiscal choice.

The uniform tax subsidy variable $(1-p)$ does influence revenues as expected. As more and more of the burden of an average dollar of property taxation falls on the residential base, there is a move away from the use of this tax and towards the use of fees. The estimated short-run elasticity of tax revenues with respect to $(1-p)$ is -.13 (calculated at sample means) while the short-run elasticity of fees with respect to $(1-p)$ is .22. Long-run, equilibrium elasticities allowing for the effect of the lagged dependent variables on revenues are -.23 for R and .30 for Fee.[35] In the end, the two revenue effects from a change in $(1-p)$ just about cancel each other, leaving total own revenues (= R + Fee + SST, with marginal effects calculated as the sum of regression coefficients) and thus city spending largely unaffected.

Of the three grants-in-aid variables, capital matching aid, $(1-\mu_k)$, has no significant effect (statistically or quantitatively) on current own revenues; a plausible result given that city capital outlays are largely debt financed. Current accounts matching aid $(1-\mu_c)$ is for welfare services and this aid does affect own revenues, increasing property taxation and fees and reducing selective sales taxation as the matching rate declines. The results imply welfare assistance is price inelastic--that is, as the welfare matching rate is reduced own welfare expenditures rise requiring an increase in own revenues. Those revenues come from property taxation (biased towards the poor) and fees. Offsetting the increase in fees is a reduction in

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[35]For lag adjustment models such as this one, long-run marginal effects of changes in exogenous variables are calculated as the estimated regression coefficient (the impact effect of a change) times the equilibrium "multiplier effect" allowing for the influence of the lagged dependent variable. For the soft-limit sample these multipliers are equal to 1/(1 - .437) for property taxation, 1/(1 - .242) for fees, and 1/(1 - .457) for selective sales taxation; see Kmenta (1971, p. 479).

selective sales taxation. Finally, increases in lump-sum grants (A) and exogenous own revenues net of interest payments $(\bar{T} - I)$ reduce property taxation and fees about equally, but most of these new monies stay within the budget for current expenditures.[36]

The two variables meant to describe the potential elasticity of city revenue schedules--RCSI and $RCSI^2$--are (nearly) always significant and their effects are always U-shaped as anticipated. Tax and fee revenues are lowest (implying base elasticities are highest) when the region's RCSI is between 2 and 3. Selective sales taxation reaches a minimum for RCSI = 4.7, the very upper end of our sample's values. RCSI seem to capture important regional differences in the process of fiscal competition. Cities with high values of RCSI face no competitive suburban fringe and local own revenues and spending are larger. Cities with low values of RCSI contain residents too poor to exit to the average suburb and again fiscal competition is low, and, *ceteris paribus*, own revenues and spending are again higher. Using the same measure of fiscal competition, Inman (1982) has presented some evidence that these higher expenditures are often captured by public unions in the form of higher wages and benefits.

Of the service demand variables, average city income (CINC) and responsibility for education (ED) increase taxes and/or fees, while percent commuters (PCOM), manufacturing jobs per capita (MANU), and a time dummy variable for the Reagan presidency (REAG) alter the mix of financing in plausible ways. Burdens are shifted from taxpaying residents to fee-paying non-residents as PCOM rises, from fee-paying businesses to taxpayers as MANU increases, and from taxes to fees with the Reagan appeal to "privatize" government financing.

The presence of "soft" property tax limitations do reduce the use of the tax (by about 12% from the mean in the long-run) and increase fees by a nearly equal amount. Soft property tax limitations control taxes but not total revenues or government spending.

Of the included redistributive variables, increases in $\bar{r}_y$ stimulate property taxation (marginally) and reduce fees and selective sales taxation (significantly) as predicted by the

[36]The variables A and $(\bar{T} - I)$ were also entered separately in these regressions; their separately estimated effects on R, Fee and SST were nearly identical. Thus combining the variables as our theory suggests is appropriate. This is *not* the case in absolute limitation model, however; see below at fn. 39.

redistributive model outlined in section II.B. Increases in $\bar{Y}_s$ have exactly the opposite effects, also as predicted. Of the two political influence variables, increases in the percent poor (PCP) stimulate fees and selective sales taxation and discourage property taxation as expected. Increases in the percent of taxpayers who are rich leads to reductions in all taxes, however, perhaps reflecting the very wealthy's reduced demands for city services in addition to their redistributive preferences.

It is the statistically significant effect on revenue mix of the average property tax subsidy $(1-\tau)$ which remains as a possible puzzle. There are two possible explanations. First, the prediction that $dr*/d(1-\tau) < 0$ is correct, but the estimates here based on a revenue equation reveal cities to be on the downward side of their revenue curves where rate reductions increase revenues. The recent work of Sexton (1987), Ladd and Bradbury (1988), and Holtz-Eakin and Rosen (forthcoming) reject this interpretation. There is a second explanation consistent with the redistribution model. As estimated, $(1-\tau)$ is being asked to play two roles, one as an average subsidy to property taxation and the other as a proxy for the redistributive effects on local taxation of federal and state tax policies. As constructed, the main source of variation in $(1-\tau)$ is from the deductibility of local taxes from federal and state income taxation. This subsidy benefits only those who deduct, specifically middle and upper income homeowners. Thus variation in the included average subsidy $(1-\tau)$ is effectively variation in the income-target subsidy $(1-\tau_i)$ received by the rich. As $(1-\tau_i)$ for the rich increases, β_i for the rich is also increased. From the redistributive model outlined in II.B, therefore, the resulting rise in β_i for the rich should stimulate an increase in property taxation and a reduction in fees and selective sales taxation. This is what we do observe. Further, the other average subsidy variable in the model, $(1-p)$, does not discriminate by income class or affect β_i, but it does influence revenues as predicted by the average subsidy effect.[37] Together these results imply roles for both

[37] I should note that Holtz-Eakin and Rosen (forthcoming) do obtain a negative effect of $(1-\tau)$ on property taxation for their sample of cities. Their sample, however, is dominated by small to middle sized suburban communities with income homogeneous populations and (most likely) uniform assessment for property taxation. In such cities the average subsidy effect of the variable $(1-\tau)$ is likely to dominate any redistributive effects.

16.18.3

redistribution politics and excess-burden-minimizing behavior as separate explanations for the local decision to tax.

C. Results: The Absolute Limit Regime

Table 2, eqs. (1r)-(3r) provide estimates of the revenue model for those cities of our sample living under an absolute property tax rate limit, $r \leq \bar{r}$. All cities in this subsample are known to be at their constraint. The fact that the tax rate constraint is binding for these cities implies the property tax equilibrium will be defined fully by the constraint ($\bar{r}$) and the variables in the model which determine tax base. Thus all tax preference variables which uniquely define the slopes of the tax rate indifference curves in Figure 2--$(1-\tau)$, $(1-p)$, X_r, X_p, and $\bar{r}_y$ and $\bar{r}_s$ —become irrelevant in the property tax equation.[38] These tax preference variables may still influence fees and selective sales taxation, however, and are therefore retained in those revenue equations; see Table 2.

For the property tax equation, an F test confirms the exclusion restriction for the tax preference variables. Further, the included exogenous variables other than $\bar{r}$ all seem to influence property tax revenues through their effects on tax base as predicted by the constrained specification. Qualitatively, these variables behave here as they might in a total property value capitalization equation. City mean income (CINC), manufacturing jobs per capita (MANU), and a large commuter workforce (PCOM) measure increased residential and business property investments. Given $r = \bar{r}$, increased current matching aid (μ_c) or lump-sum transfers $(A + \overline{T} - I)$ mean more current period public services and higher tax bases, *ceteris paribus*.[39] In the same vein, the Reagan presidency was particularly hard on central city budgets--numerous small aid programs not measured in A were cut--and further depressed center city tax bases. As

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[38]Further, there is no need to estimate the model as part of a "switching regime" specification. We know before estimation that all constrained cities are at the constraint, and, for this paper at least, the constraint is exogenous.

[39]As part of a capitalization equation, A, $\overline{T}$, and I might well have different effects on tax base. Increases in A and reductions in I should unambiguously increase base, but $\overline{T}$ will only do so if increased government spending more than compensates for the increase in own exogenous taxes. This is in fact what we do observe when the effects of the three variables are estimated separately, further confirming the interpretation of the R equation as a tax base equation. Aid increases revenues, I lowers own property tax revenues, and $\overline{T}$ is negative but insignificant.

before, capital matching aid is insignificant for current accounts financing. Finally, the two variables meant to measure regional tax competition--RCSI and $RCSI^2$--are no longer significant in the property tax equation. This is as it should be since rate constrained cities cannot compete through property taxation.

In contrast, the exogenous variables in the fee and selective sales tax equations ought to influence those revenues much as predicted for the unconstrained model. On the whole, this is what we do observe; the explanations in III.B apply here as well. The two exceptions are the negative effect on fees of the net price for welfare $(1 - \mu_c)$ and the positive effect on selective sales taxation of percent rich (PCR).

What are the effects of the tax limitation itself on local revenue choice? It is important to note that the estimated results in eqs. (1r)-(3r) apply only to city revenue choice *once the city has fallen under limitation*. The coefficients for the variable $\bar{r}$ in Table 2 do *not* measure the revenue effects of the move from no limitations to absolute limitation; that must be estimated separately. Table 3 provides those estimates of revenue changes for sample cities whose states did impose a limit during our study period (1961-1986), estimated as the difference between predicted city revenues when unconstrained (using eqs. (1s)-(3s)) and actual city revenues under the constraint. Table 3's estimates are the average by state of those changes for all cities in all years following the imposition of $\bar{r}$. Tax limitations have had large negative effects on the levels of local property taxation, and while fees and selective sales taxation sometimes increase, only in California have they offset the large declines in property taxation. New Orleans, long a user of sales and income taxes, is the only sample city unaffected by its new property tax constraint.

Once cities are within the tax limitation regime, however, redistributive politics returns to the floor. What the coefficients for $\bar{r}$ in Table 2 do reveal are the effects on revenues of increasing the limit, once the city has been constrained. Property taxes rise (but only slightly) as $\bar{r}$ is increased, while total revenues from fees and selective sales taxation declines. Total spending is only marginally affected. These are the predictions of the redistribution model.

Table 3: Introducing Tax Limitations*

Sample State	Revenue Change in:					
	R		Fee		SST	
	ΔR	%Δ	ΔFee	%Δ	ΔSST	%Δ
Arizona	-14.14 (3.97)	-64.66%	3.43 (5.53)	8.21%	-4.21 (3.17)	-35.29%
California	-24.71 (17.56)	-30.65%	27.10 (38.97)	32.97%	1.43 (4.41)	8.51%
Louisiana	.62 (6.78)	1.52%	10.32 (13.55)	15.39%	-4.78 (2.62)	-40.72%
Massachusetts	-49.26 (30.22)	-14.65%	-7.93 (15.09)	-8.67%	4.82 (6.03)	∞**
New Jersey	-58.12 (22.91)	-36.43%	.72 (7.07)	3.80%	-15.84 (11.17)	-53.86%

*Δ measures the average level change of revenue for all sample cities in the state for all years following the introduction of limitations. Standard error of the estimated change is within parentheses. Measured as real (1967) dollars per capita. %Δ measures the ratio of the average change to the average revenue level of the tax one year before the introduction of limitations.

**SST are new taxes introduced following the limitation; the %Δ is therefore infinite.

IV. Does Deductibility Influence Local Taxation?

No recent issue in U.S. local government finance has been more seriously researched and debated than the effects of the removal of federal deductibility for state and local taxes. Prior to the federal Tax Reform Act of 1986, all state and local taxes except for fees and selective sales (excise) taxes could be deducted from federal taxable income by an itemizing taxpayer. The debate preceding the 1986 reforms contemplated the full removal of these deductions, though in the end, only the deductibility of sales taxation was disallowed. Three arguments were offered for their removal. First, deductibility is useful only for itemizing federal taxpayers, primarily concentrated in the upper ends of the U.S. income distribution. Deductibility therefore makes the federal tax structure less progressive. Second, as a subsidy for local taxation, deductibility may create a "false" incentive to overspend on local government services, or encourage the use of taxes over economically more efficient user fees. Finally, deductibility was estimated to have cost the U.S. Treasury $32.4 billion in lost revenues in FY 1985, certainly a helpful sum for a federal government struggling to control a rising budgetary deficit. On their face, these economic arguments for disallowance seem persuasive, but each ignores the reality of the local decision to tax. Removing local deductibility may, or may not, improve U.S. fiscal performance. To resolve the issue we must see how state and local governments will react to the reform. Table 4 summarizes the likely responses of this sample's cities.

The full removal of federal deductibility for all local taxes will increase the average net of subsidy cost of local property taxation $(1 - \tau)$ from .86 to .96 (state income tax deductibility and state property tax relief assumed to remain) and $(1 - \tau)$ for income and sales taxation from .88 to .98 (state income tax deductibility assumed to remain). The estimated impact and equilibrium effects of these increases on each source of local own revenues are reported in Table 4 for the two subsamples, based upon the estimated coefficient for $(1 - \tau)$ reported in Table 2.

Dropping federal tax deductibility does have a potentially significant effect on the mix of local revenues. The loss of deductibility initially increases the burden share of city taxation for middle and upper income households. In both no-limit and absolute-limit cities, redistributive local politics appears to compensate for this added burden on the rich by reducing fees and

Table 4: Removing Deductibility

Sample	Effects on Revenues			
	ΔR (%)	ΔFee (%)	ΔSST (%)	ΔRevenue† (%)
No Limit				
Impact*	$1.89 (3.00%)	-$1.23 (-1.22%)	-$1.01 (-4.86%)	-$.35 (-.18%)
Equilibrium**	$3.36 (5.32%)	-$1.62 (-1.60%)	-$1.86 (-8.96%)	-$.12 (-.07%)
Absolute Limit				
Impact*	≡ 0	-$9.49 (-8.42%)	-$.33 (-1.94%)	-$9.82 (-5.00%)
Equilibrium**	≡ 0	-$23.32 (-20.68%)	-$.57 (-3.44%)	-$23.89 (-12.18%)

†ΔRevenue = ΔR + ΔFee + ΔSST

*Impact effects estimated as $\Delta(1-\tau) = .10$ times the estimated coefficient for $(1-\tau)$ for each endogenous revenue source; see Table 2. All dollar amounts are real (1967) dollars per capita; (%) measures the percentage change from FY 1986 average sample revenue.

**Equilibrium effects estimated as the impact effect adjusted for the estimated effect of lagged revenues from Table 2. All dollar amounts are real (1967) dollars per capita; (%) measures the percentage change from FY 1986 average sample revenue.

selective sales taxation. In an effort to maintain local services, there is an offsetting increase in property taxation in those (no-limit) cities which are legally allowed to do so; the impact and equilibrium decline in government spending is less than \$1 in these no limit cities. Cities under absolute property tax limitations do not have the property tax option, however, so the full effect of reduced fees and selective sales taxation will be felt as reduced government services. One might well expect redistributive services for the poor to be the most vulnerable; see Chernick and Reschovsky (1986). The equilibrium reduction in local variable revenues in these tax limit cities may be as much 12%; as a percent of *total* city revenues for current services the equilibrium decline will be 7.5%.

Three conclusions seem warranted from these results. First, while removing deductibility will increase the progressivity of the federal tax code, it is likely to make the local tax structure in larger U.S. cities marginally more regressive as property taxation is increased and fees are lowered. Second, total local government spending in large cities may be reduced but the cuts will not be large. If property taxes can be increased then they will almost fully offset the decline in fees and selective sales taxation. If city property taxes are constrained, then local own revenues and government spending will decline but by no more than 3-7%. Third, the U.S. Treasury will collect more money from taxpayers in large cities. Local taxes originally favored by deductibility are either constrained by state policy (income and sales) or rise slightly (property). Only local fees and selective sales taxes are reduced, but business fees, at least, are still a deductible expense. Thus Treasury's revenues from this sample's cities will unambiguously increase.

This last policy conclusion is in direct contrast to the conclusion in Feldstein and Metcalf (1987) who find that removing state and local tax deductibility may well reduce Treasury's revenues. Using state-local aggregate taxation from property plus income plus sales taxation as their dependent variable, Feldstein-Metcalf find that an increase in $(1-\tau)$ reduces the use of these deductible taxes and increases the use of fees. Since fees are still deductible by business firms, the substitution of fees for personal taxes induced by the increase in $(1-\tau)$ will reduce Treasury savings from dropping deductibility and may actually turn the savings into a loss.

Though the policy conclusions of the two studies differ, the underlying analytical results need not be in conflict. The Feldstein-Metcalf analysis seeks to explain the variation in the aggregate of state and local taxes from property plus income plus sales taxation. Each of these taxes is variable in an aggregate state-local model. The total tax variable will respond to the negative average subsidy effect of changes in $(1-\tau)$ but also to redistributive effects. However, the redistributive effects following reform will likely have their biggest effects on the mix of taxation, not on total taxation. It is not inconsistent, therefore, for the Feldstein-Metcalf study to find a significant negative effect of $(1-\tau)$ on total personal taxation for all state and local governments, and for this study to find a significant positive effect on (just) city property taxation. The Feldstein-Metcalf results help us to understand the aggregate effects on Treasury revenues of tax reform. The results here allow us to look at reform's effects on a large city subsample and on the mix of local financing.

Interestingly, it appears to be redistributive politics' effects on the mix of taxation which has determined the state and local response to the actual reforms in the Tax Act of 1986. Only deductibility for state-local sales taxation was removed. Since that time, state and local sales tax rates have either remained constant or have increased, while state income tax rates have been reduced. This outcome is in direct contrast to the predictions of the representative taxpayer's average subsidy effect. It is, however, exactly the result expected from this tax model with redistribution politics where increases in r_s and reductions in r_y reduce the rich's share of the burden of state and local taxation (see p. 23 above). With the loss of deductibility as a federal subsidy to richer local taxpayers, r_s has been increased and r_y has been reduced to restore the politically preferred distribution of the aggregate state and local net tax burden.

V. A Concluding Comment

> What we do not like is that we are taxed--not that we are stupidly taxed. (W)hen we have gotten angry about it in the past our rulers have not troubled themselves to study political economy in order to find out the best means of appeasing us. Generally they have simply shifted the burden from the shoulders of those who complained, and were able to make things unpleasant, to the shoulders of those who might complain, but could not give much trouble.
>
> Woodrow Wilson, Congressional Government, 1885, p. 131.

Woodrow Wilson seems to have it right. If there is one strong impression which emerges from this analysis it is this: There are important incentives implicit within local redistributive politics which define a community's decision to tax, incentives not accurately modeled or estimated by the familiar representative taxpayer model of fiscal politics. By focusing exclusively on the preferences of an average taxpayer and on minimizing the excess (or "stupid") burdens from taxation, those models necessarily exclude current period redistributive incentives from local fiscal choice. In large U.S. cities, at least, that appears to be a mistake. The analysis here finds an important role for variables thought to influence the structure of local redistributive politics but which are arguable excluded from the representative taxpayer model. Exogenous changes which shift the balance of local tax burdens among income groups induce a pattern of revenue adjustments which move to restore that balance. Indeed, the estimated effects of one of the model's central policy variables--the deductibility of local taxes--can only be understood in this light. Whether this redistributive approach and these empirical results generalize to other governments remains to be seen. At a minimum, however, the results suggest caution in the use of the representative taxpayer model for the behavioral analysis of large government fiscal policy. Hopefully, too, the results will encourage further theoretical work on the modeling of redistributive fiscal policy in large, income diverse polities.

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Appendix: City Sample

City	RCSI*	Tax Limitation Status**		
		No	"Soft"	Absolute
Atlanta	1.567	1961-86	--	--
Baltimore	1.102	1961-86	--	--
Birmingham	1.300	--	1961-79	1980-86 ($\bar{r}_m = .02$)
Boston	1.773	1961-80	--	1981-86 ($\bar{r}_m = .025$)
Buffalo	1.525	--	--	1961-86 ($\bar{r}_m = .02$)
Chicago	1.514	1961-86	--	--
Cincinnati	1.824	--	--	1961-86 ($\bar{r}_a = .01$)
Cleveland	1.229	--	--	1961-86 ($\bar{r}_a = .01$)
Columbus	1.510	--	--	1961-86 ($\bar{r}_a = .01$)
Dallas	2.652	1961-76	1977-86	--
Denver	2.384	--	1961-86	--
Detroit	1.442	1961-86	--	--
Ft. Worth	2.178	1961-76	1977-86	--
Houston	2.284	1961-76	1977-86	--
Indianapolis	2.668	1961-73	1974-86	--
Kansas City	1.653	1961-78	1979-86	--
Long Beach	2.143	1961-78	--	1979-86 ($\bar{r}_m = .01$)
Los Angeles	2.102	1961-78	--	1979-86 ($\bar{r}_m = .01$)
Louisville	1.525	--	--	1961-86 ($\bar{r}_a = .015$)
Memphis	2.097	1961-86	--	--
Milwaukee	1.439	1961-73	1974-86	--
Minneapolis	1.905	1961-73	1974-86	--
Newark	1.221	1961-76	--	1977-86 ($\bar{r}_m = .025$)
New Orleans	1.732	1961-74	--	1975-86 ($\bar{r}_a = .01$)
New York	1.713	--	--	1961-86 ($\bar{r}_m = .025$)
Norfolk	1.617	1961-86	--	--
Oakland	2.024	1961-78	--	1979-86 ($\bar{r}_m = .01$)
Oklahoma City	2.507	--	--	1961-86 ($\bar{r}_a = .015$)
Omaha	2.963	1961-79	1980-86	--
Philadelphia	1.612	1961-86	--	--
Phoenix	2.756	1961-80	--	1981-86 ($\bar{r}_m = .01$)
Pittsburgh	1.727	--	1961-86	--
Portland	2.094	--	1961-86	--
Rochester	1.306	--	--	1961-86 ($\bar{r}_m = .02$)
San Diego	2.577	1961-78	--	1979-86 ($\bar{r}_m = .01$)
San Francisco	2.240	1961-78	--	1979-86 ($\bar{r}_m = .01$)
San Antonio	2.801	1961-76	1977-86	--
Seattle	2.202	1961-71	1972-86	--
St. Louis	1.583	1961-78	1979-86	--
St. Paul	1.437	1961-73	1974-86	--
Toledo	1.565	--	--	1961-86 ($\bar{r}_a = .01$)

*The city's average Ratio of City Income per capita to Suburban Income per capita over the sample period, 1961-1986. Source: Sales and Marketing Management, Survey of Buying Power; 1960-1986.

**Fiscal years in which tax limitation applies; $\bar{r}$ is the exogenously set tax rate denoted $\bar{r}_m$ if set as a limit on market value or $\bar{r}_a$ if set as a ("mill rate") limit on asessed value. Source ACIR, Significant Features of Fiscal Federalism, 1980-81 Edition.