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Peter Mieszkowski; George R. Zodrow

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Taxation and the Tiebout Model: The Differential Effects of Head Taxes, Taxes on Land Rents, and Property Taxes

By PETER MIESZKOWSKI and GEORGE R. ZODROW
Rice University

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I. Introduction

PERHAPS THE MOST SIGNIFICANT ARTICLE on the theory of state and local public finance is the seminal paper by Charles Tiebout (1956). Tiebout constructed a multijurisdictional model in which independent local governments offer a wide variety of expenditure and tax policies, and perfectly mobile consumers reveal their preferences for local public goods through their choice of residential community. He argued that, under such circumstances, local public service provision would be efficient. The Tiebout model has formed the basis of a vast number of subsequent articles in the state and local public finance literature and has also been very influential in urban and regional economics.

The efficiency properties of various Tiebout-type models of local public good

provision have been examined, and the role of politics in these models has been debated at length in this literature. Of more direct relevance to this paper, however, is the fact that although Tiebout had little to say directly about taxation (simply assuming the existence of head taxes), subsequent analyses have used adaptations of this model to examine the effects of local head taxes, land taxes, and property taxes. It is the literature on the efficiency and distributional effects of alternative local taxes that is the subject of this survey.¹

¹ Thus we do not attempt a comprehensive survey of the research based on the Tiebout model, including the many articles on the efficiency of local public service provision and on political aspects of local service provision; various aspects of this literature are surveyed by David Wildasin (1986b, 1987), Daniel Rubinfeld (1987), Anwar Chaudry-Shah (forthcoming), Pierre Pestieau (1983), Joseph Stiglitz (1977, 1983a), George Zodrow (1983b), and Truman Bewley (1981). The comprehensive review articles by Wilda-

We focus on two general issues. The first is whether the local property tax is a nondistortionary benefit tax that is equivalent to the head tax envisaged by Tiebout, or whether it is a distortionary tax on capital that is borne primarily by the owners of capital. Research based on the Tiebout model generally emphasizes the incentives for taste/income stratification at the local level and studies zoning as the mechanism for effecting such stratification. This literature focuses on deriving conditions under which intrajurisdictional redistribution does not occur, either because jurisdictions are homogeneous or because capitalization of fiscal differentials in heterogeneous jurisdictions eliminates the potential for such redistribution. The models used are partial equilibrium in nature and abstract from the possibility of redistribution to the consumers of public services at the expense of capitalists. Within such a framework, the property tax can be viewed as a benefit tax or a user charge for local services received.

However, only a relatively small minority of contributors to the property tax literature treat the tax as a nondistortionary benefit tax. Instead, as detailed below, most writers analyze efficiency and redistributional issues that would arise only if the benefit view did not fully describe the effects of the property tax, including the extent of redistribution from capitalists to the consumers of public services and intrajurisdictional redistribution from wealthy to poor residents within heterogeneous jurisdictions. In many cases, these studies explicitly or implicitly accept the validity of the so-called new view of the property tax, which holds that the "average" burden of the tax is borne primarily by capital

owners, with differentials about the average causing largely offsetting "excise tax" effects on factor and consumer prices.

The literature on the distributive effects and the benefit aspects of the local property tax can be traced back at least to the work of Alfred Marshall (1890). Nevertheless there still appears to be a lack of consensus as to whether the tax is an economically neutral "fee for public services" or a distortionary and redistributive tax on capital. Despite considerable support for the idea that the property tax is best modeled as a distortionary tax on capital, there are several important recent contributions that support the benefit view. For example, Alan Auerbach (1987) argues that a set of local property taxes in a Tiebout-type multiple jurisdiction setting is not equivalent to a national wealth tax, because individuals can enjoy the public services offered by a jurisdiction only if they reside there. This contradicts the central conclusion of the new view of the property tax, which implies that the imposition of a comprehensive uniform tax by all communities would in fact have the same effects as a national wealth tax.

Don Fullerton and Roger Gordon (1983) generally treat all property taxes as pure benefit taxes in their numerical analysis of the effects of tax distortions in general equilibrium models.² They argue that the property tax is simply a price at which local residents purchase public goods. Similarly, the numerical simulations performed by Fullerton and Yolanda Henderson (1984) include a case in which all property taxes are offset at the margin by public services received.

² They also consider a case in which one-half of nonresidential property taxes represent nonbenefit taxes. Fullerton and Gordon note that the validity of their assumption "depends critically on the availability of zoning regulations." However, they offer no evidence that would support the notion that such binding zoning constraints (for both residential and nonresidential property) actually exist in practice.

sin are particularly useful; they were an excellent source of information and insight as we prepared this survey.

They argue that such treatment is appropriate if taxpayers are sufficiently mobile and there is a sufficiently large number of jurisdictions offering different tax and expenditure packages.

The lack of consensus regarding the effects of the property tax is further illustrated in two recent surveys. In a review article on tax incidence theory, Laurence Kotlikoff and Lawrence Summers (1987) equivocate as to whether the property tax is a benefit tax or a tax on capital. Although generally supportive of the new view of the property tax, they argue that the distortions of capital allocation implied by the new view may be "offset over time by benefit tax forces, such as changes in zoning and migration across localities and states" so that the benefit view may partially describe the long-run effects of an increase in property taxes and expenditures. Similarly, Wildasin (1986b) concludes his review of the benefit and new views of the property tax by suggesting that a "theoretical synthesis" might combine elements of both theories and yield a model in which part of the property tax acts as a head tax paid by consumers of public services and the remainder acts as a distortionary tax on capital.

Although a general theoretical synthesis of the benefit and new views has not been developed in the literature, our survey will demonstrate that it is possible to reconcile the two opposing views of the property tax in the sense that each is correct under particular circumstances. More precisely, the property tax system can be transformed into a set of nondistortionary user charges or head taxes with the appropriate explicit or implicit binding zoning constraints. However, if zoning requirements specifying the minimum level of capital per taxpayer are not binding and thus do not determine precisely the amount of residential capital per household (or the level of in-

dustrial capital per firm), the property tax will be distortionary at the margin. Once this distortion is introduced and the demand for capital in a community is affected by the tax, it can be demonstrated that, under certain plausible assumptions, the overall return to capital in the nation will fall by roughly the amount of property tax revenue. This occurs even if communities are stratified by taste and/or income so that there is no intrajurisdictional redistribution. Thus, the assumption of binding zoning is the distinguishing feature of the benefit view of the property tax.

We also consider the "classical" or traditional view of the (residential) property tax. This view, which is based on a partial equilibrium analysis of the housing market in a single taxing jurisdiction, holds that the property tax is fully shifted forward in the form of higher property taxes. We show that the classical view is consistent with the new view, in the sense that it may be characterized as a special case of certain elements of the new view. Specifically, the effects of the property tax in a single taxing jurisdiction predicted by the classical view are analogous to the effects in the taxing jurisdiction described by the "excise tax" component of the new view. Moreover, our survey demonstrates that the new view results can be obtained from a general equilibrium analysis of the effects of a property tax increase in a single taxing jurisdiction. Thus, the classical and new views are not inconsistent; rather, they emphasize different aspects of a single analysis of the effects of the property tax. This result helps to establish that the benefit view of the property tax applies at the national level only when zoning is binding.

The second broad topic addressed in this survey is the effects of head taxes and land taxes in Tiebout-type models of local public service provision. We fo-

cus on the question of whether the head taxes envisaged by Tiebout as an efficient form of taxation are in fact efficient once the strong assumptions made in his model are relaxed. Of special importance are the assumptions that individual income is location independent, that local governments are able to achieve and maintain optimal community size, and that land markets can be ignored in the analysis.³ Our survey emphasizes the fact that, once these assumptions are relaxed within the context of a Tiebout-type model characterized by perfect individual mobility among communities, the efficiency properties of head taxes change dramatically. We also examine land value taxation in a Tiebout framework. Here the focus is on developing and analyzing the generality of the "Henry George theorem," which states that local governments should rely exclusively on land value taxation and that under certain circumstances public expenditures will exactly equal land rents.

A fundamental distinction in this analysis is the difference between "metropolitan" and "regional" models of local public goods. That is, although the Tiebout model is customarily viewed as a description of a single metropolitan area that includes a wide variety of suburbs, many of the papers surveyed construct regional models—models of systems of cities or metropolitan areas. We discuss the implications of these two alternative means of modeling local provision of public goods. In addition, many of the papers in this area are normative in the sense that they discuss the nature of an "optimal" tax structure for the particular economic system modeled; these optimality results are described as well.

The paper is organized as follows. The

following section presents some general facts on local expenditures and on trends in property tax finance. Section III describes how the head taxes envisaged by Tiebout were an efficient form of taxation in the context of the rather strong assumptions made in his model. Section IV develops the benefit view of the property tax and focuses on defining the circumstances under which local property taxes can be viewed as equivalent to the head taxes as assumed by Tiebout.

In Section V we focus on a recent theoretical reformulation of the "new" view of the property tax that includes many of the benefit-related features of local public service provision emphasized by proponents of the benefit view (other than the assumption of perfect or binding zoning). We also discuss a number of variants of the basic new view model, and explain the relationship between the new view and the classical view of the property tax described above.

Section VI examines the efficiency and equity implications of a distortionary property tax. Some of these contributions are based on the new view, some on the classical view, and others on a metropolitan version of Tiebout model in which the effects of the tax on capital earnings are ignored; the latter literature emphasizes the distorting effects of the property tax on housing consumption and on the level of public services. Section VII deals with empirical issues, primarily with the use of capitalization studies in distinguishing between the new view and the benefit view. It also addresses the question of whether evidence of capitalization supports the benefit view.

In Section VIII we examine the "regional" versions of the Tiebout model described above. We focus on the effects of head taxes and taxes on land rents in such models. A final section summarizes the conclusions drawn by the survey.

³ For purposes of this survey, "local" provision of public goods generally refers to any public expenditures made at a subnational level—local, state, or regional.

TABLE 1
PROPERTY TAXES AND LOCAL EXPENDITURES RELATIVE TO
NATIONAL WEALTH AND INCOME

	(1) Property Taxes National Wealth	(2) Property Taxes Personal Income	(3) Local Expenditures Personal Income
1950	.0114	.031	.064
1960	.0137	.040	.081
1970	.0163	.044	.101
1975	.0134	.039	.112
1980	.0092	.030	.098
1986	.0108	.031	.096

Sources: Columns 1 and 2—United States Department of Commerce (1975, 1987a, 1987b) and Council of Economic Advisers (1988). Column 3—United States Department of Commerce (1986).

II. Background Information on Property Tax Finance and Local Expenditures

This section presents some data on property taxes and local expenditure levels. This material provides background information for the survey of the theoretical and empirical literatures that follows in the remaining sections of the paper.

In 1985 the expenditures of local governments, cities, school districts, and counties in the United States were 11 percent of personal income.⁴ About 40 percent of expenditures was for education, 8 percent was for hospitals and health care, 8 percent was for police and fire protection, 5 percent was for public welfare, and 5 percent was for highways. The remainder was distributed over a wide range of functions, including water supply, transportation, housing, and recreation.

General revenues consisted of 38 percent tax finance, 33 percent intergovernmental aid from state governments, 6 percent intergovernmental aid from the federal government, 13 percent user charges, and 10 percent from miscellaneous charges. About 75 percent of own

tax revenues were from the property tax, so this tax provided 28 percent of local general revenues.⁵ From a historical perspective, this 28 percent figure represents a relatively low level of reliance on the property tax, as local property taxes accounted for 73, 48, and 41 percent of general revenues in 1902, 1960, and 1970, respectively. In recent years, local governments have relied increasingly on local income, sales, and payroll taxes; as a result, the share of own tax revenue raised by property taxes has fallen from 87 percent in 1950 to the current level of 75 percent.⁶ Federal aid to local governments did not become significant until the 1960s and 1970s. State aid grew rapidly during the 1930s and represented 23 percent of local revenues by 1940 (United States Department of Commerce 1975).

Table 1 presents comparisons of total property tax collections as a fraction of wealth and income for the nation. These data indicate that the overall burden of

⁵ About 97 percent of total property taxes are collected by local governments.

⁶ A prominent example of the decline in reliance on the property tax is the state of California, where property taxes fell from 37 percent of general revenues in 1978 to 28 percent in 1985; this decline followed the property tax limitations imposed by Proposition 13.

⁴ Unless otherwise indicated, the data in this section are taken from Advisory Commission on Intergovernmental Relations (1985, 1987).

TABLE 2
AVERAGE EFFECTIVE PROPERTY TAX RATES ON
SINGLE-FAMILY FHA-INSURED HOMES

Average Effective Property Tax Rate in the U.S. (Percentage of Full Market Value)					
1958	1966	1971	1977	1981	1985
1.34	1.70	1.98	1.67	1.26	1.21

Source: Advisory Commission on Intergovernmental Relations (1987, Table 64).

property taxation, relative to national wealth, is currently roughly the same as in the early postwar period. The effective property tax "rates" implied by these comparisons rose from 1950 to 1970 as local expenditures rose relative to national income and wealth; for some jurisdictions, property tax rates did not peak until the mid-1970s. Expenditures have fallen relative to personal income since 1970; this has been accompanied by an even larger decline in effective property tax rates over the period, due to increases in state and federal aid. For example, the local share of school financing for the nation decreased from 52 percent in 1970 to 42 percent in 1980; it then rose slightly to 44 percent in 1986 following a reduction in federal aid under the Reagan administration. In addition, there has been a shift toward nonproperty sources of tax finance.⁷

The results presented in Table 1 are in general accord with data on effective property tax rates on single-family homes with FHA-insured mortgages calculated (by state) by the Advisory Commission on Intergovernmental Relations (ACIR). National aggregates of these data are presented in Table 2. These data indicate a peak in effective property tax rates in the early 1970s, followed by a steady decline in rates.

The recent decline in property tax rates indicated by the national data are typical of the experience in individual states, as effective property tax rates on FHA-financed homes have fallen in virtually every state since 1971 (ACIR 1987). This effect has been particularly pronounced in those states that have enacted property tax limitations. For example, the effective property tax rate in California fell from 2.48 percent in 1970 to 1.08 percent in 1985, as the local share in education finance in California fell from 57 percent to 24 percent; these changes followed the property tax limitations imposed by Proposition 13. The relative decline is even larger in Massachusetts, where the average tax rate declined from 3.13 percent in 1971 to 1.33 percent in 1985 during a period of tax limitations and rapidly rising property values.

The data on national averages mask large interstate variations in effective tax rates. For example, in 1985 effective property tax rates ranged from a high of 2.47 percent in New Jersey to a low of 0.22 percent in Louisiana. In general, property tax rates are higher in New England and the northern industrial states and lower in the Southeast and the Southwest.⁸ Regional variations in tax rates are partly explained by differences in expenditure levels, but also by differences in local financial responsibilities, variations in state aid, and differences in the extent of reliance on local income and sales taxes. For example, in 1985 the local share of education finance averaged 55 percent in New England but only 35 percent in the southeastern states; in particular, property tax rates are lower in Alabama, Louisiana, and now in California because of large amounts of state aid,

⁷ User charges and miscellaneous income have not increased as a percentage of general revenue.

⁸ Census of Government data on median property tax rates for real property involved in measurable sales generally confirm the decline in effective tax rates between 1971 and 1981 as well as the relatively high tax rates in the northern states (U.S. Department of Commerce 1973, 1978, 1984a).

as the local shares for education finance in these states were 17, 26, and 24 percent, respectively. In addition, many southern and western cities impose local sales taxes, and thus rely to a relatively smaller extent on the property tax (at any level of expenditures).

Differences in the extent of reliance on local income and sales taxes are also an important factor in explaining variations in effective property tax rates within regions. In particular, such variations among northern cities can be explained largely in terms of differences in the extent of reliance on taxes other than property taxes. For example, a number of cities, including New York, Philadelphia, Cleveland, and St. Louis, that historically have had average property tax rates nevertheless have high overall local tax burdens. In contrast, Boston and Milwaukee have comparable overall burdens but rely exclusively on the property tax.⁹ Measure of local tax burdens must also account for local payroll taxes.¹⁰ Several studies have focused on expenditures rather than tax rate differences across large central cities (William Oakland 1979; George Petersen 1976). Per capita expenditures, after allowing for differences in functional responsibility, vary considerably across cities; differences of 50 percent or more are common, with northern cities spending considerably more than southern cities.¹¹

⁹ For example, in 1987 the total local (property) tax burden for a family with \$25,000 of income in Philadelphia was \$1,597 (\$519); comparable figures in New York were \$1,253 (\$716), in Cleveland \$1,584 (\$460), in St. Louis \$666 (\$314), in Boston \$1,150 (\$1,150), and in Milwaukee \$1,408 (\$1,408) (ACIR 1985, Table 76).

¹⁰ San Francisco has a 1.5 percent payroll tax; Los Angeles and Newark tax payrolls at a rate of 0.75 percent.

¹¹ For example, some representative per capita city expenditures levels (excluding education and welfare expenditures) are \$1,535 in New York City, \$1,037 in Philadelphia, \$1,080 in Baltimore, \$1,140 in Boston, \$971 in Detroit, \$671 in Chicago, \$618 in Los Angeles, \$563 in Dallas, and \$568 in Houston (ACIR 1987).

A related question is the extent of differences in local expenditure levels and property tax rates across central cities and their suburbs. Oakland (1979) has documented both the relatively high level of per capita local expenditures and the declining property tax bases of northern central cities relative to their suburbs. David Bradford and Harry Kelejian (1973) developed a model of the relative decline of central cities that emphasizes the role of these fiscal factors. However, subsequent work by Edwin Mills and Richard Price (1984) has not confirmed their finding that redistributive fiscal policies in central cities are an important factor in the decentralization of metropolitan areas.¹²

Unfortunately, it is not possible to generalize regarding the disparities in effective property tax rates among central cities and their suburbs largely because of the lack of a national sample of high-quality data. Census data on effective property tax rates for different jurisdictions are simply too incomplete and fragmented to allow any safe conclusions. The expected result that central city property tax rates significantly exceed suburban rates (say, by a factor of two) is confirmed for a few northern cities.¹³ But, in general, no wide disparity is discernible in the available data.

We conclude this brief overview of data on property taxes and local expenditures by considering differences in per pupil education expenditures across school districts (aggregated at the state

¹² These studies aggregate suburbs into a single "outside central city" unit. They thus do not provide information on effective property tax rates by community, a topic on which there are relatively few published studies. Some data on property tax rates across communities are provided in several of the studies of interjurisdictional tax capitalization surveyed by John Yinger et al. (1988), and by Morris Beck (1963), who analyzed effective tax rates for 100 communities in northeastern New Jersey and found that effective property tax rates varied from less than 1 percent to over 7 percent.

¹³ Hartford and Baltimore are two prime examples.

TABLE 3
MEANS AND STANDARD DEVIATIONS OF PER PUPIL EXPENDITURES FOR
LARGE SCHOOL DISTRICTS

State	1967		1982	
	Mean Expenditure	Standard Deviation as a Percentage of Mean	Mean Expenditure	Standard Deviation as a Percentage of Mean
New York	\$1,049	14	\$4,188	21
New Jersey	\$757	18	\$3,315	15
Illinois	\$678	22	\$2,986	30
Michigan	\$692	20	\$3,091	22
Texas	\$535	19	\$2,375	19
California	\$758	26	\$2,683	13

Source: United States Department of Commerce (1969, 1984b).

level). Education is of course of special policy importance; moreover, by focusing on education we avoid the complication of interjurisdictional differences in program responsibilities that plagues comparisons of interjurisdictional expenditure levels. Differences in per pupil education expenditures, especially those apparently related to disparities in property tax bases, have been of special concern. Wide variations in expenditures per pupil and large differences in assessed valuation per pupil by district have been documented (ACIR 1973). Summary data for 1970 indicate that expenditures per student vary within states by factors of three or more between the districts at the 90th percentile and the lowest level.¹⁴

Table 3 reports mean per student expenditures and the standard deviations of expenditures for large school districts (those with enrollments exceeding 5,000

students) in a number of large states. These data indicate no clear trend in the variation of expenditures per student among the large school districts in these states. The most dramatic movement toward equality of per pupil expenditures as measured by the standard deviation of expenditures across districts is in California (where the local share in the financing of education decreased from 57 percent in 1970 to 19 percent in 1980). In general, interjurisdictional differences in per pupil education expenditures remain significant, despite significant contributions of financial aid from state governments¹⁵ and the attention focused recently on variations in expenditures per student. This suggests that interjurisdictional differences in demands for local public services such as education are significant—a point that generally supports

¹⁴ Judicial approaches to achieving interjurisdictional equity have been surveyed by Rubinfeld (1979). The best-known court case is the Serrano decision in California, which argued that inequality in school spending between districts resulting from property tax base differences was invalid because public education was deemed to be a "fundamental" interest. We are not aware of studies on whether this case has led to a decrease in interjurisdictional expenditure difference in education.

¹⁵ It seems clear that state aid to education has narrowed effective property tax rates across school districts. For example, in the San Antonio, Texas, metropolitan area, the property tax base per student is eight times greater in the wealthiest districts than it is in the poorest districts, and there is little variation in tax rates across districts. Nevertheless, expenditures in the wealthiest districts are only twice as high as in the poorest districts, as 90 percent or more of school expenditures in the poorest districts are financed through state aid. (This comparison is based on unpublished data made available to us by the State of Texas Education Agency.)

the predictions of the so-called Tiebout model of local public expenditures to which we now turn.

III. *Taxation in the Tiebout Model*

Tiebout's (1956) classic article was written as a response to Paul Samuelson's (1954) argument that accurate revelation of preferences for pure public goods is highly unlikely if individuals perceive that their tax payment is based on their revealed demands. Tiebout constructed a multijurisdictional model in which a large number of independent local governments provided different public service and tax packages, thus offering potential residents a wide variety of fiscal choices. Local public services were assumed to have no spillover benefits across jurisdictions. Consumers were assumed to have location-independent incomes and to be perfectly mobile. Tiebout argued that under such circumstances consumers would reveal their preferences for local public goods through their choice of residential community, and that the resulting level of local public service provision would be efficient.

Tiebout made two key simplifying assumptions in the construction of his model. First, he assumed that all communities financed local public services with head taxes. Second, he assumed that all communities were of "efficient size" in the following sense. Suppose that the utility function for individual i who resides in community j is $u_i(x_i, y_j)$, where x_i is the amount of a composite private good consumed by individual i and y_j is the level of public services available to each individual who resides in community j . For example, y could be educational services, described in terms of teacher-student ratio, average scores on standardized tests, and so on. The per capita average cost curve for any given

level of y is $c = f(n; y)$, where n is the population of the community.

Tiebout assumed that per capita average cost is a U-shaped function of population at each level of y . The region of decreasing costs reflects the benefits of cost sharing for the local public good as population increases. However, the public good is assumed to be "impure" or subject to congestion, and at some point the added congestion costs attributable to increased population are assumed to outweigh the benefits of additional cost sharing; beyond this point, average costs increase with population size. Tiebout assumed that the local government in each community maintained its population at exactly the optimal size—the minimum point of the per capita public good average cost curve. Although the mechanism by which this would occur was not made entirely clear, the basic notion was that governments could attract residents until the community was of the optimal size (through chamber of commerce type activities) and then prevent further population growth through sufficiently restrictive zoning ordinances.¹⁶ In addition, Tiebout assumed that the optimal size of an individual community (n^*) was small relative to the total population size (N), that N/n^* was an integer so that the total population could reside in communities of optimal size, and that there was a sufficient number of communities so that each type of individual service demand could be satisfied.

The Tiebout assumptions are sufficient

¹⁶ Note that empirical evidence provided by Werner Hirsch (1970), Theodore Bergstrom and Robert Goodman (1973), and Thomas Borcherding and Robert Deacon (1972) indicates that the minimum average cost for local public services is reached at relatively low levels of population. This supports Tiebout's implicit assumption that many communities producing different levels of public services can exist efficiently in a single metropolitan area in the sense that all economies of scale in the production of local public services are exhausted. See also Bruce Hamilton (1983).

to ensure that each individual, subject to his budget constraint, will maximize utility by choosing the community producing his most preferred public service and tax package. In particular, the existence of U-shaped average cost curves for local public services in the Tiebout model, coupled with the assumption that each local government is successful in achieving and maintaining a population of optimal size, implies the optimality of head tax finance because such taxation is equivalent to efficient marginal (and average) cost pricing. Moreover, the head tax can be viewed as a benefit tax, in the sense that each resident pays a head tax equal to the (average and marginal) cost of local public services received.¹⁷

Our focus in this article is on the effects of relaxing these two assumptions. The bulk of the paper (Sections IV–VII) examines the effects of relaxing the assumption that head taxation is available and assuming instead that public services must be financed with local property taxes. In Section VIII, we reintroduce head taxes and then examine the effects of relaxing the assumption that local governments can achieve and maintain optimal population size.

IV. *The Property Tax as a Benefit Tax*

Tiebout's assumption of local head tax finance limited the direct relevance of his model, because such taxation seldom occurs in practice; rather, the primary source of own revenues for local jurisdictions is the property tax.¹⁸ Thus, it was left to later researchers to establish the link between local use of property taxes

and the benefit taxation required for efficient operation of the Tiebout model. The existence of such a link was suggested in a frequently cited article by Wallace Oates (1969), who examined empirically the capitalization of the benefits and costs of local public expenditures in house values. Oates argued that the effect of an increase in taxes on property values should be net of the benefits conferred. His empirical work supports the proposition that increased expenditures increase property values while increased taxes decrease property values; he seems to conclude that property taxes are benefit taxes in the sense that they are similar to user charges for services provided.

Bruce Hamilton (1975b, 1976a) made these ideas more precise in a sequence of two very influential articles in which he derived conditions under which the local property tax could be equivalent to the head tax envisaged by Tiebout. The models constructed in these papers are based on assumptions similar to those made by Tiebout; in particular, all residents within a community are homogeneous with respect to local public service demands and receive the same level of services, residents are perfectly mobile, income is location-independent, and local governments offer a menu of tax and expenditure packages sufficiently diverse that all tastes are satisfied. Hamilton assumes that local public goods can be modeled as publicly provided private goods (at a constant per capita cost), so that questions of optimal community size do not arise. The two essential differences between his approach and the structure of the Tiebout model are local use of property tax rather than head tax finance and explicit modeling of the housing market. In Hamilton (1975b), all communities are homogeneous with respect to house value, and there is a sufficiently large number of communities that

¹⁷ Of course, the total valuation of benefits may exceed the head tax paid.

¹⁸ Although local and especially state use of income and sales taxes is quite prevalent, we focus on local use of the property tax (as well as land taxes and head taxes in Section VIII) for purposes of this survey.

differ with respect to house value and expenditure-tax packages that the tastes of each type of individual can be satisfied. Hamilton (1976a) includes such homogeneous communities as a benchmark, but the model is considerably more general in that it also allows for communities that are heterogeneous with respect to house value.

The critical assumption in Hamilton's (1975b) model of completely homogeneous communities is that zoning ordinances can be used to enforce community homogeneity with respect to house value. This zoning specifies that no household can live in a community unless it consumes a certain quantity of housing, say 2,000 square feet.¹⁹ Under such circumstances, no household would build a house larger than the minimum requirement, because this would result in higher taxes and redistribution toward households who buy the minimum amount of housing; the household would simply choose to live in a homogeneous community with larger houses. Moreover, effective zoning ordinances preclude the construction of houses with relatively low values, which implies that poor individuals cannot move into relatively wealthy communities in order to consume public services at subsidized prices (see William Wheaton 1975). As a result, the zoning constraint is binding and the community is homogeneous with respect to house size.²⁰

Thus, the critical assumption of binding or "perfect" zoning transforms a property tax that would otherwise be distortionary into a nondistortionary head tax or user charge; that is, because households cannot adjust their housing consumption in response to the residential property tax, the tax effectively becomes a lump-sum tax. Individuals sort themselves according to tastes for housing and for public services. The result is analogous to that in the Tiebout model—individual location decisions serve as a preference revelation mechanism, and the allocation of resources to the local public sector is efficient. This of course implies that there is no income redistribution through the local public sector.²¹

In the more general version of his model, Hamilton (1976a) considers the case in which communities that are heterogeneous with respect to house value coexist with the homogeneous communities described in his earlier work. The critical new assumption in this model is that these heterogeneous communities are fully developed. This assumption implies that Hamilton effectively is maintaining his assumption of binding or perfect zoning, even though houses are no longer required to be identical; because the house size on each lot is specified, the assumption of fully developed communities is equivalent to imposing a type of "heterogeneous zoning" constraint on the community. In particular, it is impossible for any household to change its

¹⁹ Differences in housing quality are ignored, or it is assumed that the property tax assessment is based solely on square footage. The essential feature is that the assessed value for property tax purposes must be the same for all residences.

²⁰ Note that the generation of homogeneous communities with respect to the demand for public services is consistent with the results of Martin McGuire (1974) and Eitan Berglas and David Pines (1981), which are derived for a club model in which head taxes or user charges are the source of finance. These authors note that income transfers are more efficient in achieving redistribution than a common level of a collectively provided good; low-income groups

prefer to receive an income transfer rather than receiving subsidized public services of an equal amount, and high-income groups prefer to provide tax subsidies to low-income groups rather than be constrained to consume an inefficiently low level of the public good.

²¹ It is interesting to note that any local tax can be transformed into a head tax if consumption restrictions are imposed as the condition of residence in a community. For example, if zoning ordinances could be written in terms of a minimum expenditure level on clothing, a local tax on clothing would be equivalent to a head tax.

housing consumption in response to changes in property taxation.

Under these assumptions, Hamilton provides a strong capitalization result—the total value (of housing structures and land) in a heterogeneous community is exactly equal to the total value of homogeneous communities (when both have the same land area). Moreover, this perfect capitalization result implies that the property tax is a benefit tax. The essence of his reasoning can be captured by the following simple example.

Suppose there are two groups of identical households (denoted as H and L) who live in houses worth \$50,000 and \$25,000, respectively. Lot size is assumed to be the same for both types of housing. For simplicity, property taxes are imposed only on structures. If public services are \$500 per household, the tax rate in a heterogeneous community consisting of equal numbers of H-type and L-type houses will be 1.33 percent, and the annual tax on a H house (L house) will be \$667 (\$333).

Suppose the market rate of interest is 10 percent. Recall that both H and L individuals are perfectly mobile and that they always have the option of residing in a homogeneous community that provides their preferred combination of both house value and public services. This implies that any fiscal differentials in the heterogeneous community due to the difference between public services received and residential property taxes paid must be fully capitalized into house prices. Thus, the H house will sell at a discount of \$1,670 [$= (667 - 500)/0.1$] in the heterogeneous community relative to its price in the homogeneous H community; similarly, an L house in the heterogeneous community will sell at a premium of \$1,670 [$= (500 - 333)/0.1$] relative to its price in a homogeneous L community. This simple example provides an illustration of perfect capitalization of fiscal dif-

ferentials. It also illustrates the more general result that fiscal capitalization implies that the total value of a heterogeneous community will be exactly equal to the total value of a homogeneous community if the land areas of the two communities are the same.

Hamilton uses this conclusion on perfect capitalization to argue again that the property tax is a benefit tax; that is, the total “payment” made by residents, which consists of actual yearly taxes paid plus the annualized value of the fiscal differential, exactly equals the marginal and average cost of local public services. Thus, perfect capitalization implies that Hamilton again achieves the Tiebout-type result that, under the appropriate circumstances, the property tax can be viewed as a local head tax or benefit tax in payment for the public services provided by the jurisdiction, even when some communities are heterogeneous with respect to house value.²² Note that Hamilton’s results are derived at the level of a single metropolitan area. Nevertheless, if all metropolitan areas could be similarly characterized, the results would apply at the national level for a system of metropolitan areas; that is, the benefit view result would hold for a national system of local property taxes.

William Fischel (1975) and Michelle White (1975a) have extended Hamilton’s argument to the taxation of commercial and industrial capital.²³ They argue that

²² For future reference, note that the analysis assumes that land values in the heterogeneous communities are calculated relative to the homogeneous jurisdictions. Thus, Hamilton’s fiscal capitalization result is based on an analysis of *relative* rather than *absolute* capitalization.

²³ White (1975b) also developed one of the first criticisms of the Tiebout-Hamilton perfect zoning model. She argued that the equilibrium in the model was unstable, because local communities have an incentive to change their zoning plans every few years so as to force any new houses to be more valuable than the existing houses and thus subsidize local service received by the existing residents.

the common perception that the Tiebout model applies only to residential communities while taxes on industry subsidize household expenditures is incorrect. Instead, in their models, zoning and perfect mobility of firms also result in a neutral, efficient equilibrium in which the benefits of public services provided to firms are equal to costs paid in the form of nonresidential property taxes.

Fischel's work focuses on the trade-off between the fiscal surplus generated by the location of firms in a community and the negative neighborhood or environmental effects of industrial activity. White's discussion is more directly related to the Tiebout hypothesis. She argues that firms are mobile in the long run and will move unless the marginal value of public services is equal to their tax payments in a community. Different industries will have different public service requirements and firms will stratify themselves by type of community. The critical feature of White's analysis, as in the residential version of the benefit view model, is the assumption of perfect zoning. In her model, zoning not only limits the type of firm that can enter a community, but also imposes a minimum property requirement to insure that firms pay their fair share of taxes. A sufficiently large number of communities, variations in service levels and zoning, and interjurisdictional competition for firms imply an equilibrium in which zoning is binding on industrial capital. As a result, the property tax on industrial capital is also a nondistortionary benefit tax, as mobile firms choose an optimal level of public services by choosing the appropriate community, effectively purchasing such services through the payment of nonresidential property taxes.

V. *The New View of the Incidence of the Property Tax*

A drastically different perspective on the effects of the property tax is provided

by the so-called new view of the property tax, which holds that the property tax is not an efficient benefit tax but a distortionary tax on capital that is borne primarily by capital owners. In the following three sections, we describe the basic new view model, discuss some recent variations of the model, and comment on the "classical" or traditional model of property tax incidence and how it relates to the new view.

A. *The Basic New View Model of the Property Tax*

The "new view" of the property tax was developed by Procter Thomson (1965), Peter Mieszkowski (1972), and Henry Aaron (1975) and was reformulated recently by Zodrow and Mieszkowski (1986b). This analysis, which examines the incidence of the property tax from a general equilibrium perspective using a model of a nation comprised of independent local jurisdictions, concludes that the property tax is not a benefit tax. Rather, the "average" burden of the capital portion of the property tax—that corresponding to the average rate of property taxation in the nation—falls primarily on the owners of capital; the burdens associated with property tax rates higher than the average are borne to varying degrees by consumers or suppliers in the high tax jurisdictions, with analogous offsetting effects in relatively low tax jurisdictions.

The view of the property tax as a "profits tax" or a tax on capital has a long history, as it can be traced to the work of Herbert Davenport (1917) and Harry Brown (1924).²⁴ Other writers who characterize the property tax as a capital tax

²⁴ Brown's work is especially interesting as he anticipates modern incidence analysis by arguing that the incidence of a tax on capital in a subsector of the economy will be borne by capital as a whole, with capital shifting out of the taxed sector into the untaxed sector and driving down the overall return to all capital.

include Earl Rolph (1954), Harvey Brazer (1961), Arnold Harberger (1966), Leonard Rosenberg (1969), Mason Gaffney (1972), and George Peterson (1973).

The derivation of the new view by Mieszkowski (1972) considers the effects of the property tax within the context of a general equilibrium system of a nation that consists of independent local taxing jurisdictions. It was based on the traditional national model of tax incidence developed by Richard Musgrave (1959) and Harberger (1962). In particular, it follows Harberger in assuming perfect competition and a fixed national capital stock that is perfectly mobile within the nation so that the after-tax rate of return to capital is equalized across all production sectors.

Most important for our purposes, this type of analysis assumes that public services are fixed exogenously and then analyzes the effects of an exogenous substitution of the property tax for some alternative source of tax finance. (Sometimes it is simply assumed that tax proceeds are wasted.) As a result, the new view conclusion that the property tax is primarily a tax on capital appears to be logically independent of the benefit-related factors stressed by the proponents of the benefit view. In particular, the original new view formulation ignores factors such as (1) households that differ with respect to tastes for public services and choose their jurisdiction of residence on the basis of the tax and expenditure package it offers, (2) endogenous changes in local public services and the effects of such changes on individual utility, (3) independent and competing local governmental jurisdictions, and (4) the role of zoning.

Zodrow and Mieszkowski (1986b) have reformulated the new view using an approach that is based on the Harberger general equilibrium model of national taxation, but one that also formally incorporates each of the above-mentioned factors typically emphasized in benefit view

models but ignored in the original new view derivation. Their model assumes a fixed national capital stock, with capital perfectly mobile across a fixed number of jurisdictions that have a fixed amount of land (see also Zodrow and Mieszkowski 1983). There are two "types" of individuals who are segregated in homogeneous jurisdictions according to their differing demands for local public goods; that is, there are two types of jurisdictions—those composed of "high demanders" and those composed of "low demanders." These residents are immobile and all land is locally owned in each jurisdiction; residents also own their own labor and a share of the national capital stock.²⁵

The local government in each jurisdiction determines its public expenditure levels to maximize the welfare of its residents and can finance these services with either a head tax or a property tax. Inter-jurisdictional competition is introduced by assuming that each independent local government sets its tax and expenditure policies assuming that it faces an infinitely elastic supply of capital and that other governments do not respond to changes in its tax and expenditure policies. An elementary form of zoning is introduced by assuming that residential and nonresidential land is fixed at their efficient levels (those that would obtain if head taxes were used). Thus, labor and nonresidential land can be treated as a fixed composite factor; this factor is combined with capital to produce a composite good, which can be costlessly transformed into a public good. Capital and the fixed amount of residential land produce housing in each jurisdiction.

Because each independent local jurisdiction perceives a completely elastic

²⁵ The assumption that residents are immobile is restrictive and inconsistent with the perfect mobility assumed by Tiebout and Hamilton. Note, however, that there is no incentive for residents to move in the model, in the sense that all communities are assumed to be homogeneous and utility would not be increased by moving to another community.

supply of capital, total reliance on local head taxation is optimal in this model.²⁶ This "head tax" equilibrium is interpreted as corresponding to the equilibrium with perfect binding zoning. Relaxing the constraint of perfect zoning is modeled by assuming that the extent to which head taxation is available is reduced exogenously (simultaneously for all jurisdictions). As a result, all jurisdictions are forced to rely to some extent on property taxation; as would be expected, property tax rates are higher in the communities populated by individuals with relatively high levels of demand for public services. Also, because the initial equilibrium is an efficient one, second-order excess burden effects are ignored in the differential incidence analysis.

This model yields the new view of the effects of the property tax. Specifically, as the availability of head taxation (perfect zoning) is reduced, capital bears the average burden of the level of property taxation introduced in the nation. This "profits tax" effect of the new view (Mieszkowski 1972) is attributable to the use of the property tax by all local jurisdictions in an economy in which the national capital stock is assumed to be fixed.²⁷ Because the total supply of capital is perfectly inelastic, the burden of such general use of the property tax must be borne by capital owners; that is, the return to capital must fall by the "average" rate of taxation in the nation.²⁸

Tax differentials between communi-

ties, or more specifically differences between the local tax rate and the average rate of tax in the nation, give rise to what Mieszkowski (1972) labels the "excise tax" effects of the property tax. Specifically, the cost of capital is higher in relatively high tax jurisdictions, which results in higher housing prices and lower wages and land rents in such jurisdictions. Exactly offsetting effects (lower housing prices and higher wages and land rents) occur in the relatively low tax jurisdictions.

In addition, local governments underprovide local public services in this version of the new view because they are reluctant to use the property tax for they perceive that it will drive mobile capital out of their jurisdiction.²⁹ The reduction in demand for local public services lowers the output of the composite good, increases the output and consumption of housing, and results in higher housing and land prices as well as lower composite good prices and lower wages in both types of jurisdictions. Thus, in contrast to models in which the property tax is imposed only on housing capital and the demand for housing is decreased by the property tax, housing demand increases in this model because the decrease in the demand for public services lowers the output of the composite good sector. This tax-induced change in the composition of output introduces a theoretical ambiguity into the determination of the incidence of the property tax. However, as long as the effects of this consumption distortion are sufficiently small, the primary effects of the property tax are the profits tax and excise tax effects derived in the original derivation of the new view.

Thus, this work demonstrates that the

²⁶ This result parallels that presented in Zodrow and Mieszkowski (1986a).

²⁷ We do not consider the implications of relaxing the assumption of a fixed national capital stock. For discussions of the effects of capital taxes in models in which the national capital stock is not fixed, see Marian Krzyzaniak (1967), Martin Feldstein (1974a, 1974b), Ronald Grieson (1975), and Joel Slemrod (1988).

²⁸ As will be discussed below, calculating the "average" rate of property taxation is not as straightforward as it might appear.

²⁹ Note that this actually will not occur in equilibrium if all jurisdictions raise their taxes simultaneously, although a differentially high tax rate will reduce a jurisdiction's capital stock.

essential difference between the new and benefit views is the assumption of binding zoning constraints under the latter approach. Once this assumption is relaxed, the property tax is no longer an efficient benefit tax, but is rather a distortionary tax on capital. Note in particular that the introduction of the other "benefit view type" features described above into the standard new view incidence model does not change the basic conclusions of that approach.³⁰

B. *Variations on the Basic New View Model*

A sizable literature addresses the effects of the property tax within an analytical framework broadly similar to that outlined above; this literature has provided a large number of extensions and elaborations of the new view results. A few studies have constructed variants of the new view model designed to examine the generality of the result that the average burden of the property tax is borne by property owners. For example, because the new view approach utilizes a differential analysis from an undistorted initial state (either a situation with no taxes or the "head tax equilibrium" described above), excess burden effects are ignored. Paul Courant (1977) constructs a multijurisdictional, fixed national capital stock model in which the property tax is imposed at different rates by each jurisdiction in the initial equilibrium. His principal result is that the existence of excess burden effects implies that the average rate of property taxation in the nation is not a precise measure of the tax burden on cap-

ital or an accurate benchmark for computing excise tax effects. This occurs because the distribution of the excess burden of taxation across factors is ambiguous—the sign of the difference between the conceptually correct measure and the average tax rate measure of the burden of the tax on capital is theoretically ambiguous. However, this difference is generally rather small; in Courant's numerical examples, the difference between the theoretically correct and the "average rate" measure never exceeds 6 percent. Thus, Courant's work generally confirms the conclusion that a system of local property taxes depresses the after-tax rate of return on capital and suggests that, in the absence of unusually large excess burden effects, the conclusion that the return to capital falls by the average rate of tax in the nation is a reasonable approximation.

An alternative approach focuses on the fact that the new view derivation does not include an explicit public sector, as public goods are modeled simply as government purchases of the composite commodity. Vernon Henderson (1985b) shows that the introduction of a tax-exempt public sector changes the results because an increase in the property tax (on housing and a composite export good) induces a shift of capital and labor to the tax-exempt public sector. He demonstrates that the relative sizes and relative capital intensities of the private and public sectors are important for the incidence of incremental increases in the tax. In particular, when the public sector is capital-intensive and sufficiently large, the relative burden of the property tax can shift increasingly to consumers at sufficiently high tax rates, as the absorption of capital by the capital-intensive tax-exempt sector drives up the demand for capital.

Many writers have focused on the excise tax effects of the property tax pre-

³⁰ Several other studies (to be discussed below) demonstrate that the explicit introduction of benefits into the analysis does not vitiate the conclusion that principal burden of the local property tax falls on capital. For example, Chuan Lin (1986) and John Wilson (1986) both assume that property tax revenues are returned to residents in the form of lump-sum subsidies; in both models, the property tax is a tax on capital.

dicted under the new view, especially on the extent to which forward or backward shifting of tax differentials is the more likely outcome. As would be expected, the results depend primarily on commodity demand and factor supply elasticities, with forward shifting more likely if demands for taxed goods are relatively inelastic and backward shifting more likely if factor supplies are relatively inelastic. For example, Paul Hobson (1986) constructs a model similar to that developed by Courant, although he considers infinitesimal taxes from a non-distorted initial equilibrium so that excess burden effects are ignored. In Hobson's model, different jurisdictions produce a single good (housing) using capital and land, and renter households have exogenously determined incomes. A composite good is produced outside of the economy and sold to residents at a fixed price. The effects of tax revenues are ignored (they are "wasted"). The model differs from the standard new view derivation described above because it includes cases in which land is less than perfectly elastic and individuals are mobile.

Hobson first considers the capital component of the property tax. He shows that, when land is fixed and the population is immobile, tax rate differentials are fully shifted forward when the elasticity of substitution in consumption (ϵ) between housing and other goods equals the elasticity of substitution in housing production (σ); less (more) than full forward shifting occurs when $\epsilon > (<) \sigma$. However, when renters are perfectly mobile across communities, capital tax rate differentials are perfectly capitalized in land values; that is, there is no forward shifting. Turning next to the land portion of the property tax, suppose that land is supplied elastically. In this case, the results are altered because the land component of the tax is shifted. For example,

with a perfectly elastic supply of land, the land component is fully shifted to renters if $\epsilon = \sigma$; if $\epsilon > \sigma$ some of the land component is borne by capital owners, while if $\epsilon < \sigma$ the land component is shifted by more than 100 percent (so that capital benefits from the land portion of the tax). Note this implies that, unless $\epsilon = \sigma$ so that capital is not affected by shifting of the land component of the tax, the excise tax effects of the property tax on housing and land prices do not cancel (Lin 1986).

The new view model described above assumes two types of communities and households who are immobile but do not have any incentive to move across communities. Several researchers have introduced labor mobility into the new view framework in order to examine situations in which mobile renters respond to tax and expenditure packages, and bid up rents in the communities with relatively favorable tax/expenditure combinations. Such extensions have resulted in a number of interesting complications with implications that differ considerably from the simple "excise tax effect" paradigm described above.

Wilson (1984) shows that if property taxes are paid out as a subsidy to workers residing in the taxing region, high tax states will attract labor and repel capital. He allows individuals to differ with respect to capital endowments and thus introduces income differences and varying demands for housing across individuals. If housing prices increase in one community after the establishment of property tax differentials between communities, high demanders migrate to the low-price community, while low demanders migrate to the community with high housing prices. This specialization in residence across communities according to demand for housing (and the associated changes in housing prices) results in an equilibrium in which housing prices are

equalized across communities even though property tax rates vary. Wilson's result thus undermines the generality of the excise tax effects on housing prices predicted by the new view.

Jan Brueckner (1981) constructs a two-city general equilibrium model in which an export good is produced with inputs of land and labor, and housing is produced with land and the export good. (Note that capital is ignored entirely.) Individuals are perfectly mobile across regions, so that individual utility is equalized. Brueckner shows that a tax on housing production in a single region induces labor to migrate to the nontaxing region, and the resulting misallocation of labor decreases the wage throughout the economy. As a result, land values decrease in the taxing region and increase in the nontaxing jurisdiction—results that again differ dramatically from the excise tax effects predicted by the new view.

Lin (1986) also constructs a multicommunity model with perfect mobility and equalization of individual utility across communities. In each community housing is produced with capital and land and a composite good is produced with labor and land. The total supply of land in each community is fixed, but land must be allocated across the two production sectors. Property taxes are imposed on housing consumption and the proceeds are returned to workers in the form of lump-sum payments. Lin analyzes the effects of increasing the property tax on housing in a single small community on the after-tax return to capital and on wages and land rents in all the communities. His results generally support the new view contention that a tax on capital in one community will depress the return to capital through the economy, and he obtains fairly conventional results regarding the excise tax effects of a property tax increase.

Lin's model is of particular interest because it is suggestive of a proposition that links the results of an incidence analysis of the effects of a simultaneous increase in the property tax by a large number of identical communities and the results of an analysis of the effects of a tax increase by a single small community. This proposition was first formulated by Brown (1924), who argued that the incidence implications of the "small open economy" assumption that a single small jurisdiction within a nation faces a fixed net return to capital are misleading. If a property tax is imposed in one small community, the tax-induced reallocation of the capital stock will in fact appear to have a negligible effect on the after-tax return to capital in the nation. However, the relatively small effect of this change on the after-tax return to capital, multiplied by the nation's entire capital stock, will not be negligible relative to the tax revenues collected in the small taxing jurisdiction. Indeed, under the appropriate circumstances, the reduction in national capital income will exactly equal tax revenues in the small taxing jurisdiction.

The imposition of the property tax will also have the effects typically stressed in "small open economy" analyses of property taxes—commodity prices will increase and returns to less than perfectly mobile factors will fall in the taxing jurisdiction. However, these effects will be offset by commodity price reductions and increases in returns to less than perfectly mobile factors in the rest of the economy.³¹ Note that, in contrast to the capital burden of the tax, these redistributive effects are not directly linked to the amount of revenue raised in the small taxing jurisdiction.

As noted by Charles McLure (1977), the link between this result and the new

³¹ Note the analogy to the excise tax effects of the new view.

view is straightforward. If the effects of one community imposing a distortionary property tax are those described above, it follows that when other communities pursue similar policies the changes in commodity prices and returns to immobile factors will tend to offset one another, but the reductions in the net return to capital induced by property taxation in each jurisdiction will be cumulative. Thus, when large numbers of local communities independently impose property taxes, the overall effect is very similar to the situation in which they all raise taxes simultaneously.

The Brown proposition was formalized recently by Bradford (1978), who analyzes the effects of an increase in a tax on capital in a single small jurisdiction in a two-factor (land and capital) model. Bradford also demonstrates that more than 100 percent of the excess burden of such a tax is borne by capital owners, so landowners in the aggregate gain from the imposition of the tax.

Several recent contributions represent applications of the Brown proposition. Courant and Rubinfeld (1978) demonstrate that capital owners will have a large negative willingness to pay for a project in a single jurisdiction that is small relative to the size of the nation when the project is financed by a tax on mobile capital. Mieszkowski and Zodrow (1985) show that the Brown proposition accurately describes the incidence of a formula-apportioned state corporate income tax imposed by a single (or a small number of) states. That is, capital owners in the nation as a whole bear the burden of the state's corporate income tax, while commodity price increases and factor price declines in the taxing state are offset by commodity price reductions and factor price increases in all of the other states. Wildasin (1988) has also used the proposition in studying the distributive effects of benefit-cost analysis.

The Brown proposition has generally been derived in contexts in which the benefits of public expenditures are not explicitly modeled and households are not mobile across communities. Mieszkowski and Zodrow (1986) use a variant of Lin's model to prove the Brown proposition within the context of a multijurisdiction "renter" model in which households are perfectly mobile across jurisdictions and the national capital stock is fixed. In this framework, a composite good is produced only with labor, and wage rates received by renter households are independent of their place of residence. Housing services are produced with inputs of capital and land in a large number of communities. A single small community imposes a property tax on housing structures and returns the proceeds to its residents in the form of a lump-sum subsidy. For the special case in which the price elasticity of demand for housing and the elasticity of substitution between land and capital in the production of housing are equal, the change in after-tax capital income is exactly equal to tax revenues; this is the precise version of the Brown proposition. Even when these elasticities are unequal, the general point remains—a distortionary property tax in one small community has a significant effect on the overall return to capital relative to the amount of taxes collected.

Note that this result holds even though renters anticipate the benefits of the lump-sum subsidy and increase their demand for housing accordingly. The critical point is that in the absence of binding zoning the demand for housing capital will decrease in the taxing community, as the increase in the cost of housing services decreases the quantity demanded and land is substituted for structures in the provision of housing. As noted above, this "single jurisdiction" result is directly related to the new view result—as each community in turn imposes a property

tax, the supply price of capital is decreased slightly for all other communities, so that in the aggregate the return to capital is decreased by the average rate of tax. Thus the new view result does not depend on the assumption that all communities increase their taxes simultaneously (Mieszkowski 1972). Note that the result that capitalists pay for public services provided at the local level even though renters would be willing to pay for the expenditures with a head tax is similar to the conclusion that a national capital tax falls on capitalists, even though workers would be willing to pay for expenditure benefits with a head tax or a tax on wages.

Finally, note that throughout this analysis we have assumed that the demand for capital can adjust fully (when zoning is not binding). An alternative possibility is that while zoning in a community is not perfectly binding, it is sufficiently restrictive that the demand for capital can adjust only partially to the imposition of a property tax. Such an interpretation would be consistent with Wildasin's (1986b) suggestion that the property tax may be partially a head tax and partially a tax on capital. We return to this point below.

C. *The Classical View*

It is useful to relate the preceding discussion to the "classical" or traditional view of the effects of the (residential) property tax, which is based on a partial equilibrium analysis of the housing market in a single taxing jurisdiction (Herbert Simon 1943; Dick Netzer 1966). This view argues that capital bears none of the burden of the capital portion of a residential property tax, because the supply of capital to a single jurisdiction is perfectly elastic. That is, the classical view assumes that the price of capital is determined in a national market and is unaffected by the taxing policy in a single

jurisdiction that is small relative to the nation as a whole. Under this view, the burden of the capital portion of the property tax is fully shifted forward in the form of increases in the price of housing.³²

The discussion above indicates that the classical view is not fundamentally inconsistent with the new view; rather it can be interpreted as focusing solely on the "excise tax" effects in the taxing jurisdiction under a special set of circumstances. By adopting a partial equilibrium approach with a fixed national rate of return to capital, this view explicitly ignores the general equilibrium adjustments that give rise to the "capital tax" component of the new view, as well as the central tenet of the Brown proposition—net capital income in the nation falls by roughly the amount of revenues raised in a small taxing jurisdiction. Moreover, the analysis above correctly suggests that the specific excise tax effect predicted by the classical view (full forward shifting in the form of higher housing prices) represents a special case; in general, some combination of forward shifting and backward shifting to immobile factors of production would be expected to occur.

Much of the recent research in the urban economics literature either explicitly or implicitly assumes the validity of the classical view of the effects of the property tax; that is, such studies are frequently based on partial equilibrium "metropolitan" formulations of the Tiebout model that ignore the general equilibrium effects on the national net return to capital stressed by the new view and the Brown proposition. These metropoli-

³² In addition, the land portion of the tax is assumed to be borne entirely by landowners, because the supply of land is assumed to be perfectly inelastic. For a discussion of why this conventional assumption about the incidence of a tax on land rents may be inappropriate in the presence of portfolio choice considerations, see Feldstein (1977).

tan studies focus on the case in which the "single jurisdiction" in the derivation of the old view is a metropolitan area, and the after-tax rate of return to capital is taken as given in the tax/expenditure policy decisions made by the local jurisdictional governments that comprise the metropolitan area. Typically, the price of a traded good is also taken as given, housing services are produced with inputs of capital and land, the metropolitan population is assumed to be fixed, and spatial features of varying degrees of complexity are introduced.

These studies generally demonstrate that the full forward shifting predicted by the classical view is also a special case in a partial equilibrium framework, and that in more general cases the factors that determine the mix between forward and backward shifting are similar to those described in the discussion of general equilibrium models above. In particular, a typical result (completely analogous to that described previously) is that, with a fixed metropolitan land supply, the classical result of full forward shifting of the capital portion of the property tax obtains when the elasticity of substitution in consumption (ϵ) between housing and other goods and the elasticity of substitution in housing production (σ) are equal (Wildasin 1986b; Stephen Leroy 1976; Dennis Carlton 1981; Brueckner 1981). When $\epsilon > \sigma$, demand is sufficiently elastic (relative to the ease of substituting land for capital as the gross of price of capital increases) that full forward shifting does not occur, and some of the burden of the capital portion of the property tax is borne by immobile land. Conversely, when $\epsilon < \sigma$, demand is sufficiently inelastic that more than 100 percent of the capital portion of the tax can be shifted forward.³³

These results must be qualified when the metropolitan land supply can vary as a result of boundary changes; typically, agricultural land is assumed to be tax-exempt with the price of land at the (variable) urban fringe equal to its opportunity cost in agriculture. A variety of results can be obtained when variable land supply is introduced into the analysis, as there are a number of offsetting effects. For example, suppose $\sigma < 1$ as suggested by most empirical estimates (John McDonald 1981) and $\epsilon = 1$. In this case, the reduction in land demand induced by a property tax, coupled with relatively limited capital-land substitution possibilities, implies a reduction in the demand for land (as well as a reduction in urban land area and an increase in population density); this in turn reduces aggregate land rents so that landowners bear some of the burden of the capital portion of the property tax (Leroy 1976). However, the land portion of the property tax may be shifted forward to consumers because urban land can be converted to agricultural use; that is, the supply of land subject to the tax is not fixed while the metropolitan population cannot vary (Richard Arnott and James MacKinnon 1977). Not surprisingly, the results on the extent of forward and backward shifting of the property tax are quite sensitive to model formulation and parameter values; however, the simulation results reported by Arnott and MacKinnon are very roughly in accord with the full forward shifting predicted by the classical view.

Finally, note that the existence of substantial forward shifting in the metropolitan partial equilibrium models described

³³ A variant of these types of results is due to Grieson (1974), who assumes a housing production cost function such that marginal construction costs in-

crease with building height or "density" on a fixed amount of land; he concludes that for reasonable parameter values a substantial portion of the property tax burden—30 percent or more—falls on landowners, with the remainder being shifted forward to consumers.

above hinges on the assumptions of a fixed population and an invariant wage rate. Forward shifting is much less likely if individuals (the suppliers of local labor) are perfectly mobile between cities so that individual utility can be assumed to be constant. In these models, backward shifting of the property tax to local landowners is the general rule. In addition, wages tend to increase as labor is substituted for taxed capital; as a result, some forward shifting—coupled with higher wages—is possible even with perfectly mobile labor (A. Mitchell Polinsky and Rubinfeld 1978; Donald Haurin 1980 1981).

VI. *Efficiency and Equity Aspects of the New View*

This section examines the efficiency and equity implications of the new view of the property tax.³⁴ Some of these analyses are based on the classical view; the discussion above indicates that such studies can be interpreted as focusing on the excise tax effects of the new view (generally only in the taxing jurisdiction).

A. *Efficiency Aspects*

We examine three types of efficiency issues raised by the property tax. The first is the implication for efficiency of the new view result that the profits tax component of the property tax lowers the after-tax rate of return to all capital in the nation. The second is the general equilibrium efficiency aspects of the excise tax effects of the property tax; we also comment on several partial equilibrium studies that have examined the effi-

ciency effects of local use of the property tax within a single metropolitan area. The third is the possibility that local use of a distortionary property tax may result in an inefficient level of public services.

The new view argues that the property tax is primarily a tax on capital, as the average burden or “profits tax” component of the tax is borne by all capital owners in the form of a reduced rate of return to capital. The effects of a reduction in the net return to capital, especially on the level of saving and capital formation, are among the more contentious issues in public finance, and a discussion of that literature which has been surveyed elsewhere (David Starrett 1988 and Kotlikoff 1984 and the references cited therein, especially Michael Boskin 1978 and Summers 1981) is far beyond the scope of this paper. However, there is no doubt that the level of taxation of capital income is perceived to be a critical issue by many economists.

The overall level of taxation of capital income is clearly affected by the choice between the new view of the property tax as a distortionary tax on capital and the benefit view of the tax as a nondistortionary user charge. An indication of the magnitude of this distinction is provided in the simulations presented by Fullerton and Yolanda Henderson (1984). They show that the assumption that the property tax is a pure benefit tax rather than a differential tax on capital results in a reduction in the overall effective tax rate on capital income in the U.S. from 26 to 9 percent; thus, the empirical consequences of the choice between the new and benefit views of the incidence of the property tax are quite dramatic. This of course implies that the associated intertemporal distortions would be considerably greater under the new view than under the benefit view (Fullerton and Gordon 1983).

The new view also suggests that prop-

³⁴ Of course, if one adopts the benefit view, the efficiency and equity characteristics of the property tax are straightforward—the tax is an efficient one and results in no redistribution of income. The researchers cited below assume either explicitly or implicitly the absence of binding or “perfect” zoning, and that the property tax distorts housing and/or other consumption decisions.

erty tax differentials give rise to inefficiencies due to tax-induced misallocation of capital. To the extent that the property tax is not applied uniformly across all sectors in all jurisdictions, tax differentials will distort the allocation of capital. The extent of such differentials is unclear. In the Fullerton and Henderson simulations, treating the property tax as a benefit tax rather than a tax on capital lowers the standard deviation of marginal effective tax rates across sectors by roughly 12 percent (from 0.17 to 0.15). This suggests fairly modest property tax effects on the efficiency of the allocation of capital. However, these results are aggregated at a fairly high level, and do not consider interjurisdictional tax differentials. More empirical work on this topic would appear to be desirable; a particularly interesting question is the extent to which differentially high property taxation of owner-occupied housing (relative to nonresidential property) may improve the efficiency of resource allocation by offsetting overly generous tax treatment of investment in owner-occupied housing under the corporate and personal income tax systems.³⁵

Several analyses have focused on the efficiency effects of property taxes at the level of a single metropolitan area (Arthur Sullivan 1984, 1985, 1987; Arnott and MacKinnon 1977; Zodrow 1984). Such studies are of course partial in nature in that they ignore general equilibrium welfare effects outside the area being analyzed. The general conclusion of these studies is that, if residents are relatively immobile, the level of welfare in the taxing area will fall as a result of the use of a distortionary property tax (e.g., relative to a neutral land tax), but the magnitude of the decrease is likely to be relatively small. However, if residents are perfectly

mobile between metropolitan areas and new communities can be formed at a constant level of welfare to absorb the resources from the taxing jurisdiction, the efficiency losses due to use of a distortionary property tax may be quite large. In this case, the burden of the property tax, including the excess burden, falls fully on land.³⁶ Property taxes also distort the location of the city border when metropolitan land area is allowed to vary; again, the resulting excess burdens are relatively small if the population is assumed to be fixed (Arnott and MacKinnon 1977).³⁷

The final aspect of the efficiency question that we consider is the effect of local use of the property tax on the level of public service provision. A. C. Pigou (1947) was the first to articulate the general proposition that the optimal level of public services is likely to be lower in situations in which distortionary taxes are used, relative to a first-best optimum in which lump-sum finance is used. This argument seems particularly compelling in the state and local context, as state and local governments, relying on taxes on mobile capital and competing for new businesses, may engage in "tax competition"—holding taxes and spending below efficient levels in an attempt to attract new business (George Break 1967; Oates 1972).³⁸ In the following discussion, we

³⁶ For example, Sullivan finds that property tax-induced excess burdens range from 46 to 175 percent of total tax revenue when perfect mobility is assumed, but that excess burdens fall to a modest 5 or 6 percent of revenue when the total population of the region is given. Small efficiency costs in a metropolitan model with fixed populations are also obtained by Zodrow (1984), who shows that metropolitan property tax-base sharing and tax rate equalization induce substantial changes in relative land prices but very modest aggregate welfare gains.

³⁷ Arnott and MacKinnon find total excess burdens of roughly 10 percent and marginal excess burdens of nearly 20 percent.

³⁸ Helen Ladd (1975) argues that such considerations also affect the composition of the property tax base.

³⁵ Bob Hamilton and John Whalley (1985) argue that this is the case for Canada.

consider the extent to which local use of the property tax results in inefficient public service levels.³⁹

The question of public service underprovision or "tax competition" has been analyzed using both partial equilibrium models of a single metropolitan area (or a single political jurisdiction) and general equilibrium models of the nation as a whole. Although the partial equilibrium analyses of a single jurisdiction neglect general equilibrium welfare effects in other jurisdictions, they allow for considerable detail in the modeling of intrajurisdictional production and demand structures. For example, in the simple case in which individual utility is separable between the public good and housing, local reliance on a distortionary property tax on mobile capital in the presence of interjurisdictional competition typically results in a level of public services in which the marginal benefits of the public good (the sum of residents' marginal rates of substitution) exceed marginal costs.⁴⁰ However, once the assumption of separability is relaxed, a determinant of the extent to which local

public services are underprovided is the interaction between individual demands for local public services and the goods produced by production sectors subject to the property tax. Thus underprovision of local public services may not occur if housing and the public good are complementary, because the second-best level of public service consumption is low relative to an efficient equilibrium, as housing consumption is reduced by the property tax (Henderson 1985b; Bucovetsky 1985). In addition, if differential property taxation of capital used in the production of both a traded good and a relatively inelastically demanded nontraded good is feasible, there is a presumption that capital used in the production of the nontraded good should generally be taxed at a higher rate, especially if the two production sectors are roughly similar (John Beck 1983; Wilson 1985).

The possibility that local use of the property tax might lead to underprovision of public services is also considered by John Yinger (1982, 1985), who focuses on the effects of community heterogeneity. Yinger constructs a median voter model of expenditure determination. As first pointed out by Robin Barlow (1970), such a model may imply underspending on public services; this occurs because, for an income distribution skewed toward high incomes, the mean marginal benefit of public expenditures will be less than median benefits, but median preferences will prevail so that spending will be too low. Yinger (1985) provides a number of simulations showing that the degree of underspending may be substantial. He notes that, even if new community formation is allowed, fiscal variables will be capitalized in land values in the long run unless each income-taste class lives in perfectly stratified jurisdictions.

Yinger also shows that fiscal capitalization can either offset or magnify the dis-

³⁹ We consider only issues directly related to local use of the property tax. Inefficient levels of local public services can result for a wide variety of reasons. For example, the fact that local governments will ignore benefit spillovers can result in underprovision (Boskin 1973; William Brainard and Treney Dolbear 1967; Oates 1972; Alan Williams 1966). Opportunities to export tax burdens may result in overprovision of local services (McLure 1967, 1981). However, under certain circumstances, the ability to export taxes does not affect the marginal price of local services (Mieszkowski and Eric Toder 1983). In addition, concerns that unrestricted in-migration of individuals who consume local public services but do not pay their share of increased costs may result in local public service underprovision (Starrett 1980, 1982; Robin Boadway 1982). Arnott and Grieson (1981) and Gordon (1983) provide general analyses of "optimal" state and local tax structures in the presence of such considerations.

⁴⁰ This marginal condition does not necessarily establish that the total level of services provided is too low at the tax-distorted equilibrium (Anthony Atkinson and Nicholas Stern 1974; Sam Bucovetsky 1985).

tortionary effects of a residential property tax on the demand for housing. The reason the effect is ambiguous is that capitalization is a relative phenomenon; the capitalization in housing prices of the expenditure and tax package in a particular community occurs relative to some baseline community (which is not easy to identify). He shows that, while the tax rate in the baseline community has a distortionary effect on housing demand, variations in tax rates across jurisdictions are not a source of distortion due to capitalization. Note that although Yinger does not discuss the new view of the property tax, his conclusions that the property tax is a distortionary tax and that fiscal differentials are capitalized relative to some baseline community are fully consistent with and indirectly supportive of the new view. That is, the essential points of the new view are that the return to capital is decreased by the average rate of tax in the nation (reflected in Yinger's baseline community) and that tax differentials around this average give rise to excise tax effects (reflected in his relative capitalization effects).

The general equilibrium approaches utilize models similar to those used in the derivation of the new view. In a typical model, capital is assumed to be fixed in total supply but perfectly mobile across jurisdictions, populations are immobile, and a large number of independent local jurisdictions are identical or broadly similar. The objective of the government of each region is to choose the level of property tax-financed local services to maximize the utility of a representative resident, subject to a fixed after-tax rate of return on capital. Tax competition is defined as a situation in which public service outputs and tax rates are inefficiently low; in such an equilibrium, the federal government could raise national welfare by requiring each region to raise the level of its public

expenditures (Wilson 1986; Zodrow and Mieszkowski 1986a).

The general message of this literature is that there is a tendency toward underprovision of local public services because all local jurisdictions are hesitant to tax mobile capital and would generally prefer head taxation if it were available (Oates and Robert Schwab 1985). Models with sufficiently simple production structures generate strong results. For example, Zodrow and Mieszkowski allow only a single composite good that is produced with labor and capital and used in consumption either as a private good, a publicly provided private good ("individual" public services), or a publicly provided intermediate good in production ("business" public services). When the availability of lump-sum taxation is exogenously reduced by a small amount from the first-best optimum, the level of public services declines for both individual and business public services. Moreover, individual public services also decline unambiguously when a limitation on lump-sum taxation is imposed in a second-best equilibrium with a finite property tax.⁴¹

Models with more complex production structures, including separate production sectors for nontraded housing and/or the public good, generate similar but weaker results. For example, Wilson shows tax competition exists as long as an increase in public expenditures (and property taxes) in a single region would lower its capital stock; that is, the local government is underspending on public services in order to avoid tax-induced capital outflow. A sufficient condition for this to occur is for public production to be labor intensive relative to private production.

⁴¹ Their results on underprovision are thus stronger than those obtained by Atkinson and Stern (1974), who were able to obtain unambiguous results only for an infinitesimal increase in distortionary taxes from the first-best optimum.

Necessary and sufficient conditions for tax competition are weaker and are shown to be satisfied under empirically plausible parameter values.

An interesting implication of this literature is that local use of a property tax on mobile capital can be viewed as generating an externality. Specifically, when one region increases its property tax, the resulting outflow of capital to other jurisdictions increases their tax revenues, but this benefit is not considered by the taxing jurisdiction in setting its tax and expenditure levels. A local public goods subsidy paid by the government could remedy the problem of underprovision of public services due to this externality. Wildasin (1986a) shows that such a subsidy should equal the increase in tax revenue that occurs in all other jurisdictions as a result of the capital outflow induced by an increase in property taxation by a single jurisdiction. He estimates that the subsidy required, in the absence of existing grants from the state and federal governments, is as high as 40 percent; this clearly suggests that, without existing grants-in-aid and in the absence of other considerations (such as the deductibility of state and local taxes against the federal income tax), the level of underprovision may be very large. However, once account is taken of existing grants, the subsidy rate falls to (a still significant) 10 percent.

Finally, Wilson (1987) provides a major qualification to the result that local use of the property tax leads to underprovision of local public services. He utilizes a basic general equilibrium framework similar to those described thus far, but focuses on trade between regions and the fact that the imposition of property taxes induces product specialization. A region choosing a high tax rate and a high level of public services finds it advantageous to specialize in labor-intensive goods, despite its relatively low wage level (which

results from a relatively low capital intensity due to capital out-migration). Alternatively, a region can choose low taxes and expenditures, in which case it will have relatively high wages and will produce the capital-intensive good. In this model, there is no optimal tax and expenditure policy and, given commodity prices, different regions will pursue different public goods and product mix strategies; in particular, otherwise identical regions will follow diverse tax and expenditure policies that are inefficient from a national perspective. Moreover, because of complications due to trade, the nation's marginal rate of transformation between private and public goods is not well defined. As a result, a general case for underprovision of local public goods cannot be established, even though each region chooses a level of public services such that the social marginal benefit exceeds the marginal resource cost of provision.

B. *Distributional Aspects of the Property Tax: Is the Property Tax Regressive?*

Aaron (1975) provides a review of the early property tax incidence studies that follow the classical view and assume the tax burden should be allocated according to consumption. All these studies indicate some degree of regressivity, with the bottom income group typically bearing a tax burden as a percentage of income twice that of the high income group. As Aaron points out, the degree of regressivity may be overstated because these estimates are not based on normal or permanent income.⁴²

The distributional implications of the new view result that the property tax is

⁴² Aaron presents evidence using survey data indicating that house value increases in proportion to income. However, the consensus estimate of the income elasticity of housing demand out of permanent income is 0.75 (John Quigley 1979).

a distortionary tax on capital are in marked contrast to these results. Two types of effects are of interest. The first is the effect on the national distribution of income of the profits tax component of the property tax—the redistribution from owners of capital to the consumers of local public services. The second is the intrajurisdictional redistributive effects of local use of the property tax. We consider each of these effects in turn.

The new view indicates that the primary effect of the property tax is a reduction in the overall return to capital; because the ownership of capital is concentrated among the individuals in the highest income brackets, this implies that the profits tax portion of the tax is highly progressive.⁴³ This result is unlikely to be reversed by the excise tax component of the property tax, because the effects of price, wage, and land rent differentials induced by property tax differentials across jurisdictions would be expected to cancel out to a first approximation; for example, relatively low wages or land rents (or high consumer prices) in high tax jurisdictions would be roughly offset by relatively high wages or land rents (or low consumer prices) in low tax jurisdictions, with presumably relatively minor effects on the national distribution of income.^{44,45}

Unfortunately, a precise comparison of the implications for the distribution of tax burden across income classes implied

by adopting the new view rather than the benefit view of the property tax is not available. However, the recent study of the incidence of federal, state, and local taxes compiled by Joseph Pechman (1985) provides some insight. Although Pechman considers a wide variety of incidence assumptions in his compilations, he does not consider the possibility that the property tax is borne in proportion to benefits received. The closest alternative to such an assumption is probably his “variant 3b,” under which the capital portion of the property tax is borne in proportion to consumption of private goods (including imputed rent on owner-occupied housing) and the land portion is borne by landowners. This can be compared to his “variant 1c” under which the property tax is borne by all property owners.⁴⁶

Although such a comparison is obviously extremely rough, it may provide some indication of the order of magnitude of the differences in distribution of tax burden implied by the new and benefit views. Under Pechman’s variant 3b (the benefit view proxy), the property tax is roughly a proportional tax with respect to annual income at a rate of approximately 2.1–2.5 percent of income.^{47,48} In contrast, under variant 1c (the new view proxy), the property tax is roughly proportional through the first nine deciles (actually slightly regressive and then slightly progressive) at an effective tax rate of between 1.2–1.6; however, the effective tax rate jumps dramatically to 3.1 for the top decile (and to 3.7 and 4.9 for the top 5 percent and top 1 percent income groups, respectively). Al-

⁴³ Note, however, that attribution to individuals of pension wealth would reduce the extent of such concentration.

⁴⁴ Note that the new view implies that even if capitalization within a heterogeneous jurisdiction prevents intrajurisdictional redistribution—as argued by Bruce Hamilton (1976a)—the profits tax component of the property tax is nevertheless progressive as it redistributes income from capitalists to consumers of local public services.

⁴⁵ Unfortunately, there appears to be no practical empirical verification of this type of redistribution—that is, a test of the proposition that property tax is a capital tax.

⁴⁶ Pechman considers only the average burden of the property tax, and makes no attempt to correct for excise tax effects.

⁴⁷ All figures are taken from Pechman (1985, revised tables, p. 4)

⁴⁸ The only exceptions are the first two deciles, where the effective property tax rates are 4.1 and 3.1, respectively.

though a study designed explicitly to isolate the distributive effects of the new view would be desirable, it seems unlikely that the basic message provided by this adaptation of Pechman's results would be changed. That is, the property tax is a significantly more progressive tax, especially at the highest income levels where property income is concentrated, if the new view rather than the benefit view is adopted in the allocation of tax burdens to income classes.

Unfortunately, there are relatively few empirical or simulation studies that might shed some light on the validity of the new view of the property tax. Wheaton (1984) tested for the excise tax effects predicted by the new view by analyzing rents on commercial properties in the Boston metropolitan area. He found that rents on these properties were not related to differences in commercial property tax rates across jurisdictions. This result implies that property tax differentials were absorbed by property owners, capitalized in land values, or reflected in wage differentials rather than reflected in higher commercial rents. However, the results are somewhat difficult to interpret because Wheaton did not control for public service levels in the study.

In contrast, Richard Dusansky, Melvin Ingber, and Nicholas Karatjas (1981) found evidence of positive excise tax effects for residential rental properties for a sample Long Island suburb. This result suggests that tax rate differentials across communities are shifted to renters. Dusansky, Ingber, and Karatjas controlled for public service levels, but found no relationship between residential rents and service levels.

In a very different quantitative approach, John Mutti, William Morgan, and Mark Partridge (forthcoming) developed a six-region, seven-industry simulation model of the effects of the property tax for the United States. Both capital

and labor are mobile in their model. The primary conclusion they draw from their simulations is that the profits tax result of the new view—that capital will bear the average economy-wide burden of a system property taxes—is quite robust.

The redistributive effects of local use of the property tax within a single metropolitan area are also of interest. Empirical evidence suggesting that the degree of intrajurisdictional income heterogeneity is large (in a number of Pennsylvania metropolitan areas) suggests that intrametropolitan redistribution may be extensive (Howard Pack and Janet Pack 1977, 1978).⁴⁹ Unfortunately, there is surprisingly little work on this issue.

One reason for the relatively small amount of research in this area is that the data requirements are considerable; in particular, information about land price differentials attributable to zoning and detailed data on intrametropolitan housing rents are necessary before any conclusion regarding redistribution can be reached. Using such data for Toronto, Bruce Hamilton (1977, 1979) shows that, all other things equal, land zoned for low-density/high-income single-family homes sells for about one-third the price of land zoned for higher-density housing development. The low-density development is essential to generate a fiscal surplus for the local government budget, while the high-density development yields a fiscal deficit. The differentials in land prices are maintained by zoning policy, and local governments apparently restrict developments that are costly from a fiscal standpoint and encourage those yielding a fiscal surplus. Thus, information about the degree of income and tax-base heterogeneity within a community

⁴⁹ Note that income homogeneity is treated as a proxy for the homogeneity of tastes for public service assumed by the benefit view.

is insufficient to establish redistribution. Low-income groups living in apartments who apparently receive fiscal benefits at the expense of more affluent households may in fact be net losers relative to a system of head taxes, if restrictive zoning increases their housing costs sufficiently.⁵⁰

The most suggestive work on the effects of local government structure on income distribution and overall economic welfare is due to Robert Steen (1987a, 1987b). Steen constructs a monocentric general equilibrium model of a single metropolitan area consisting of multiple jurisdictions and five types of households that are differentiated by income level. He then simulates the effects of moving from a multijurisdictional structure to a single-jurisdictional metropolitan form of government. He also considers the effects of a change from a head tax system of finance to a property tax system.

In carrying out these experiments, Steen considers three possible representations of the existing governmental structure. The first, which he believes to be the best characterization of reality, is a three-jurisdictional model (referred to as 3J hereafter) comprised of a central city and two types of income heterogeneous suburbs. The second is a modified Tiebout-Hamilton model (semi-TH hereafter) that consists of a heterogeneous unzoned central city, and a group of homogeneous, perfectly stratified suburbs. Finally, there is the perfect Tiebout-Hamilton model (TH hereafter), in which the entire metropolitan area, including locations close to the central business dis-

trict, consists of perfectly zoned homogeneous jurisdictions.

Steen's simulations indicate that, in the 3J or semi-TH cases, the adoption of a metropolitan form of government results in only a modest improvement in the welfare of the lowest income groups who reside principally in the central city; this result confirms the conclusion of an earlier study of the effects of metropolitan consolidation by Bradford and Oates (1974). Although the adoption of a metropolitan government confers gains on those in the lowest income groups in their roles as taxpayers and consumers of public services, it also results in higher land values and rents in the central city. This occurs because the formation of a metropolitan government diminishes the incentive for high-income groups to stratify themselves in suburban communities, so they move back to the central city and drive up land rents there. In contrast, in the TH case in which complete stratification characterizes the initial equilibrium, the gains to the lowest-income groups resulting from adopting a metropolitan form of government are quite large; land value and rent increases are modest relative to fiscal gains. Steen concludes that the effects of changes in methods of providing or financing local public services will be very different if the TH model, rather than a model with "less severe" assumptions, is taken to represent current reality. He argues that the assumptions of the TH model are unrealistic so it is "not very useful in studying the effects of changes in the current system of local public finance."

Steen's work suggests that theoretical work on the Tiebout model has far outrun empirical and institutional implementation of the model. Relatively little is known about the typical level of intra-jurisdictional redistribution within a metropolitan area. Nevertheless, the discussion above suggests that some general conclusions can be drawn. For example,

⁵⁰ In a similar vein, Bucovetsky (1981) notes that outside aid that increases local public expenditures in a community may reduce the welfare of low-income residents if the resulting immigration of higher-income residents bids up rents sufficiently. He also argues that the main effect of a metropolitan tax-base sharing and rate equalization policy is to change relative land values across communities, so that landowners rather than renters benefit from tax decreases in some jurisdictions.

it is clear that the distribution of tax burden depends on how property taxes change factor rewards and on the income distribution of communities. In general, low-income renters will gain from property tax finance at the expense of capital owners even when communities are highly stratified by income. They will gain even more if communities are heterogeneous with respect to income, and in the level of capital services consumed by different households. The amount of fiscal redistribution will be much more extensive in a single-jurisdictional metropolitan area than in a fragmented, highly stratified system of local governments. Analysis of such intrametropolitan redistribution is intrinsically empirical and institutional, dealing with specific features of governmental structure and the extent of market capitalization of fiscal differentials. Attempts to ascertain the extent of this form of property tax-induced redistribution would appear to be a fruitful area for future research.

VII. *Capitalization Tests as a Means of Differentiating Between the New and Benefit Views*

Thus far, we have considered only purely theoretical models of the effects of the property tax. A natural question is whether empirical research can provide any insights regarding the validity of the benefit and new views of the property tax. Most of the empirical research in this area has focused on the extent to which property taxes and local government expenditures are capitalized into house values. This literature is too vast to be surveyed in this article.⁵¹ In this section, we merely summarize its main results, focusing on the extent to which capitalization studies shed light on the benefit view versus new view question.

The capitalization literature was initi-

ated by Oates (1969) who tested for fiscal capitalization by regressing the median house value in a jurisdiction on the effective property tax rate, per capita public expenditures, and other variables that controlled for house size and neighborhood characteristics. His results support the proposition that increased expenditures increase property values while increased taxes decrease property values, and he seems to conclude that property taxes are in fact benefit taxes.

Matthew Edel and Elliott Sclar (1974) and Bruce Hamilton (1976b) argue that Oates' test confirms that households take fiscal variables into account when making locational decisions. However, they argue that a long-run equilibrium in a Tiebout model with free entry into community formation (or endogenous community boundaries) should be characterized by *no* relationship between fiscal variables and property values. If the property tax is a benefit tax that is equivalent to a head tax, and all households receive their preferred level of public services, then there is no advantage to residing in a high-expenditure, low-tax jurisdiction—residents pay for what they get. Thus, variations in demand for public services should not be a determinant of property value differences across communities, any more than the variations in expenditures on private goods across communities should affect property values. Accordingly, Edel and Sclar and Hamilton argue that the capitalization of fiscal variables is an indication of disequilibrium—that is, certain types of communities are in oversupply or undersupply in the metropolitan area, relative to a long-run equilibrium.⁵²

More recently, Bruce Hamilton (1983) has argued that complete adjustment of

⁵¹ For an excellent review of the capitalization literature see Yinger et al. (1988).

⁵² Hamilton qualifies this argument to account for the possible fiscal advantages of industrial capital, differential access to state and federal aid, and differential costs in producing public services.

the supply of housing, which would imply zero capitalization, is unlikely even in the long run because expansion of fiscally advantaged housing will always be opposed by existing residents. In such an equilibrium, he maintains that the results of Oates and others, which imply that property taxes and expenditures are approximately fully capitalized into housing prices, support the proposition that the Tiebout mechanism is efficient and that property taxes are benefit taxes. However, the work of several writers indicates that this interpretation of Oates' results is problematic.

Dennis Epple (1980) has noted that, by using income to control for neighborhood effects, Oates introduced a demand variable into his regression. Thus his estimating equation can be interpreted as a demand equation, and the negative sign on the tax variable may simply reflect a price-related decrease in the demand for housing.⁵³ A more fundamental simultaneity problem, noted by Epple as well as by T. J. Wales and E. G. Wiens (1974), originates in the local government budget identity. At any level of expenditures, higher tax rates must be imposed in communities where average house values are low. Similarly, if tax rates are held fixed, a community with high average house values will have higher expenditures. In the absence of perfect controls for housing quality, the correlations between house value and taxes and expenditures may be spurious, merely reflecting the budget identity. Moreover, the relationship between expenditures and taxes on residential housing is not exact, as the amount of industrial capital, other input costs including wages, and efficiency in public service provision vary across communities. These factors provide varia-

tions in the data and allow the extent of expenditure and tax capitalization to be estimated; however, they also make the interpretation of the capitalization results difficult.

Brueckner (1979b) argues that, because of the budget identity, the inclusion of both expenditures and the tax rate as explanatory variables for the determination of house values destroys the predictive value of the estimating equation. He analyzes a metropolitan model in which utility is equalized across jurisdictions. Variations in public expenditures across jurisdictions, holding other variables constant, are accompanied by variations in tax rates so as to maintain budget balance.

Brueckner tests for whether the level of public service provision is efficient, given that communities are heterogeneous and that the property tax distorts housing consumption. Efficiency is determined by the sign of the coefficient on expenditures. If increases or decreases in expenditures leave property values unchanged, the level of public service provision is at the correct level. If an increase in expenditures in the cross section of jurisdictions increases (decreases) property values, public services are underprovided (overprovided). Using Oates' sample of New Jersey jurisdictions, Brueckner estimates a negative coefficient for the expenditure variable, and concludes that public expenditures are inefficiently too high for this particular sample. Brueckner also explicitly introduces the amount of business capital as an explanatory variable, and finds that, holding the level of expenditures constant, an increase in the amount of business capital decreases the tax burden on residential capital and thus increases property values.

In a later paper, Brueckner (1982) uses a sample of Massachusetts communities to test whether aggregate property val-

⁵³ Epple also notes that the standard capitalization studies do not test whether public services are efficiently provided at minimum cost.

ues (as opposed to the median property values used in his initial study) in a community are related to expenditure levels. He finds that the estimated coefficients for educational expenditures and non-educational expenditures are significantly different from zero, and concludes that for these communities there is no systematic under- or overprovision of public services.

However, as noted by Brueckner himself and by Mark Pauly (1976), Brueckner's conclusion that a zero expenditure coefficient in a capitalization equation indicates an efficient level of service may be unwarranted. Pauly constructs an example in which most communities in a sample provide a level of expenditures that is either relatively too high or relatively too low. He shows that, if local expenditure levels are distributed symmetrically about the population mean, a regression of property values on educational expenditures will show zero capitalization, even though most communities are either under- or overproviding local public services.

In contrast to capitalization studies that test only whether households are informed about fiscal considerations in bidding for property, Epple, Allen Zelenitz, and Michael Visscher (1978) establish a much more severe test of the Tiebout hypothesis. They follow Hamilton in interpreting a Tiebout world as one in which the selection of a jurisdiction of residence by mobile consumers results in reduction or elimination of the dead weight loss arising from local taxes. Their version of a Tiebout community is one in which the combination of constant returns to scale in public service provision and zoning leads to the formation of homogeneous communities. Heterogeneous communities arise only if there are economies of scale in public service provision that cannot be exhausted with homogeneous communities.

Epple, Zelenitz, and Visscher attempt to determine whether it would be possible to distinguish econometrically between Tiebout-type homogeneous communities and heterogeneous communities. They show that the demand for housing and public services in homogeneous communities would be independent of the tax rate, while taxes do enter the demand functions for the median individual for a heterogeneous community. They argue that, because of simultaneity in the determination of taxes, public expenditures and housing demand, the two models are indistinguishable from one another if data on the median household are used to estimate the demand relationships.

They then consider whether it would be possible to distinguish between Tiebout and non-Tiebout communities by testing for capitalization of differential tax rates and/or public expenditure levels. They argue against this approach on the grounds that even when the supply of land is not perfectly elastic within a metropolitan area, land values will tend to be equalized across communities if municipal boundaries are movable.⁵⁴ In particular, they argue that land that is undervalued because of fiscal factors will be annexed by communities with higher land values.

Epple, Zelenitz, and Visscher consider whether price-accessibility functions in urban models have econometric implications not found in the simpler models described above. They conclude that even though such land price equations are highly nonlinear, they could be used to estimate a tax parameter that would distinguish between the Tiebout and the heterogeneous jurisdictions model. But the data requirements for this estimation are quite severe, and the authors con-

⁵⁴ Subsequent research implies that this is a questionable assumption; see Epple and Thomas Romer (1986).

clude that an accurate test of the Tiebout hypothesis that the property tax is a benefit tax has not yet been conducted.

All of the studies described thus far are studies of interjurisdictional rather than intrajurisdictional capitalization. There are a number of intrajurisdictional studies that estimate the capitalization of tax differentials caused by imperfect, inequitable assessment practices.⁵⁵ Such intrajurisdictional studies test whether households are aware of tax differentials in bidding for properties. However, because they are limited to one community, they cannot test for the efficiency of public service provision. Moreover, because they do not estimate demand functions or accessibility functions, they cannot test the extent to which the property tax is a nondistortionary benefit tax.

In summary, empirical studies of capitalization are useful as tests of whether households are informed about fiscal factors in bidding for housing. However, to date such tests have not resolved the basic issue of whether the benefit or the new view represents the more valid description of the effects of the property tax. An obvious question is whether in principle (apart from estimation problems) a capitalization test could be devised that would distinguish between the new and "heterogeneous jurisdiction" benefit views of the property tax.⁵⁶

It would appear to be difficult to construct such a test, because both the new and benefit views generally imply that some capitalization would occur. Under the heterogeneous jurisdiction version of the benefit view, capitalization of fiscal differentials in land prices would occur

as described above (Section IV). However, capitalization findings are also entirely consistent with the new view result that the rate of return of capital is decreased when all jurisdictions in a metropolitan area increase their taxes and expenditures simultaneously. To see this, consider a "new view" model analogous to the model analyzed by Bruce Hamilton (1976a). Suppose there are three types of communities—homogeneous communities with high house values (H), homogeneous communities with low house values (L) that have a value equal to one-half that of an H house, and mixed communities (M) that consist of half H housing and half L housing. Note that Hamilton effectively assumes that individuals are perfectly mobile (and achieve a constant level of utility), because he assumes that individuals can always choose to live in homogeneous, perfectly zoned jurisdictions. Assume that expenditures per household are equalized across all communities, tax rates are 1 percent, 1.33 percent, and 2 percent, and the before-tax rate of return is 10 percent. Under these circumstances, the average rate of tax is 1.33 percent and, according to the new view, the after-tax yield on capital will fall by 1.33 percentage points. Moreover, because H and L households are perfectly mobile across jurisdictions, the "excise tax" effects are that tax differentials will be fully capitalized in land values rather than shifted forward into housing prices.

This analysis indicates that capitalization is likely to occur under both views of the property tax; thus, merely establishing the existence of capitalization does not necessarily distinguish between the new and benefit views. However, two types of empirical tests might be performed that would distinguish between the two views, assuming a long-run equilibrium with perfectly mobile individuals. First, note that the nature of capital-

⁵⁵ For example, Yinger et al. (1988) analyze capitalization in communities in which tax liabilities paid on specific properties are adjusted significantly as a result of reassessment.

⁵⁶ Capitalization would not occur under the "homogeneous jurisdiction, perfect zoning" version of the benefit view developed by Hamilton (1975b).

ization is different in the two cases. Under the benefit view, fiscal differentials (the present value of all future differences between benefits received and taxes paid on a property) are capitalized into land values. In contrast, under the new view, capitalization reflects the change in land rents that occurs as a result of capital migration induced by tax differentials relative to the national average. One possible means of differentiating between the two views would be to compare estimates of the actual amount of capitalization in a community to the amount of capitalization implied by each theory. Such an approach would appear to be quite difficult to implement in practice.

A second approach that would examine the effects of property tax and expenditure increases in a single (heterogeneous) community might be more promising. Under the benefit view, such increases would result in capitalization of the associated fiscal differentials; however, as noted above, a central tenet of the benefit view is that such increases should not change the aggregate value of land in the community. In contrast, under the new view, the capital out-migration induced by an increase in the property tax should result in lower land values in the community. Thus, a possible means of differentiating between the two views would be to determine whether the capitalization effects induced by a property tax increase in a jurisdiction reduce aggregate land values in the community or leave them unchanged.

Another approach has been suggested to us by Brueckner. In a world characterized by equal utilities in different jurisdictions (perfect mobility), housing demand is the sole determinant of house values and excise tax effects cannot occur; that is, house value cannot rise with an increase in the property tax rate (other things equal) because utilities would fall. Given this constraint Brueckner suggests

focusing on intermetropolitan rent differences, as individual utilities are more likely to vary across metropolitan areas. In this situation, the benefit view predicts that, in long-run equilibrium, rents would depend on construction costs and on public expenditures per household, but would be independent of taxes. In contrast, the new view predicts that the cost of capital is affected by taxes so that rents would depend on tax rates as well as construction costs and expenditure levels. The essence of the approach would be to determine whether interjurisdictional differences in rents are related to taxes after accounting for differences in public expenditures.

VIII. *Head Taxes and Land Taxes in Regional Models*

The basic hypothesis of the Tiebout model is that, under the appropriate assumptions, individuals effectively reveal their preferences for local public goods by "voting with the feet" through their residential location decisions. The Tiebout model is commonly viewed as a description of a single metropolitan area, with a central city surrounded by independent suburban jurisdictions; the suburbs are homogeneous with respect to demand for local public services, and public services are provided at minimum average (per capita) cost. Individuals all work in the central city but are free to select the residential suburb, and thus the local public service/tax package, of their choice; the selection of a residential suburb is assumed to have no effect on an individual's income.

A number of authors have questioned the validity of this "metropolitan" version of the Tiebout model of efficient local public service provision, and have constructed an alternative framework that we shall refer to as the "regional" model of local service provision. The "regional"

terminology follows from the fact that individuals are assumed to work in the jurisdiction in which they reside, rather than being free to choose among a variety of metropolitan suburbs without changing jobs. We begin by describing the regional model of local public service provision. Next, we consider the nature of taxation in the regional model, focusing first on head taxes and then on taxes on land rents.

A. *The Regional Model*

The regional models are distinguished by the fact that they typically reject three of the assumptions that were made by Tiebout and that characterize most metropolitan models of local public service provision. They are thus relevant for analyses in which these assumptions seem unrealistic.

The first is the assumption that individuals can choose among alternative local jurisdictions (metropolitan suburbs) without affecting their income. Instead, the regional models assume that income is determined endogenously within each jurisdiction, and that individuals live and consume local public services in the same jurisdiction (region) in which they work. Because individuals are required to live and work in the same jurisdiction, because income depends on the characteristics and location of each jurisdiction, and because the economy consists of a number of such jurisdictions, these models are clearly regional rather than metropolitan in nature.

The second premise rejected in the regional models is Tiebout's assumption that all communities can be maintained at an optimal size—that corresponding to the minimum point of a U-shaped per capita cost curve for local public services.⁵⁷ Rather, regional models as-

sume that local governments are unable to control community size to the absolute extent assumed by Tiebout, and that suboptimal migration among jurisdictions may occur. Such migration is clearly of interest because Tiebout's assumption of fixed and efficient community size seems unrealistic.

Third, the regional models reject the assumption that local land markets can be ignored. Although the role of land markets was not discussed by Tiebout, the standard urban economics model of a single metropolitan area is presumably the appropriate way to model the determination of land values in the Tiebout model (J. Vernon Henderson 1985a). That is, the value of land on the urban fringe is equal to the opportunity cost of land in agriculture, while land values increase as communities are located closer to the central business district to reflect lower commuting costs. As long as land markets are competitive and there is free entry into community formation, the long-run determinants of land values in such a model are location, the size of the metropolitan area, and transportation costs.⁵⁸ In particular, local provision of public services in the Tiebout model does not generate a surplus, and cannot affect land values in the long run.⁵⁹ In contrast, jurisdictional size is

public goods or public goods that exhibit congestion. As will be shown below, the migration issues addressed by the regional models become much less important if local services are publicly provided private goods with constant average and marginal per capita costs.

⁵⁸ The neighborhood characteristics of a developed community (including fiscal factors) have only short-run effects on land values in such a framework.

⁵⁹ Note in particular that there is no advantage to using a tax on land rents to finance local public goods in the Tiebout model. In the rather unusual event that a community was homogeneous in that everyone lived on identical lots and could not alter their land consumption, a tax could be imposed on land rents without altering the results. However, such a tax would effectively be equivalent to the head tax assumed by Tiebout.

⁵⁷ Alternatively, the assumption that local public services are simply publicly provided private goods is rejected, as local services are modeled as pure

assumed to be fixed (or the supply of land is less than perfectly elastic) in the regional model, and the determination of land values is a critical element of the analysis of local public good provision.

The regional model of public goods originates in the work of James Buchanan (1950, 1952), Buchanan and Richard Wagner (1970), and Buchanan and Charles Goetz (1972) and was extended and formalized in the subsequent research of Frank Flatters, Henderson, and Peter Mieszkowski (1974) and Stiglitz (1977). In contrast to Tiebout's emphasis on preference revelation, these authors stress the effects of migration in models with local public goods, and generally conclude that individual migration decisions are very likely to be inefficient.⁶⁰

The structure of a relatively simple version of the regional model is as follows. The economy is comprised of a fixed number of regions, each of which has a fixed quantity of land. A composite good (Y_i) is produced in each region (i), with $Y_i = F^i(N_i, S_i)$, where F^i is a standard constant returns to scale production function and N_i and S_i are inputs of labor and land. The composite good can be costlessly transformed into the local public good. Individual utility is defined over consumption of the private and public goods. Individual migration between jurisdictions is unrestricted and costless so that, in equilibrium, individual utility is equalized across all regions.

An advantage to population concentra-

tion is commonly introduced into the regional model by assuming that the local public good provided by the government of each region is a pure public good (completely nonrival in consumption). Thus, per capita average costs of the public good are inversely proportional to population. However, the gains to increasing population are limited by the assumption of a fixed amount of land in each region, which implies diminishing returns in production to additional population (because all residents must work in the jurisdiction in which they reside). At low levels of population, economies of scale in public good provision are assumed to dominate diminishing returns in production, so that per capita utility in a region increases with population size. Eventually, diminishing returns to labor are assumed to overtake economies of scale in public good provision, so that per capita utility reaches a maximum and then decreases with further population growth. As in the Tiebout model, the result is an optimal population of finite size.

If all regional sites were identical and the total population of the nation were large relative to the population of the optimal size region, the efficient equilibrium would be a system of identical cities of optimal size. A typical equilibrium in a simple version of the regional model can be characterized as follows. Suppose that all individuals are identical and a planner is charged with maximizing the per capita utility level $U(C/N, G)$ of a representative individual in a representative jurisdiction, where the homogeneous output (Y) can be used as a pure public good (G) or a private good, where C is aggregate consumption of the private good.⁶¹ In this case, the solution to this problem yields the usual Samuelson condition for the optimal provision of the

⁶⁰ For example, Buchanan was concerned about the possible inefficiencies associated with fiscally induced interregional migration. He argued that concentrations of population in the major cities of the Northeast in the U. S. were induced by agglomeration economies and returns to scale in the private sector, and that taxes imposed on the associated locational rents would result in an inefficient concentration of population in the nation's largest urban centers. His major concern was that these industrial centers, if not unique, would at a minimum be very difficult to replicate in the South.

⁶¹ The jurisdiction subscripts have been dropped to simplify notation.

pure public good, and the additional condition

$$F_N - C/N = 0. \quad (1)$$

The latter condition specifies that the marginal product of labor should equal per capita consumption of the private good. The interpretation of this result is that $F_N - C/N$ measures the net social marginal product of a worker. Recall that the public good is nonrival so that additional workers can consume local public services at zero marginal cost to existing residents and the planner chooses the optimal level of local public good provision for all population levels. Thus, workers should be admitted to a region and allowed to consume the local public good until their net social product is zero—that is, until their marginal product of labor is equal to their per capita consumption of the private good.

B. Head Taxes in the Regional Model

As suggested above, the research that utilizes the regional model focuses on the inefficiencies that arise when migrants do not take account of the fiscal implications of their location decisions. Perhaps the most striking result of this literature is that the use of head taxes, which generally promote efficiency in the allocation of resources (as they do in the Tiebout model), gives rise to inefficiencies in the regional model.

To see this, consider the simplest case in which there are only two regions ($j = 1, 2$), there is a fixed national population, the public good is nonrival, and individuals are perfectly mobile so that utility is equalized across the regions. Initially, abstract from land rents by assuming that they accrue to absentee landlords. The net social benefit to the residents of region one of having an additional resident is $F_{N1} - C_1/N_1$; similarly, the net benefit of a new resident

to the residents of region two is $F_{N2} - C_2/N_2$.

As utility is equalized across regions, efficiency requires that the net social benefit to the nation of moving an individual from region two to one be zero, or

$$(F_{N1} - C_1/N_1) - (F_{N2} - C_2/N_2) = 0. \quad (2)$$

If each worker is paid the value of his marginal product and head taxes are used to finance the public goods in each region, equation (2) reduces to

$$T_1 - T_2 = 0, \quad (3)$$

where T_j is the head tax in region j .

If all regions are identical, head tax finance results in an efficient equilibrium. However, once the sizes of regions or the quality of sites are allowed to differ, head taxation generally results in a suboptimal allocation of the national population. For example, Flatters, Henderson, and Mieszkowski (1974) consider the case in which the populations of the regions differ because of different endowments of land. In this case, the per unit price of the public good varies across regions, and head taxes are equal across regions only in the special case in which the compensated elasticity of demand for public goods is exactly equal to one. Otherwise, equation (2) will not be zero and free migration of population across regions does not lead to a social optimum. Specifically, if the compensated price elasticity of demand for the public good is less (more) than one, the head tax in the region with the smaller resource endowment will be relatively high (low) and the region will be underpopulated (overpopulated) relative to the optimum. Accordingly, a central planner could subsidize migration to the smaller (larger) region and the utility of every individual in the nation would increase.

Thus, within the context of the regional public goods model, the use of head taxes

generally is not efficient in the presence of individual migration; rather, head taxes are distortionary because they can be avoided by moving to a different region.⁶² Such migration is likely to lead to inefficiency because migrants acting to maximize their own welfare do not consider “fiscal externalities”—the effects of their relocations on other individuals.⁶³

C. Taxes on Land Rents in the Regional Model

The authors who investigate the provision of public goods within the context of the regional model generally focus on the use of taxes on land rents rather than head taxes.⁶⁴ The central result discovered by these writers, following Henry George (1914) is that, under certain circumstances, decentralized provision of local public services will be efficient if taxes on land rents are used to finance local public expenditures.

This result is most easily seen within the context of the simple regional model described above. Substituting from equation (1) into equation (2) yields

$$G = F(N, S) - F_N N, \quad (4)$$

which implies that, for the optimal population, all wage income is devoted to private goods consumption while total land rents exactly equal expenditures on the public good. This is the Henry George theorem (HGT), which states that the efficient level of public expenditures (for

the optimal population) should be financed entirely with a 100 percent tax on land rents. That is, in order to achieve efficiency in the decentralized regional model with pure local public goods, land rents should be fully expropriated to finance public expenditures; head taxes are unnecessary and, as shown above, generally undesirable.

The rationale underlying the HGT in the regional model is that land rents are a surplus created by the benefits of concentrating population in a location in order to take advantage of economies of scale in the consumption of the pure public good. Land rents are created through the advantages of collective consumption, and efficiency requires that such land rents finance the source of surplus. Thus, within the context of the regional model, the differences between the effects of head taxes and the taxation of land rents are generally quite dramatic.⁶⁵

The HGT is quite robust, as demonstrated by Arnott and Stiglitz (1979). They introduce the concept of differential land rents, or payments to landowners in excess of the opportunity cost of land, and show that the HGT holds for differential land rents when the opportunity cost of land is positive.⁶⁶ Indeed, Arnott and Stiglitz conclude that the HGT holds in all economies in which differential land rents are well defined (the opportunity cost of land is the same in all cities), the economy is sufficiently large that assign-

⁶² This discussion considers the use of head taxes in isolation; the subsequent section considers the use of head taxes in conjunction with taxes on land rents.

⁶³ Note that the efficiency of head taxes as congestion charges in “club” models is not directly relevant to the models discussed here; in the club models, land is not considered and income is exogenous. For a recent survey of the theory of clubs, see Todd Sandler and John Tschirhart (1980).

⁶⁴ Some authors consider combinations of head taxes and taxes on land rents, with the head taxes serving the role of a congestion charge; for example, see Wildasin (1980).

⁶⁵ When all regions are identical, land is collectively rather than individually owned, and population size is controlled to achieve an optimum, head taxes and taxes on land rents are equivalent in the sense that land rents could accrue to the population, and an equal lump-sum tax could be imposed to finance the public good. But the equivalence holds only in this special case and masks the general superiority of land taxes in the regional model.

⁶⁶ The opportunity cost of land is generally assumed to be either zero (if land is fixed) or the cost of land at the urban fringe (if the supply of land to a region or a metropolitan area is not perfectly inelastic).

ment of all residents to a city of optimal size is possible, and the distribution of economic activity over space is efficient. Similar results are derived by Arnott (1979) and Henderson (1985a), who extend the HGT to urban economies in which population density is endogenous and land rents reflect differential transportation costs to a central business district.

Another version of the HGT is due to Starrett (1974) and William Vickrey (1977), who consider the financing of the fixed-cost elements of production activity in a city rather than the financing of a local public good. In these models, fixed costs are spread over a larger output as population grows in the city, but the resulting increase in city size also increases transportation costs and land rents. At some level of output and population, the average cost of production is assumed to reach a minimum. If firms charge prices covering variable production costs and their land rent payments, they will just cover the exogenous price of the export good at the optimal output but they will not be covering fixed costs. The Starrett/Vickrey version of the HGT is that these land rents will just equal the subsidy necessary to cover fixed costs at the optimal minimum cost level of production.

A number of writers, including Arnott and Stiglitz (1979), Berglas and Pines (1981), and Boadway and Flatters (1982), have derived a modified version of the HGT that allows for congestion in public goods use. This approach is closer in spirit to Tiebout's model, in which a U-shaped public good average cost curve (with respect to population) arises because the benefits of public good cost sharing are eventually outweighed by congestion costs.

For example, Boadway and Flatters (1982) introduce congestion costs by assuming that the utility function is $U(C/N, G/N^\alpha)$, where C/N is per capita con-

sumption of the private good, G is the quantity of the public good, and G/N^α is the level of public services. The parameter α is an index of "publicness" of public services. A value of $\alpha = 0$ corresponds to a pure, nonrival public good, while $\alpha = 1$ implies that the public service is perfectly rival and is equivalent to a private good. They demonstrate that per capita utility is maximized if

$$(F_N - C/N - \alpha G/N) = 0 \quad (5)$$

and if a modified Samuelson condition is satisfied. From equation (5) it follows that unless $\alpha = 0$, a head tax should be used to account for the congestion effect $\alpha G/N$. Thus, the modified version of the HGT states that the sum of land rents plus congestion charges (head taxes) should equal public expenditures. Public expenditures will not necessarily increase as α increases because the optimal community size and total land rents will decrease as the degree of public goods increases. Similar results are obtained by Wildasin (1980), who argues that the result of generally inefficient individual location decisions common to most regional models that allow only head taxation is misleading; he stresses that efficient location decisions characterize some models that allow head taxes to serve as congestion charges to correct for fiscal externalities, with the remainder of revenues raised from taxes on land rents.

Berglas (1982) and Berglas and Pines (1981) obtain a similar result within the framework of the theory of clubs. They consider the case in which an individual user of a club facility such as a swimming pool can vary the frequency of utilization of the facility. They show that if the size of the consuming group is chosen optimally, an optimal congestion tax imposed on per unit use of the facility will just cover the cost of the facility, so that club goods can be provided by the market.

These results are analogous to those derived for the Tiebout model.

In more recent work, Berglas (1982, 1984) has developed a local public goods model in which a publicly supplied good (water) has a private and public component. The utility function for the individual is $U(C, W, Q)$ where C is consumption of the private good, W is individual consumption of water, and Q is the quality of water, which is interpreted as a public good. The unit cost function $C(Q, N)$ is assumed to be U-shaped with respect to population, where N is population size which is endogenous. Berglas shows that for a community of optimal size, marginal cost pricing of water will just cover cost. That is, user charges for water consumption are analogous to the congestion fees described above.

Berglas then considers a situation in which the quality of water is given and Q stands for another nonrival public good such as a museum. He shows that when community size is optimal and water is priced at marginal cost, the user charges on the water will also be sufficient to pay for the pure public good. This is another example of the phenomenon forming the basis of the HGT. In this case, there are two activities—one characterized by decreasing costs (the museum) and the other characterized by increasing costs (water); the balancing of the two effects on costs in determining optimal population size allows the profits generated on the increasing cost activity to just offset the cost of the decreasing cost activity (for which the marginal cost of use is zero). Note that this result implies that the division between user charges and taxes does not depend on the division between pure public goods and goods for which user charges can be imposed. Although in general a combination of user charges and taxes will be necessary, there will be situations in which user charges are the sole optimal source of finance.

Oded Hochman (1981) extends the regional model of public goods in a number of directions. He constructs a general two-factor (land and labor) model that includes public good congestion effects, endogenous formation of cities with a central business district, residential suburbs, explicit commuting costs, two internationally traded production goods, an agricultural sector, economies of agglomeration in production, and externalities. He concludes that an economy with local public goods financed with taxes on land rents can operate efficiently without any intervention or coordination by a central level of government, and that any inefficiency at the local level must be caused by the use of head taxes (other than those used to internalize externalities including congestion costs) or other distortionary taxes.

Although the preceding discussion suggests that the HGT is quite robust, the conclusion regarding the efficiency of land taxes (such as the version of the HGT developed by Hochman) is strictly correct only if sites are identical and/or economies of scale in the private sector are the same across cities/regions. This point is emphasized by research in several areas. For example, Stiglitz (1977) was the first to note that the simple decentralized version of the HGT does not hold when sites vary in quality or natural resources and regions are not of the same size. Other writers, including Flatters and Douglas Purvis (1980), examine the importance of differences in natural resource endowments and discuss the migration effects of land taxation, where "land" is defined broadly to include natural resources. The basic point made by these authors is that resource-rich regions can impose taxes on the rents accruing to their natural resources and thus achieve relatively high levels of services or low levels of taxes on mobile factors such as labor and capital. With a decen-

tralized form of finance, individuals face an incentive to reside in the resource-rich regions to share in the benefits of these rents, so that local taxation of land (broadly defined) loses its efficiency properties. That is, the distribution of the population will be suboptimal relative to a centralized form of finance in which the national government collected the taxes on national resource rents.⁶⁷

Berglas (1979) extends this analysis to consider differential amenities across regions. He shows that when regions vary in size and taxes are imposed to control a disamenity such as pollution, revenues should be collected by the national government or returned to households independently of place of residence. In a two-region model, he shows that if the larger, more polluted region collects and rebates relatively large per capita taxes to its residents, the allocation of the population will be distorted because the population of this region will be too large.⁶⁸

A useful formulation of these issues is developed by Boadway and Flatters (1982). They allow for congestion in public goods consumption using the approach described above, allow land rents to accrue to residents on an equal per capita basis, and maintain the assumption that head taxes are used to finance the public good. Their generalized expression for the net benefits to the nation of moving an individual from region one to region two is

$$[(1 - \alpha)G_1/N_1 - (1 - \alpha)G_2/N_2] - [R_1/N_1 - R_2/N_2]. \quad (6)$$

The first bracketed term is the fiscal externality effect, while R_1/N_1 and R_2/N_2

are per capita land rents in the two regions, which depend on the degree to which rents accrue to the public and are distributed on the basis of residency. From equation (6) it follows that if the public service is perfectly rival ($\alpha = 1$), the fiscal externality effect disappears; moreover, as above, this effect will also be zero when head taxes are equalized across regions. However, the equalization of head taxes across regions does not guarantee efficiency, as differences in per capita land rents will influence the distribution of the population and cause inefficiencies. For example, regions with relatively high resource rents or amenity levels will tend to be overpopulated because of "rent-seeking" behavior on the part of migrants.⁶⁹

These examples suggest that when individuals can migrate freely between regions and share in its land rents a decentralized system of regions is most likely to be efficient if the regions are identical in terms of land fertility, natural resource endowments, and amenities. However, an exception to this generalization is implied by the form of the HGT first derived by Flatters, Henderson, and Mieszkowski (1974). Suppose that in fact land varies in quality and regions differ in size, but suppose also that in each region there is a separate class that owns all the land and controls expenditures, taxes, and population size. In this case, the solution to the problem of maximizing the utility of landlords subject to a constant utility level for migrants (as well as the solution to maximizing the utility of migrants subject to a constant utility level for landlords) is again that population should be increased until the marginal product of labor equals per capita consumption of the private good. As a

⁶⁷ Stiglitz notes that transfers by the central government could be designed to avoid distortions in the distribution of the population (Stiglitz 1983a, 1983b).

⁶⁸ The result that it is undesirable to return the revenues from pollution taxes to residents is analogous to that obtained by William Baumol (1972).

⁶⁹ In some cases (e.g., Alaska), the tendency toward overpopulation due to resource rents may offset a tendency toward underpopulation due to poor amenities, although a perfect offset is highly unlikely.

result, taxes on migrants (workers) will not be imposed, and the relevant version of the HGT is that land rents will equal expenditures on the public good plus private consumption of the landlords. Thus, efficiency is achieved under a decentralized system despite variations in the quality of land the size of regions.

A similar result is obtained by Berglas (1984), who assumes the government in each jurisdiction is controlled by local landowners and public expenditures are set to maximize after-tax land rents and are financed with taxes on land rents. For the case in which the quality of land varies across regions, the efficient level of public expenditures will be smaller than land values, and the residual again accrues to landowners rather than migrants.

We conclude this discussion of regional models by considering a very general and insightful dynamic model from the urban economics literature constructed by Henderson (1986). Henderson's model focuses on urban/regional development over time in the presence of differential amenities and population growth; he ignores public finance considerations including taxes and public goods. In this model, the best sites for cities are developed first along a "coast" which has advantages in shipping and climate, while the interior of the country is initially undeveloped. Per capita utility in a city initially increases with population size because of economies of agglomeration in production, reaches a maximum, and then decreases as the diseconomies of scale due to transportation costs outweigh economies of agglomeration.

Henderson demonstrates that as the nation's population grows, the coastal cities become overpopulated relative to their optimal size. However, development of new cities in the interior does not begin until the per capita utility level in the coastal cities has declined (relative

to the maximum) to the level attainable in a new interior city that is too small to take advantage of economies of agglomeration.⁷⁰ At this point, migration from the coast to the interior will increase utility in both regions. As a result of economies of agglomeration, interior development will be very rapid, and the associated increase in per capita utility in the nation during this time demonstrates the inefficiency of uncoordinated development. This pattern of development suggests that the central government should promote earlier development of the interior either by guaranteeing interior residents the standard of living that would be feasible if a large number of people moved simultaneously into the interior or by making grants to the interior. The amount of information required to establish the timing and form of intervention is much greater than that required to deal with fiscal externalities or the rent-seeking problem.

This model is relevant for development planning in countries in which one or two urban regions dominate the system of cities. However, a world of two regions, or one enormous city and a rural sector, is far removed from the suburban intrametropolitan competition of the original Tiebout model. Nevertheless, this model highlights the essential difference between the metropolitan and the regional models. Although in this case inefficiencies arise in the absence of public goods or taxes, the model illustrates clearly the fundamental issue addressed by the regional models but ignored in the metropolitan approach—economies of scale (for whatever reason) tend to result in an inefficient distribution of population, so that some form of central coor-

⁷⁰ Note the analogy with Buchanan's original speculation regarding overpopulation of large urban areas.

dination of population movements is required for nationwide efficiency.

IX. Conclusion

This article has surveyed two broad topics in the literature on the Tiebout model and local taxes. The first is research on the effects of the local property tax. We focused on two alternative views of the property tax: (1) the benefit view, which indicates that under the appropriate circumstances the property tax is effectively converted into a local benefit tax—the head tax envisaged by Tiebout; and (2) the new view, which argues that capital bears the average burden of the tax, with largely offsetting “excise tax” effects on consumers and noncapital factors in the relatively high- and low-tax jurisdictions in the nation.

It is clear that the benefit view is fundamentally inconsistent with these two views, and that the efficiency and distributive implications of this distinction are quite significant. Unfortunately, the determination of the appropriate means of determining which of the two views is the better description of reality is difficult. In particular, neither the existence of property tax capitalization nor the fact that individuals are mobile and value public services implies that the benefit view is more relevant than the new view. Rather the benefit view obtains only if zoning—either explicit zoning in homogeneous jurisdictions or implicit zoning in fully developed heterogeneous jurisdictions with perfect capitalization—is sufficiently binding with respect to the amount of capital services a household or firm must consume.

We are not aware of any systematic study on the binding nature of zoning. However, two pieces of admittedly sketchy evidence may shed at least a little light on this question. First, an analysis of zoning by suburbs in the greater Bos-

ton area by the Metropolitan Area Planning Council (1980) indicates that residential zoning requirements in all communities for both single-family homes and for apartments are specified in terms of minimum lot size requirements and not in terms of minimum structure value or size as is required for perfectly binding zoning. Second, in the Houston area, deed restrictions do in fact specify the type of unit and minimum floor space of a house. However, in some small relatively homogeneous Houston communities, virtually all the houses are roughly 50 percent larger than the minimum, thus making the restriction nonbinding and the property tax distortionary. Although far from conclusive, these two observations do not seem atypical, and suggest that perfect binding zoning is not in fact observed in practice.

In our view, a majority of researchers (including the present writers) reject the assumption of perfect or binding zoning and conclude that a national system of property taxes is distortionary and decreases the overall return to capital by approximately the amount of taxes collected. Consumers of public services may be willing to pay for public goods and, at the level of individual communities, changes in tax rates and public services levels will be reflected in changes in land prices and housing prices or rentals. But a national system of property taxation by independent local jurisdictions reduces the after-tax return to capital and alters the level and allocation of capital investment.

We also showed how the classical or traditional partial equilibrium view of the property tax as an excise tax borne by consumers (as well as modern versions of this view cast in the setting of a single metropolitan area) may be characterized as a special case of certain elements of the new view. Specifically, the effects of the property tax in a single taxing juris-

diction predicted by the classical view are analogous to the effects in the taxing jurisdiction described by the "excise tax" component of the new view. Moreover, the new view results can be obtained from a general equilibrium analysis of the effects of a property tax increase in a single taxing jurisdiction. Thus, as noted by McLure (1977), the classical and new views are not inconsistent; rather, they emphasize different aspects of a single analysis of the effects of the property tax.

The second area surveyed in the paper is the role of head taxes and taxes on land rents in Tiebout-type models of local service provision. We argue that consistency with Tiebout's concept of efficiency in the local public sector through the revelation of preferences for local public services requires a model of a single metropolitan area consisting of a large number of suburbs offering different expenditure and tax mixes. In this "metropolitan" version of the Tiebout model, household income is taken as exogenous, local governments achieve and maintain optimal community size at the minimum point of a U-shaped per capita average cost curve for public services, and the efficient method of finance is a uniform head tax on all the residents of each community.

In contrast, a second version of the Tiebout model considers a system of single jurisdiction cities or regions that make up a nation. In these models, individuals must live in the jurisdiction in which they work, income levels in each region are endogenous, the role of land markets is critical in defining the equilibrium, and community size is determined by free migration between regions rather than being fixed by local jurisdictional governments. In these "regional" models, head taxation is generally inefficient because migrants ignore the fiscal externalities associated with their moves; in-

stead, in those cases in which a surplus is generated through economies of scale in production or in consumption or the public good, a tax on land rents is the efficient means of finance.

Not surprisingly, this regional literature generally is pessimistic regarding the efficiency of a decentralized system with free migration, even in the presence of head taxation, and stresses the need for coordination in interregional fiscal arrangements and development. In contrast, the metropolitan branch of the Tiebout literature suggests that head taxes would be efficient and that inefficiencies are explained by the use of distortionary methods of finance such as the property tax.

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