Property taxation and local public spending: the renter effect

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Abstract

The point of departure for this study is the pervasive finding that, other things equal, local jurisdictions tend to spend more on local services the larger the fraction of renters among their residents. This paper seeks to determine the approximate magnitude of this "renter effect" by posing the question "How much smaller would local public budgets be if all residents were home-owners?" Making use of two quite different approaches, the paper finds a typical renter effect on local public expenditure on the order of ten percent. This finding suggests that we might do well to reform the administration of the property tax so that changes in property tax liabilities on rental dwellings are directly and visibly transformed into changes of monthly rental payments.
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In a public-choice framework, one of the basic functions of a good tax is to provide visible and accurate signals to the electorate of the cost of public services. In this way, a good tax functions much like a price in the private sector; it guides decisions, in this case public decisions, toward efficient outcomes. The literature, in fact, often makes reference to the "tax-price" of public services to individual voters.

In terms of this criterion, the local property tax is often given good marks. At the level of pure theory, for example, Bruce Hamilton [18] has shown that in a model with local zoning, the property tax can function as a perfect benefit tax that results in a fully efficient Tiebout outcome. Moreover, several students of local finance such as William Fischel [12]

believe that the Hamilton–Tiebout model provides a good description of the functioning of the local public sector in the United States. Extending the argument along another dimension in his recent book, Fischel [13] contends that, as a result of the capitalization of both the benefits from local public services and the associated tax liabilities into house prices, a system of local property taxation encourages efficient budgetary decisions by local residents. But even at a less formal level, many of us feel that the property tax is, on the whole, a good local tax, in part because of its visibility.[1]

However, this line of argument appears more compelling for the case of homeowners than for renters. Occupants of rental dwellings do not pay the tax directly; the legal tax liability rests with landlords. While there is some reason to believe that property taxes on rental units are shifted forward in the form of higher rents, it is nevertheless the case that renters never see a tax bill.[2] Moreover, there is some indirect, but pervasive, evidence suggesting that renters don't think that they pay local property taxes. This has led to the claim that there is a "renter illusion" associated with the tax [25]. If this is true, and, as we shall see, there is some persuasive evidence in support of a "renter effect," then property-tax finance may lead to inefficient budgetary decisions in the local public sector. If renters believe that they don't have to pay for local public services, they will tend to support excessively large public budgets; as a result, we might expect overspending in the local public sector.

The purpose of this paper is to assess the validity of this claim in the light of a large body of econometric evidence that comes from efforts to estimate demand functions for local public goods. I shall do two things here. First, I try to reach a rough estimate of the magnitude of the renter-effect on local public spending. More specifically, I attempt to answer the question "How much smaller would local public spending in the United States be if every household owned its own home?" Second, I will discuss some measures for reform of the local property tax to remedy this deficiency. One approach (and one with some historical precedent) would be to limit the privilege of voting on budgetary measures to property owners. But there are fundamental economic, as well as basic democratic, objections to this solution. An alternative would be simply to send tax bills directly to renters instead of to landlords. This may complicate the administration of the tax somewhat, but it would probably improve its performance in encouraging efficient decision-making on public budgets. More on this later.

1. The evidence on renter behavior: an overview

Beginning with the seminal papers by Thomas Borcherding and Robert Deacon [6] and Theodore Bergstrom and Robert Goodman [3], a large econometric literature has evolved that seeks to estimate demand functions for local public services. These studies begin with a sample of local jurisdictions for which we have observed fiscal outcomes. They then associate the outcome in each jurisdiction with the demand of a particular resident (often the

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[1] For a recent and useful collection of papers on property taxation and local government finance, see Oates [27].

[2] For a careful theoretical treatment of the shifting of property taxes on renters, see Robert Carroll and John Yinger [8].

median-voter). This approach thus generates a set of observations, consisting of points on individual demand curves, from which we can estimate econometrically a generic demand function for local services.[3]

In the course of estimating these demand equations, researchers specify a set of control variables that typically have included (among other things) the fraction of residents that own their own homes. And time and again, the finding emerges that, other things equal, the larger the fraction of renters in a community, the higher the level of local public spending (per capita). This is the phenomenon that I am calling "the renter effect."

In the next section, we will investigate this finding more carefully and, in particular, shall try to reach some kind of rough estimate of the magnitude of the renter effect from existing econometric studies. But I should note further that there are other kinds of studies that also find such a renter effect. Gil DeBartolo and Peter Fortune [9], in a study of municipal bond referenda in Ohio, found that the proportion of renters in a community is positively and significantly related to the likelihood of passage of a bond issue. They conclude from their study that "...renters and educated voters are more likely to support an expansion of public services than are home-owners and less educated voters" (p. 59). Likewise, Jorge Martinez-Vasquez [22] notes that in a series of bond referenda in St Louis in 1974 for increased spending on a range of local services (including police, fire, parks, highways, and libraries), renters were much more supportive than were home-owners. On each proposal, the percentage of "yes" votes at the precinct level was positively and significantly related to the percentage of renters. Finally, Mickey Levy [20], in an econometric study of voting behavior on two referenda in California, found that renters were significantly (in a statistical sense) less likely to vote "yes" on Proposition 13 which restricted levels of property taxation.[4]

There is thus a substantial and compelling body of evidence that associates the presence of renters with higher levels of local public spending. But this requires careful interpretation. The conventional response has been to attribute renter support for larger public budgets to a form of fiscal illusion, the erroneous perception on the part of renters that they face a zero (or very low) tax-price for local services. But as some have argued, this perception may not be in error; it may be the case that property taxes are not fully and expeditiously shifted forward onto renters or that, for other reasons, they face a relatively low tax-price. Martinez-Vazquez [22], for example, argues that renters do, in fact, obtain larger *net* benefits from local services so that their tendency to support increased public spending is indeed quite rational (see also Martinez-Vasquez and David Sjoquist [23]). Ellen Roche [31] and Robert Carroll and John Yinger [8] provide further support for this view with evidence that property taxes are, to a substantial extent, not shifted forward onto renters. There is thus a real issue as to whether renter support of expanded local expenditure is the result of illusion or whether it is a rational response to a low tax-price (or perhaps some combination of the two). What I want to emphasize is that this issue is not really germane to this paper. My concern here is the propensity of renters to think *for whatever reason* (imagined or real) that they pay a very low (perhaps zero) tax-price for local public ser-

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[3] For a more detailed description and assessment of this literature, see Daniel Rubinfeld [33] and Oates [26].

[4] However, as a referee suggested to me, this may be explained in part by the presence on the ballot of Proposition 8, an alternative to Proposition 13, that promised tax breaks to renters.

vices. Thus, I shall not refer in this paper to "renter illusion" but to the "renter effect." The question of interest here is "How large is the renter effect on local public expenditure?" To this matter, we turn now.

2. The magnitude of the renter effect: an extrapolation from existing econometric findings

One way to get some sense of the magnitude of the renter effect is simply to take the estimates from the econometric literature of the impact of the home-owner variable on local public expenditure and extrapolate to a case of complete home-ownership. For example, most of these studies estimate a spending equation in log-linear form, where the dependent variable is the logarithm of public expenditure (on some category of spending) and the relevant independent variable is the percentage of residents who own their own home. A typical equation from this literature is thus of the form:

$$\ln E = a_0 + a_1 \ln N + a_2 \ln t + a_3 \ln Y + \sum a_i X_i, \tag{1}$$

where E is municipal spending on a specified class of local public services, N is population, t is the tax-price of the median voter, Y is the income of the median voter, and the X_i constitute a vector of "taste" variables that include (among others) the percentage of residents that own their own homes.[5] If we know the fraction of home-owners in the sample (say 60 percent), we can simply multiply the estimated coefficient by 40 to determine the predicted percentage decrease in local spending for the case of complete home-ownership.

Table 1 presents a substantial list of studies, several of which estimate a series of expenditure equations for different samples and different categories of expenditure. I summarize the nature and findings of these studies in the table.[6] In the far right column, there appears a calculation of the implied percentage decrease in spending that would occur if all renters were to become home-owners. As indicated above, this is a simple extrapolation from the observed composition of the community to our hypothetical case of 100 percent home-ownership.[7]

The estimates of the renter effect based on the extrapolations in Table 1 vary widely. They range all the way from about 7 percent to over 40 percent. There is clearly no

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[5] Again, see Rubinfeld [33] and/or Oates [26] for more on all this.

[6] I present in the table only a selection from the many equations that some of these studies report. I have tried in such cases to select representative results for the study. There are, incidentally, a few studies that have not found a statistically significant renter effect; see Gary Reid [29] and Robert Schwab and Ernest Zampelli [36]. There have also been some such studies outside the United States. Paul Rothstein [32] finds some evidence that the percentage of renters is positively associated with local public spending in Japanese prefectures, but Bruno Heyndels and Carine Smolders [19] are unable to find a significant renter effect in their study of Flemish municipalities. This may reflect the fact that Flemish municipalities rely less heavily on property taxation than most American local governments.

[7] In some instances, the studies do not report the mean value in the samples of the percentage of home-owners to give us our initial position. In such cases, I have used the "home-ownership rate" from the closest census year and geographic region as a proxy. The home-ownership rate, incidentally, ranges from about 60 to 65 percent for the US as a whole over the relevant period.

Table 1

	Study	Sample	Function	Extrapolated renter effect
(1)	Beck [1]	CA mun.	Gen. Exp.	15.5
(2)	Bergstrom and Goodman [3]	US mun.	Gen. Exp.	29.3
	"	US mun.	Police Exp.	42.7
	"	US mun.	Parks and Rec.	29.7
(3)	Bogart [5]	NJ mun.	Public-Works Exp.	26.6
(4)	Brazer and McCarty [7]	CT sch. dst.	School Exp.	14.7
	"	NJ sch. dst.	"	7.4
	"	VA sch. dst.	"	18.4
	"	CT mun.	Mun. Exp.	31.1
	"	NJ mun.	"	14.1
	"	VA mun.	"	7.9
(5)	Deno and Mehay [10]	US mun.	Total Exp. I	24.3
	"	US mun.	Total Exp. II	37.6
	"	US mun.	Police Exp.	32.6
	"	MI–OH mun.	Total Exp. I	15.9
	"	MI–OH mun.	Total Exp. II	23.4
	"	MI–OH mun.	Fire Prot. Exp.	34.6
(6)	Ferris [11]	US cities	Total Exp.	33.7
	"	"	Gen. Exp.	27.6
(7)	Gonzales, Means, and Mehay [14]	CA mun.	Police Exp.	21.1
(8)	Gronberg [17]	IL mun.	Mun. Exp.	10.9
(9)	Lovell [21]	CT sch. dst.	Exp. per Pupil	7.9
(10)	Megna and Lee [24]	WI sch. dst .	Exp. per Pupil	14.4
(11)	Peterson [28]	CA sch. dst.	Exp. per Pupil	14.9
	"	MI sch. dst.	"	8.4
	"	NJ sch. dst.	"	11.3
	"	NY sch. dst.	"	21.6
(12)	Santerre [34]	CT sch. dst.	Exp. per Pupil	10.2
	"	CT mun.	Mun. Exp.	14.1
(13)	Sass [35]	CT mun.	Mun. Exp.	25.8
	"	CT sch.dts.	Sch. Exp.	26.5

non-arbitrary way of picking a single representative number to characterize these findings. A simple average of the numbers in this column, for example, is 21.1 percent. But the results certainly convey the sense of a very large renter effect: they suggest that the presence of renters in a community is "typically" associated with an elevation of public spending on the order, perhaps, of 20 percent or more. This is a big effect, so large perhaps as to strain its credibility![8]

There are, however, at least two good reasons to be uneasy over accepting these findings uncritically. First, there is an obvious problem of misspecification here. As Judith Roberts [30] pointed out some time ago, the striking differences in home-owner and renter support

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[8] The extrapolation estimates also hint at some systematic differences by function. In particular, the extrapolated renter effect seems typically smaller for school spending than for other categories of local public expenditure. Perhaps this reflects the fact that renter households have, on average, fewer children than owner-occupied units [15].

for budgetary measures suggest that it is probably necessary to estimate separate demand equations for the two groups (something she carried out in her dissertation). In particular, simply adding on a "taste variable" indicating the fraction of residents who are home-owners is not a satisfactory way to address this matter.

Second, there is the matter of far-reaching extrapolations. The coefficient estimates for the home-owner variable indicate the magnitude of the effect in the vicinity of the sample means, typically 60 to 65 percent of residents. It takes a substantial leap of faith to extrap-olate this measured impact to an extreme value of the variable, namely 100 percent, that lies far outside the range of observed values.

In fact, there is a compelling reason for believing that such extrapolations have an in-herent upward bias. In the appendix to this paper, I set forth a framework that shows that the marginal effect on public spending of reducing the percentage of renters diminishes as the fraction of renters becomes small. Thus, extrapolating the marginal effect over a large range gives rise to substantial overestimates of the renter effect. In the appendix, I find that for a typical case from Table 1 the extent of the overestimation from the extrapolation procedure is roughly 40 percent.

If we take from Table 1 a "typical" value of the renter effect based on extrapolations of, say, 20 percent, and then apply a 40 percent correction, we find that we have a rough estimate of the renter effect of about 12 percent, or, so as not to imply such a high degree of precision, let us say on the order of 10 to 15 percent. This I will take as a "ballpark estimate" from the "corrected-extrapolation" approach.

This exercise thus provides some evidence of a sizeable renter effect. But it would be reassuring to find an alternative method for estimating its magnitude. To this, we turn next.

3. An alternative approach: a conceptual experiment

Suppose that we construct a hypothetical, prototypical community made up entirely of home-owners. We then characterize their demands for spending on local public services; this yields a distribution of demands for local expenditure. Making use of the standard median-voter model, we can describe the equilibrium level of spending as the median of the desired levels of spending in our distribution. The experiment consists of converting about one-third of the residents to renters with a perceived tax-price for local services of zero. The comparative-statics exercise leads to a new median-voter outcome which can be compared with the initial one. The percentage increase in the median level of desired spending will then give us a "representative" measure of the magnitude of the renter effect.

To carry out this conceptual experiment, we need first a given distribution of demands for local spending. Fortunately, we don't have to invent this out of thin air. Based on data from a series of telephone interviews with individual households in the state of Michigan, a group of public-finance economists have estimated some "micro-based" demand func-tions for local public expenditure (in some cases for education and in others for municipal spending).[9] Among other things, these estimated demand functions produce a predicted

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[9] For a careful description of the methodology underlying these "micro-based" demand functions, see Bergstrom et al. [4]. Rubinfeld [33] also presents an extended treatment of this approach and the basic findings.

level of desired spending for each household. Thus, they produce just what we need for our conceptual experiment: a distribution of desired levels of local expenditure.

Moreover, these data have two appealing properties for our purposes. First, the Michigan survey was limited to home-owners. Thus, the estimated demand functions and our distribution of desired level of expenditures relates to a set of households consisting entirely of owner-occupants. Second, the data are grouped by local jurisdiction. We are not working with a statewide sample, but rather with separate groups of households who have chosen to live together in the same municipality (or, in some cases, county).

More specifically, I have taken the data from a study by Edward Gramlich and Daniel Rubinfeld [16] in which they estimate demand functions for the level of municipal spending in various local jurisdictions in Michigan. In one part of the study, they provide information on mean levels of expenditure and the variance of desired spending for a group of 426 households in the Detroit metropolitan area, where the data are grouped by the specific local jurisdictions within the metropolitan area (see their Table 4 on p. 553).

Using these data, I construct our hypothetical community's distribution of desired spending in the following way. I take as the mean for this distribution the mean value of actual per-capita spending in the three counties comprising the Detroit metropolitan area for 1977; this gives us a mean value for our distribution of desired spending per capita of $845. If we assume the distribution to be (approximately) normal, then we need only its variance to conduct our conceptual experiments. To obtain a "representative" variance, I have computed an observation-weighted average of the variances for the jurisdictions in their Table 4. This gives a variance of $5872 or a standard deviation of about $77.

Armed with these parameter values, let us now conduct two conceptual experiments. In each of them, we shall convert one-third of the households in our prototypical community to renters. We do this by changing their tax-price to zero, which effectively moves them into the right-hand tail of the distribution.[10] We shall then relocate the median voter and determine the increase in the median of the desired levels of public spending.

But first we must specify where the renters are located within the initial distribution. For our first experiment, we simply assume that the distribution of renter demands is identical to that of home-owners. Thus, we are simply removing one-third of the households from each point of the distribution and shifting them to the right-hand tail. This implies that, *relative to the original distribution*, we have moved the decisive, median voter from the 50th percentile to the 75th percentile. From the normal distribution, we find that this means that spending would rise by 0.675 standard deviations or about $52 per capita—an increase of 6.2 percent in local public expenditure.

However, this may understate somewhat the change, since we might expect renters to have lower demands for public spending than home-owners. The incomes of renters, for instance, are significantly lower on average than those of owner-occupants.[11] In view of this, let us make the extreme assumption that *all* renters have demands for public services

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[10] Roberts [30], in a careful and extensive econometric study, finds that the "perceived price" by renters for local services is virtually zero, which provides some empirical support for this strong assumption. Alternatively, we can take this procedure as providing an upper limit to the magnitude of the renter effect produced in this exercise.

[11] In 1992, for example, the median income of occupants of rental units was $20,731 as compared to $38,088 for households that own their own homes.

that are below the median of the desired level of spending in the original distribution. In this second conceptual experiment, we are thus taking a third of the distribution from below the initial median and shifting them to the right-hand tail. This implies that the new median voter will be at the 83.3 percentile of the original distribution. Note that this effectively provides us with an upper-bound *under this approach* for the magnitude of the renter effect on local public spending. We find in this case that the increase in the desired level of spending by the median voter is 0.965 standard deviations—or an increase of about $74 from $845 to $919. This represents an increase in desired spending of 8.8 percent.

The critical parameter for these experiments is the variance in the desired level of spending across households. The standard deviation of about $77 derived from Gramlich and Rubinfeld may appear to some as on the low side. But this is unclear. Especially if there is a Tiebout-sorting process taking place, we might expect a relatively small variance in desired spending within communities. However, the way in which the information was collected may be slanted towards a small variance. Households were asked in telephone surveys, not for desired levels of spending, but whether they wished changes in spending (up or down) or would prefer no change. It may well be in such a context that there is a tendency toward a response involving maintaining the status quo. If this is true, then there may be some understatement of the variance in demands and hence an underestimate of the renter effect.

There is, however, a potential source of bias that works in the opposite direction. As is well known and documented, renters tend to be less active in local public life than homeowners [13, pp. 80–81]. In particular, they vote with lower frequency on local issues (including budgetary measures) than do owner-occupants. The conceptual experiment in this section has given equal weight to the preferences of each resident, whether a renter or homeowner. But to the extent that renter preferences have a lesser impact on local budgetary outcomes than those of owner-occupants, the calculations of the renter effect in our experiments will tend to overstate somewhat the magnitude of the renter effect.[12]

The two approaches used in this paper provide support for the existence of a sizeable renter effect. The estimated magnitudes admittedly differ between the two methods: the corrected extrapolation approach points to a somewhat larger effect of renters on local public spending than does our conceptual experiment using a representative, hypothetical community. And I see no fully unambiguous resolution of the puzzle. But it does not seem unreasonable to take as an estimate of the renter effect a figure at the low end of the corrected extrapolation approach and at the high end of our conceptual experiment of, say, ten percent.

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[12] Suppose, to take a fairly extreme case, that all homeowner residents influence local budgetary decisions as compared to only half of renters. Then our conceptual experiments would yield renter effects on local public spending of 2.0 and 4.0 percent respectively for the two cases in the text. This phenomenon, incidentally, should not impart any sort of bias to the estimates from the earlier corrected-extrapolation approach. Any differential behavior between renters and owners is presumably embodied in the estimated coefficients, for they are based on actual (rather than hypothetical) outcomes.

4. On policy implications

With local public spending in the United States running over \$1 trillion per year, a renter effect on the order of 10 percent implies an elevation of local expenditure of over \$100 billion per annum. How should we regard this?

There is little reason to expect the renter effect to reflect a systematically higher level of demand for public services by renters than by owner-occupants. Indeed, as Ellen Roche [31] points out, the demands of renters, if anything, are likely to be lower than those of home-owners, since renters have, on average, lower incomes and smaller family-size. The most obvious and plausible explanation is that renters support larger local budgets because they don't think they cost them much (if anything). From this perspective, we can reasonably regard the renter effect as representing excessive public spending.[13]

How might we address this distortion in local public budgets stemming from property-tax finance? One response would be simply to exclude renters from the budget-determination process. Indeed, there are historical precedents for limiting voting on local budgetary matters to local property owners. However, there are obviously persuasive political grounds in a democratic society for objecting to such exclusion. In addition, there are good economic reasons for taking exception to such a proposal. Renters are members of the community, and they consume public services, just like owner-occupants. Thus, their preferences, along with those of home-owners, should figure in the process of determining levels of public outputs. To base decisions on the preferences of a subset of the community will itself lead to inefficient outcomes.

A more appealing way to reform the budgetary process is to find some way to confront renters with the appropriate tax-price for local services. If the source of this problem is indeed fiscal illusion, this could be accomplished by simply shifting the legal liability for the property tax from landlords to tenants. Renters would thus receive tax bills for the levies due on their units in the same way as owner-occupants. This reform would, however, come at some cost in that it would complicate the administration of the tax. It is clearly easier, for example, for the tax collector to assess the value of an entire apartment complex and collect the requisite taxes from the owner than to make assessments and undertake collection from each tenant in the building.

Alternatively, leases could take a form under which landlords would automatically apportion any tax increases (or decreases) and immediately pass them forward in increased (or reduced) rents to tenants. Such rental contracts with "escalation clauses" are a fairly common practice for commercial leases. Under "net leases" (for example, "triple net leases"), a basic rental payment is specified to which is added any applicable tax payments (and, perhaps, the cost of utilities and other specified expenses). Under such a system, tenants would be assured that any increases in spending for local public programs would reflect themselves systematically and expeditiously in their monthly rental payments. There clearly are some interesting options here that could make the "tax-price" of local public

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[13] There is a substantial literature on the median-voter model and its relationship to efficient budgetary outcomes. While the median-voter outcome is not, in general, perfectly efficient, there are reasons to believe that it may typically come reasonably close to efficiency. See, for example, Theodore Bergstrom [2] and Donald Wittman [37].

services more visible to occupants of rental units; such reforms could contribute to more efficient decision-making on local budgets.[14]

These potential reforms of the tax administration process (aside from excluding renters altogether from the budget-determination process) rest, of course, on the premise that the source of the renter effect is a form of fiscal illusion. If property taxes are not, in fact, shifted to renters, then things become more complicated. One of the basic principles of the theory of taxation is that the incidence of a tax is independent of whether the tax is levied on the buyer or seller of a good. Thus, under perfect information and certain other conditions, if the tax is not, in fact, shifted forward when it is levied on landlords, then it will not be shifted forward if the legal liability is transferred to tenants. Tenants will realize that any increments to their tax payments would be offset by lower rents. In this case, the renter effect would presumably persist even if tax bills were sent to tenants.

This brings us back to the question of the precise source of the renter effect. This is a hard question to answer, and it goes beyond the scope of this paper. In particular, to distinguish between the fiscal illusion explanation and the incidence explanation (or some combination of the two) would require a fully specified structural model along with a rich body of micro-level data that explicitly differentiates between preferences of home owners and renters. It presents a challenging and important task for further research. But, apart from this issue, the existence of a renter effect, irrespective of its source, raises some troubling issues concerning the efficiency of local budgetary decision-making.

Acknowledgments

Appendix A. An estimate of the extrapolation bias

The simple extrapolation of public spending from the case of the existing percentage of renters to one with no renters is highly suspect. But it turns out that we can say more than this. Here I offer a method to estimate the extent of the bias; this approach suggests that, for our particular case, simple extrapolation results in roughly a 40 percent overestimate of the renter effect.

The basic rationale for the upward bias can be seen in terms of Fig. A.1. Let us suppose that in a given community the demands for public spending (E) are normally distributed

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[14] As William Fischel pointed out to me, such visible shifting of tax increases into higher rents takes place under certain systems of rent control; in such instances, landlords are allowed to increase controlled rents by the amount of any tax increases. Thus, rather ironically, a system of rent controls could conceivably provide a more visible set of tax-prices to residents and thereby contribute to better local fiscal decisions!
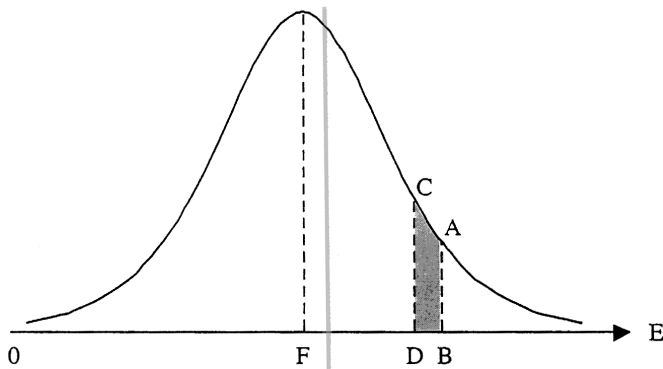
Fig. A.1.

among home-owners. The familiar bell-shaped curve in the figure denotes this distribution. Under the median-voter model, the equilibrium level of public spending would thus be OF were the community composed solely of home-owners. But let us suppose next that the community has rental occupants and that they constitute 35 percent of the residents (where 35 percent is a representative number from the various samples represented in Table 1). If we assume that renters believe that they face a zero price for public services, then their demands will be far up into the right-hand tail of the distribution. This implies that the median voter in such a community will be the home-owner in the 77th percentile of the homeowner distribution, which I have denoted as AB in the figure.[15]

Our objective is to determine the distance BF: this is the fall in the equilibrium level of public spending if all renters become home-owners. I have tried to estimate BF by taking an estimate of the marginal effect of a change in the percentage of renters and simply multiplying this marginal effect by the entire renter population. Figure A.1 immediately suggests that this is likely to generate an overestimate of the renter effect. Consider a one percentage point shift in the population from renters to homeowners. In the figure, this is represented by the area ABDC with a resulting fall in public spending of DB. Note that our extrapolation technique involves simply multiplying DB by the percentage of renters to get our estimate of the reduction in public spending when moving to an all-home-owner community. But it is clear that as we move left under the curve, the same area will at each step generate a smaller base—that is, the distance represented by DB will get smaller as we move towards F. In other words, the impact on spending of a one percentage point shift from renters to home-owners becomes less as the renter population becomes progressively smaller. Thus, multiplying DB by the fraction of renters will give us an overestimate of our desired quantity, BF.

Furthermore, we can determine the extent of this upward bias. With the normal distribution, the distance in Fig. A.1 from point F to point B (from the 50th percentile to the

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[15] To see this, consider a community with a total population of 100 that consists of 65 homeowners and 35 renters. If the 35 renters are in the upper tail of the distribution, then we can locate our median voter as the homeowner with the 15th highest demand among the homeowner population. This homeowner will be positioned in the 77th percentile of the homeowner distribution of demands (i.e., 50/65).

77th percentile) is 0.74 standard deviations (or 0.74σ). With our simple extrapolation, we effectively take the change from the 77th percentile to the 76th percentile (which is 0.03σ) and multiply it by 35, giving us a change in spending of 1.05σ. Our extrapolation estimate is thus 1.42 times (i.e., $1.05\sigma/0.74\sigma$) the desired quantity. Thus, we find that the simple extrapolations appear to overestimate the equilibrium fall in spending by about 40 percent.

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