INTRAJURISDICTIONAL CAPITALIZATION AND THE INCIDENCE OF THE PROPERTY TAX

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Abstract

Two views dominate the debate about property tax incidence — the “capital tax” or “new” view, under which the tax distorts capital allocation and is borne primarily by capital owners, and the “benefit tax” view, under which the tax is an efficient user charge. Evidence of both interjurisdictional and intrajurisdictional capitalization of property taxes and public services has been argued to provide compelling evidence for the benefit tax view. This paper focuses on the latter — the *intra*-jurisdictional capitalization effects that underlie what is arguably the most plausible derivation of the benefit tax view of the property tax. The analysis provides a model in which the capital reallocations that characterize the capital tax view induce intrajurisdictional capitalization effects that are generally similar — indeed, in the benchmark case, identical — to those that arise under the benefit tax view, suggesting that empirical evidence supporting such capitalization effects cannot distinguish between the two views. In addition, the analysis shows that these capitalization effects imply that even under the stringent assumptions of the benefit view, the property tax is *not* a benefit tax for a property-tax-financed increase in local public services; rather, it only becomes a benefit tax for future home purchasers – after the modeled intrajurisdictional capitalization effects occur.

Keywords: property tax incidence, intrajurisdictional capitalization, capital tax view, new view, benefit tax view

JEL Codes: H21, H22, H71

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I. Introduction

The debate surrounding the incidence of the property tax has raged for nearly 50 years, dating to the classic contributions of Netzer (1966), Mieszkowski (1972), and Oates (1969). Two opposing views — the “benefit tax” view and the “capital tax” or “new” view — dominate the debate. Under the benefit tax view, the property tax functions as an efficient user charge, an indirect payment for the benefits of local public services received by the residents of the taxing jurisdiction. In marked contrast, under the capital tax view, the property tax inefficiently distorts the allocation of capital, and its incidence is reflected primarily in a reduction in the national return to capital, coupled with increases in housing prices and reductions in the returns to labor and land in relatively high tax jurisdictions that are largely offset by decreases in housing prices and increases in the returns to labor and land in relatively low tax jurisdictions.¹

Many observers have noted that a resolution of the debate is among the more pressing issues in state and local public finance (Youngman, 2002; Fisher, 2009), especially since property taxes account for roughly three-fourths of total local tax revenues and nearly half of local own-source revenues (Alm, Buschman, and Sjoquist, 2011). The differences in the economic effects of the property tax under the two views is striking, as are the policy implications of pervasive use of the tax by local governments.

Under the benefit view, the property tax — as a user charge that is paid in exchange for the benefits of local public service received — corresponds closely to the head tax originally envisaged in the celebrated Tiebout (1956) model, under which interjurisdictional competition

¹ This analysis focuses solely on the residential property tax; for recent discussions of non-residential property taxes, see Muthitacharoen and Zodrow (2006, 2012). In addition, a third “traditional” view, under which
and perfectly mobile consumers result in efficient provision of local public goods. The property tax is thus the rare example of a purely non-distortionary tax; in particular, it does not distort housing consumption, the allocation of housing capital (or other forms of capital), or the provision of local public services. Second, as a benefit tax, the property tax has no effects on the distribution of income. Instead, given the existing distribution of income, the incidence of the property tax simply corresponds to the benefits of local public services received. From a policy perspective, the property tax is the efficient user charge often recommended for local government by experts in local public finance (see Mills (2008) for a recent discussion). At the same time, however, its use is subject to the standard criticism of user charges and benefit taxes, and more generally the Tiebout model — although allocative efficiency is an important criterion in evaluating the performance of the local public sector, an efficient user charge system may be viewed as highly inequitable, as access to essential local public services such as primary and secondary education and police and fire protection will be largely determined by income. Indeed, numerous court cases have successfully challenged local use of the property tax on such equity grounds.

In marked contrast, under the capital tax view, the property tax is an inefficient tax instrument, as it reduces housing consumption and distorts resource allocation, driving capital out of high tax jurisdictions and into low tax jurisdictions. Moreover, the efficiency costs of the capital misallocations due to the property tax may be significant under the capital tax view. For example, the central estimates of Muthitachareon and Zodrow (2010) — whose residential property taxes are shifted forward as higher housing prices, is a special case of the capital tax view (Zodrow, 2001a, b).
analysis focuses on interjurisdictional property tax differentials when the tax applies to both residential and non-residential property and thus does not include the intrajurisdictional misallocations analyzed in this paper — suggest average efficiency costs of roughly 6-16 percent of property tax revenues (0.24–0.65 percent of total consumption expenditures) and marginal efficiency costs of roughly twice that magnitude. In addition, the use of the local property tax can lead to inefficient underprovision of local public services, as government officials, concerned about tax-induced outflows of mobile capital, reduce the level of public services provided (Zodrow and Mieszkowski, 1986a; Wilson, 1986, 1999). Wildasin (1989) suggests that such underprovision may also lead to significant inefficiencies. The distributional effects of the property tax are also markedly different under the capital tax view. The central tenets of this view (described in more detail below) is that the average burden of the tax is borne by all owners of capital, both housing and nonhousing, with additional effects across jurisdictions that tend to cancel in terms of their effects on the distribution of income. Given the concentration of capital income among higher income groups, this capital tax aspect of the property tax implies that it is progressive (at least with respect to annual income) and represents a relatively progressive element of the national tax structure. That is, in marked contrast to the benefit view, which implies the property tax is an efficient tax that has no effects on the distribution of income but may result in an inequitable distribution of public services, the capital tax view implies that the property tax is a relatively progressive tax that results in several potentially significant inefficiencies in the allocation of capital and the determination of local public service levels.

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2 For purposes of a rough comparison, Cho and Francis (2011) estimate that eliminating the home mortgage interest deduction would result in an increase in aggregate welfare of 0.16 percent, while eliminating the deductibility of property taxes would result in an increase in aggregate welfare of 1.36 percent.
Despite the importance of a resolution of the debate on the economic effects and incidence of the property tax, the literature is far from arriving at a consensus on this issue. The depth of the lack of consensus is illustrated by two surveys of this literature. Fischel, Oates, and Youngman (2011, p. 1) begin their recent review by observing that, “Our understanding of the incidence of local property taxes is in a sad state.” They conclude (pp. 19-21) that the benefit view applies in urbanized areas, so that “the vast majority (70 to 80 percent) of the U.S. population would be candidates for the benefit view of property taxes” and that the “Tiebout model, and the associated benefit view, have long been taken by scholars in local public finance to provide a description of the working of the local public sector in metropolitan areas.” In marked contrast, in a widely cited review of the urban public finance literature, Ross and Yinger (1999, p. 2043) argue that the property tax does in fact distort the allocation of capital and arrive at the unequivocal conclusion that “the evidence against the benefits view is overwhelming.”

A central issue in the debate, dating back to the work of Oates (1969), has been whether econometric evidence of fiscal capitalization — the capitalization of property taxes and local expenditure levels into land values — provides empirical support for the benefit view. Most of this discussion has focused on inter-jurisdictional capitalization. However, intra-jurisdictional capitalization is certainly highly relevant as well, especially since it is the key element in the most plausible theoretical exposition of the benefit view, originally developed by Hamilton (1976), under which perfect capitalization of intrajurisdictional fiscal differentials is required to convert the property tax into a benefit tax in communities with

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3 One element of such evidence, discussed further below, is wide disparities in property taxes paid and local public services received. For example, Kurban, Gallagher, and Persky (2012) estimate that two-thirds of property tax payments used for education finance in Chicago suburbs reflect payments in excess of education benefits received.
heterogeneous housing. By comparison, the role of intrajurisdictional capitalization in the capital tax view of the property tax has not been fully developed (Mieszkowski and Zodrow, 1989; Zodrow, 2001a, b). Accordingly, this paper focuses solely on intrajurisdictional capitalization. It does so within the context of a highly simplified model that adopts most of the (admittedly rather stringent) assumptions of the models used to derive the benefit tax view, and is used to capture the essence of both the capital tax and benefit tax views. The main conclusion of the analysis is that the amounts of intrajurisdictional capitalization that would be expected to occur under the two views are remarkably similar, and indeed are identical in one fairly standard benchmark case. Thus, empirical evidence that is consistent with full capitalization of property taxes and local expenditure levels into land values is of little if any help in distinguishing between the two alternative views of the incidence of the property tax. In addition, the analysis shows that these capitalization effects imply that even under the stringent assumptions of the benefit view, the property tax is not a benefit tax when its rate increases to finance new public expenditures, as the associated tax-induced capitalization effects imply that the prices paid by different residents for the expanded public services (the combination of actual taxes paid and capitalization effects) differ significantly from the value of services received. Instead, the property tax only becomes a benefit tax for future home purchasers — after the modeled intrajurisdictional capitalization effects occur and are borne by homeowners at the time of the tax change.

The paper is organized as follows. The following section provides a brief overview of the property tax incidence debate. Section III reconstructs the benefit tax view within the context of a partial equilibrium version of the standard differential tax incidence model,

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4 An alternative view, developed by Hamilton (1975) and discussed below, assumes homogeneous housing.
including a derivation of the intrajurisdictional capitalization effects that would be expected under the benefit view. Section IV then alters the model to make it broadly consistent with those used to generate the capital tax view, and shows that, under the appropriate circumstances, intrajurisdictional capitalization effects are identical under the two views. More generally, in Section V, the results of a simple simulation suggest that the amount of intrajurisdictional capitalization that occurs under the two views is broadly similar, consistent with the central thesis of the paper that empirical evidence regarding such capitalization is of limited help in distinguishing between the two views. The final section concludes.

II. Overview of the Property Tax Incidence Debate

The voluminous literature on the incidence of the property tax can only be summarized briefly here; for additional details, see Ross and Yinger (1999), Nechyba (2001), Netzer (2001), Zodrow (2001a), Youngman (2002), Fisher (2009), and Fischel, Oates and Youngman (2011).

Theoretical Results. The benefit tax view is closely linked to the classic Tiebout (1956) model in which interjurisdictional competition in local public service provision coupled with perfect household mobility results in an efficient local public goods equilibrium, as consumers reveal their public goods preferences by “voting with their feet” and sorting themselves into jurisdictions that are completely homogeneous with respect to local public service demands. Although Tiebout assumed head tax finance (as do Oates and Schwab (1988) in a more recent reconstruction of the argument), other researchers have extended the model to include property tax finance.

In the earliest of these contributions, Hamilton (1975) constructed a model in which local jurisdictions were also homogeneous with respect to house values, there were enough
jurisdictions to accommodate all desired combinations of housing and government services, and binding zoning constraints establish a minimum house value for each community. Under these circumstances, all individuals in a given community pay exactly the same property tax, which then functions precisely as a benefit tax. This work was extended by Fischel (1985, 1998), who argues that zoning, defined comprehensively to include a wide variety of land use regulations, is sufficiently restrictive to convert the property tax into the uniform payment for local public services envisioned by Hamilton. The assumptions of this model, however, are difficult to reconcile with the considerable heterogeneity of home values observed in virtually all communities – heterogeneity that Rhode and Strumpf (2003) estimate is significant and does not appear to be decreasing over time.

Thus, a key development in the evolution of the benefit tax view was the extension of the model to the more realistic case in which house values within a community are heterogeneous (Hamilton, 1976). In this version, Hamilton constructed a model in which all communities were fully developed (precluding any tax-induced changes in the housing stock, which effectively was supplied perfectly inelastically) and perfectly mobile consumers had the option of living in communities that were homogeneous with respect to both demands for public services and housing. Under these circumstances, Hamilton showed that “perfect capitalization” of fiscal differentials — the difference in present values of future taxes and the value of benefits received — again converts the property tax into a benefit tax as, for example, any excess property taxes paid by the owners of high-value homes is exactly offset by lower home values due to capitalization. More recently, Fischel (2001a, b) has noted that a wide variety of empirical studies have found evidence that intrajurisdictional differences in property taxes are capitalized into house values as predicted by Hamilton’s model of
heterogeneous communities. He argues that the existence of such capitalization is sufficient to convert the property tax a benefit tax.

In marked contrast, under the capital tax view formulated by Mieszkowski (1972) and extended by Zodrow and Mieszkowski (1983, 1986b), capital is mobile so that the property tax inefficiently reduces housing consumption and distorts resource allocation, driving capital out of high tax jurisdictions and into low tax jurisdictions.\(^5\) Under the capital tax view, the property tax causes (1) a “profits tax effect” that reflects the average burden of all property taxes imposed across the nation and is borne by capital owners, and (2) “excise tax effects” that capture the effects of local tax differentials around the national average. These excise tax effects are reflected as housing and commodity price increases and wage and land price declines in relatively high tax jurisdictions, with offsetting effects in relatively low tax jurisdictions. Because these roughly symmetric effects tend to cancel in the aggregate, from a national perspective, the relatively progressive profits tax effect is the primary factor affecting the distribution of the property tax burden.\(^6\)

In addition, by examining the tax from the perspective of a single local taxing jurisdiction, Zodrow and Mieszkowski (1983) show that the excise tax effects imply that the local property tax has some important “benefit tax” aspects, as the tax-induced outflow of capital from the taxing jurisdiction implies lower returns to relatively immobile factors such as local land and labor and/or higher prices to local consumers. Thus, there is a loose link between increases in local public services and the burden of the property tax under the capital

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\(^5\) In addition, local use of the property tax can lead to inefficient under-provision of local public services, as government officials, concerned about tax-induced outflows of mobile capital, reduce the level of public services provided (Zodrow and Mieszkowski, 1986a; Wilson, 1986, 1999; Zodrow, 2003).

\(^6\) See Muthitacharoen and Zodrow (2012) for a recent analysis of the excise tax effects of the property tax.
tax view, as the burden of financing local expenditures largely falls — in the aggregate — on local factor owners and local consumers.

**Empirical Results.** A complete review of the empirical research on the property tax is far beyond the scope of this paper; see Ross and Yinger (1999), Fischel (2001a), Zodrow (2001a), and Lutz (2009) for discussions of this literature. Instead, the analysis will focus on the area of greatest relevance to this paper — the extent to which evidence of capitalization of property tax differentials into land values demonstrates the validity of the benefit tax view of the property tax.

Most of the property tax capitalization literature, dating to Oates (1969), has focused on inter-jurisdictional capitalization. Although the current consensus seems to be that full capitalization of interjurisdictional property tax differentials is a reasonable assumption (Dowding, John and Biggs, 1994; Fischel, 2001a, b), there is no consensus about the implications of this evidence. Oates (1969) and Hamilton (1983) conclude that capitalization provides evidence for the Tiebout model and the benefit tax view, and Fischel (2001a, b) argues that capitalization is sufficient to make the local property tax a benefit tax. However, Ross and Yinger (1999), among others, argue that if the supply of communities is elastic — with possibilities for new community formation, changes in existing community boundaries, or changes in the fiscal policies of existing communities — then the Tiebout model should in the long run imply zero capitalization; that is, as land is reallocated in the long run to eliminate all land price differentials, local economies will move toward a Tiebout equilibrium and capitalization will disappear.

In any case, this paper focuses instead on the implications of intra-jurisdictional capitalization of the property tax. As described above, intrajurisdictional capitalization is the
critical element of what will hereafter be called the Tiebout-Hamilton-Fischel (THF) model of the benefit tax view, which is characterized by communities with heterogeneous houses that are supplied perfectly inelastically. In such a setting, high-value homes sell at a discount and low-value homes sell at a premium, each reflecting the differences in present values of future taxes paid and the value of public services received, converting the property tax to a user charge or benefit tax.

Before proceeding further, however, it should be emphasized that the THF formulation of the benefit view is a long run result based on an analysis of the total prices for public goods — property taxes plus fiscal capitalization effects — faced by new purchasers of homes after home prices have adjusted to a property tax change. However, upon implementation of any change in property taxes, such capitalization effects significantly impact current landowners in a way that is not related to benefits received, with owners of large homes suffering capital losses and owners of small homes experiencing capital gains. These effects are pure redistributions and, if unanticipated, should not create inefficiencies in housing consumption decisions. But they are very likely to create inefficiencies in decisions regarding local public service provision, as residents contemplating an increase in public services will face implicit costs that differ greatly from the benefits of public services received; for example, owners of large homes will anticipate suffering a capital loss that might be 10-20 times the excess of the increase in their property tax payments over the value of benefits received from the service expansion, while the owners of small homes will anticipate analogous gains. This scenario is far removed from the efficient operation of the local public sector in a Tiebout (1956) world, where all residents of a jurisdiction contemplating an increase in local public services,

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7 Indeed, they could be likened to the local government “regulatory takings” analyzed by Fischel (1998).
regardless of the value of their homes, would face an equal increase in head taxes. Thus, although these intrajurisdictional capitalization effects in the THF model set the stage for the property tax to be a benefit tax for future purchasers as described by Hamilton (1976, 1983), the tax is by no means a benefit tax at the time that it is imposed or at any subsequent time that it is changed.

The most recent example of arguments linking intrajurisdictional capitalization and the benefit tax view are due to Fischel (1985, 1992, 2001a, b). For example, Fischel (2001a, b) argues that the empirical evidence supporting intrajurisdictional fiscal capitalization is conclusive (for example, see Palmon and Smith (1998) and Gallagher, Kurban, and Persky (2013)), suggesting that fiscal “capitalization is everywhere” (Fischel, 2001a, p. 56). He further argues that this provides compelling evidence that the benefit tax view as developed in the THF model accurately describes the effects of the property tax in suburban jurisdictions.\(^8\)

This contention is examined in this paper, which focuses on the intrajurisdictional capitalization that is the linchpin of the THF model and underlies Fischel’s arguments. Specifically, I construct a model, similar to those used to generate the benefit tax view, which shows that a broadly similar pattern of *intra*-jurisdictional land value fiscal capitalization occurs under both views. Moreover, numerous papers, dating back to Kotlikoff and Summers (1987) have shown that under the capital tax view, differentially high property taxes drive mobile capital out of the taxing jurisdiction and thus reduce the productivity of, and returns to, immobile local factors including land — that is, they cause *inter*-jurisdictional capitalization. Together, these results imply that the widely observed phenomenon of property tax

\[^8\] Similarly, Oates (2006, p. 27) notes that “many studies now take full capitalization as a premise” and stresses that intrajurisdictional capitalization is the essential feature of the benefit view of the property tax described here as the THF model, which is more plausible than the homogeneous housing version, which “doesn’t seem to characterize the real world very well” (p. 28).
capitalization (of either kind) provides little if any evidence that distinguishes between the capital tax and benefit tax views of the property tax.

III. A Differential Tax Incidence Model of Capitalization under the Benefit Tax View

The derivations of the benefit tax and capital tax views of the property tax are based on rather different theoretical approaches that must be reconciled for this analysis. The THF benefit tax view model characterizes the properties of a local economy in equilibrium, with local public services in communities with heterogeneous housing financed by residential property taxes. In contrast, the derivations of the capital tax view use differential tax incidence analysis in which the effects of the property tax are analyzed by first constructing an initial equilibrium with either no taxes or only nondistortionary lump-sum taxes, and then introducing property tax finance on a revenue-neutral basis and analyzing its differential effects. In the following analysis, all of the intrajurisdictional fiscal capitalization results obtained in the THF equilibrium model of the benefit tax view are derived in a differential tax incidence model that is typical of the capital tax view, but includes the basic assumptions characteristic of derivations of the benefit tax view. Although these assumptions are widely recognized as rather stringent (Rubinfeld, 1987; Ross and Yinger, 1999), they are nevertheless adopted in the analysis below – not because they are necessarily plausible but because they must be made in order to replicate the benefit tax view capitalization results.

The details of the model are as follows. The model follows the THF model in assuming that households are perfectly mobile across local jurisdictions. Local public services

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9 A list of all variables used in the model is provided in Table A1 in the appendix.
per household $G$ are common to all households in a jurisdiction,\(^{10}\) and, following most of the literature, are modeled as publicly provided private goods. There are a sufficient number of jurisdictions to satisfy all tastes for local public services. Households are assumed to have an exogenous source of income, $y$, which is identical across all households. Note that, as in the THF model, a fixed $y$ implies the analysis ignores the income effects associated with fiscal capitalization of property tax differentials in land values. Although this strong assumption might be justified in several ways (e.g., absentee landlords, small income shares for land rents, roughly offsetting land value capitalization effects), it is made primarily to be consistent with the THF approach, dating back to the Tiebout (1956) assumption that all households have only fixed levels of dividend income.

To introduce the intrajurisdictional heterogeneity with respect to housing demands characteristic of the THF approach, the model has two types of households, indexed by superscripts $i = h, l$, with $N^h$ high demanders of housing who each consume $H^h$ units of housing, and $N^l$ low demanders who each consume $H^l < H^h$ units of housing. The total population in the jurisdiction is $N = N^h + N^l$. Initially, the local economy is assumed to be in an efficient Tiebout equilibrium, with an optimal level of local public services financed with uniform head taxes of $Z$ per household. All other goods in the economy are treated as a single composite numeraire good. Note that the assumption that all households have the same exogenous income $y$ implies that high (low) demanders of housing must be low (high) demanders of the composite good. Household utility is defined over consumption of housing

\(^{10}\) Although this assumption is consistent with virtually all of the Tiebout literature, one could argue that larger homes might typically be associated with greater demands for local public services — e.g., more demand for public education due to a larger number of children — which would tend to reduce the magnitudes of the distortions caused by the property tax under the capital tax view. Nevertheless, the same issues analyzed in this paper would still arise as long as there was heterogeneity in housing demands among both the high and low demanders for local public services.
with price $q_j$, the composite good, which is chosen as the numeraire good, and the common level of local public services $G$. Since both types of households are perfectly mobile across jurisdictions, household utility for each must equal an exogenously specified level $U^i$; that is, with indirect utility functions $W^i$, perfect mobility implies $W^i(q_j, y - Z, G) = U^i$ for each of the two types of households.

In this initial “head tax” equilibrium, the supply of land $V$ within each jurisdiction is assumed to be fixed, and is used either for large houses for high demanders $V^h$ or small houses for low demanders $V^l$. The total amount of land used for each type of house is thus $V_L = N^lV^l$ and $V_H = N^hV^h$, where the subscripts $j=H, L$ indicate the two house types. Both types of housing are produced with capital $(K_H, K_L)$ and land using a constant returns to scale production function. In the initial equilibrium, the prices of both types of housing are equal as they reflect only resource costs and both capital and land costs are initially identical.

Zoning is introduced into the model by assuming that the amounts of land used for large and small houses are fixed at their initial efficient equilibrium values (where the prices of the two types of land are assumed to be equal). This is a weak form of the assumption made by Hamilton, who assumes fully developed communities and thus precludes any change in either the land or the capital allocated for the two types of housing. Note that some form of land use zoning must be assumed for any capitalization to occur; otherwise, as discussed previously, land would be reallocated until it all sold for the same price and there would be no capitalization. However, Fischel (2001a, b) and Oates (2006) argue that the supply of housing land is inelastic and indeed that fixed supplies are a reasonable assumption, at least for a lengthy “intermediate run” period. Moreover, the empirical results of Stadelmann and Billion
(2008) generally support the importance of examining the incidence of the property tax within the context of such an intermediate view, as they find that fiscal capitalization is roughly constant or may even increase over time. Accordingly, the model allows for capitalization effects by assuming fixed quantities of land used for large and small houses\textsuperscript{11}; it thus clearly focuses solely on an “intermediate run” view of the effects of the property tax.\textsuperscript{12}

Property taxation is introduced by assuming an exogenous uniform reduction in head taxes, with the resulting reduction in revenues offset with an increase in residential property taxes, holding the level of public services per capita fixed.\textsuperscript{13} Specifically, in response to the uniform per household reduction in head taxes, property taxes are applied at the same rate $t$ to all capital income $rK_H + rK_L$ and land rents $s_HV_H + s_LV_L$ earned in both types of residential housing within the jurisdiction, where $r$ is the net return to capital, which is fixed under the assumption that the taxing jurisdiction can be modeled as a small open economy, and $s_j$ is the return to land used in the production of housing of type $j$. (Alternatively, since capital and land are the only inputs into housing, the property tax could be modeled as an excise tax on housing at the same rate.) Thus, the gross price of capital is $rT$, where $T=1+t$, and gross land rents are $s_jV_jT$.

\textsuperscript{11} Indeed, as pointed out by an anonymous referee, such an assumption also has an intuitively plausible rationale: although households can easily make marginal changes in the levels of their consumption of housing capital by making (or not making) home improvements or by allowing a property to depreciate, it is considerably more difficult to “tear down” a home and thus convert land used for small homes to land used for large homes or vice versa.

\textsuperscript{12} By comparison, in a long run equilibrium in which land was reallocated until land prices were equalized, there could be no capitalization effects and the property tax could not be a benefit tax, as individuals with relatively high demands for housing would bear a disproportionate share of the burden of the tax.

\textsuperscript{13} Although the latter assumption ignores the tendency toward property-tax-induced under-provision of local public services that is the focus of the tax competition literature noted above, it is consistent with the THF approach, under which fiscal capitalization effects are due to a mismatch between property tax payments and services received, rather than due to any tax-induced under-provision of local public services.
Finally, as stressed by Mieszkowski and Zodrow (1989), Nechyba (2001), and Fischel, Oates, and Youngman (2011), a key factor distinguishing the existing models of the benefit tax and capital tax views is that the supply of housing capital is typically assumed to be inelastic under the benefit tax view (especially in THF-type models in which perfect fiscal capitalization is required to convert the property tax to a benefit tax), but highly elastic under the capital tax view (in order to get the capital reallocations that drive its results).

Accordingly, in the benefit tax version of the model, the capital stocks of both types of housing (and thus both the aggregate and individual consumption levels of housing) are fixed, while in the capital tax version of the model, capital is perfectly mobile across jurisdictions.\(^\text{14}\)

From this initial equilibrium, the calculations under the benefit tax view of the intrajurisdictional capitalization effects associated with a uniform reduction in head taxes and an offsetting increase in the property tax are straightforward.\(^\text{15}\) The local government budget constraint requires that 

\[
(N^h + N^i)G = (N^h + N^i)Z + (T-1)[r(K_H + K_L) + s_HV_H + s_LV_L].
\]

Differentiating and evaluating at the initial equilibrium \((T=1)\) with fixed government services and capital and land stocks implies 

\[
(N^h + N^i)(-dZ) = [r(K_H + K_L) + s_HV_H + s_LV_L]dT.
\]

Letting a tilde reflect logarithmic differentiation, defining population shares as 

\[
n^i = N^i / (N^h + N^i),
\]

housing expenditure shares in net income for each type of household as 

\[
\alpha^i = q_jH^i / (y - Z),
\]

and the ratio of government services to net income (for both types of households) as 

\[
\beta = G / (y - Z),
\]

while recalling that for constant returns to scale production functions

\(^{14}\) Indeed, one could argue that the analysis suggests that the benefit tax view could be viewed as a special case of the capital tax view in which housing supply and demand elasticities are zero.
\[ q_j H_j = T(rK_j + s_j V_j) \]

\[ \text{the percentage increase in the property tax required for budget balance} \]

in response to a given percentage reduction in the head tax is

\[ (1) \quad \tilde{T} = \left[ \beta / (n^h \alpha^h + n^l \alpha^l) \right] (-\tilde{Z}) \]

Differentiating the indirect utility functions of both types of households (with fixed incomes and service levels) yields \( (\partial W^i / \partial q_j) dq_j + [\partial W^i / \partial (y - Z)] (-dZ) = 0 \). Using Roy’s identity, this implies \( \tilde{H}^i dq_j = -dZ \). Thus, with perfectly mobile households, the price of each type of housing must rise by just enough to offset the value of the decline in head taxes, so that the net cost of living in the taxing community yields the fixed utility level available in other communities for each type of household; this decline in head taxes equals the cost of the public services that are now financed with property taxes. Rearranging yields

\[ \tilde{q}_j = \left[ \beta / \alpha^i \right] (-\tilde{Z}) \]

or

\[ (2) \quad \tilde{q}_H = \left[ \beta / \alpha^h \right] (-\tilde{Z}) > 0; \quad \tilde{q}_L = \left[ \beta / \alpha^l \right] (-\tilde{Z}) > 0; \]

the percentage increase in house prices is of course larger for smaller homes

\[ (\tilde{q}_L = (\alpha^h / \alpha^l) \tilde{q}_H ). \]

Consider next the key issue of the extent of capitalization in the benefit view version of the model, that is, under the assumption that housing capital stocks are fixed. Note that since both housing land and capital are fixed, any capitalization effects are effectively borne

\[ 15 \text{To keep the notation simple, all variables in the remainder of this section refer to values under the benefit view, while all variables in the following section refer to the analogous values under the capital tax view. All expressions in both sections reflect the effects of an increase in the property tax from the same initial efficient head tax equilibrium.} \]
by the entire property, so that the division of this burden between land and capital is arbitrary.

To facilitate the comparison with the capital tax view, the analysis assumes that all of the
capitalization is reflected in land values; however, one could just as easily assign some of this
burden to capital – although the key issue for purposes of comparing the two views is the total
amount of capitalization. Under this assumption, the change in the price of land used for high-
value homes is obtained by differentiating the zero profit condition, \( q_{hH} H_{h} = T(rK_{h} + s_{hV} V_{h}) \),
and substituting from (1) and (2) to yield

\[
(3) \quad \bar{s}_{h} = -\frac{1}{f_{ylh}} \frac{\beta n^{l}(\alpha^{h} - \alpha^{l})}{\alpha^{h}(n^{h} \alpha^{h} + n^{l} \alpha^{l})} (-\bar{Z}) < 0 ,
\]

where \( f_{ylh} = s_{hV} V_{h} / (rK_{h} + s_{hV} V_{h}) \) is the land share in production costs for high-value homes.

Since \( \alpha^{h} > \alpha^{l} \) by assumption, high-value home prices unambiguously decline in response to
the head tax reduction financed with a property tax increase, and the decline is proportional to
the difference in relative demands for housing \( (\alpha^{h} - \alpha^{l}) \). Moreover, this decline corresponds
exactly to the discount for high-value homes envisioned in the THF model. To see this, note
that full capitalization occurs if annual land rents for large homes — and thus the capitalized
value of future land rents in the current prices of land used for such homes — fall by the high-
value home fiscal differential, defined as the difference between the cost of the increase in
total property taxes on high-value homes and the associated benefit of the reduction in head
taxes for their owners. In the aggregate, this requires

\[
V_{h} ds_{h} = -[(rK_{h} + s_{hV} V_{h})dT - N^{h}(-dZ)] .
\]

Dividing by \( q_{hH} H_{h} \) and substituting from (1) shows
that this expression is equivalent to (3). Thus, for high-value homes, the negative fiscal
differential arising from a property tax increase that exceeds the benefit of a uniform
reduction in head taxes is fully capitalized, and high-value homes sell at the discount predicted by the THF model.

An analogous calculation yields the change in the price of land used for low-value homes, which in this case is unambiguously positive

\[
\tilde{s}_L = \frac{1}{f_{vl}} \frac{\beta n^b (\alpha^b - \alpha^l)}{\alpha^l (n^l \alpha^b + n^l \alpha^l)} (-\tilde{Z}) > 0,
\]

where \( f_{vl} \) is the land share in production costs for low-value homes. Again, this increase corresponds exactly to the premium for low-value homes in the THF model, since it equals the (negative) difference between the increase in property taxes paid on such homes and the associated benefit of the reduction in head taxes for their residents, or

\[
V_L ds_L = -(rK_L + s_L V_L) dT - N^l (-dZ).
\]

Both of the capitalization effects obtained in the model thus correspond to those predicted under the benefit view. In addition, as stressed above, the differences between property taxes paid and benefits received (the reduction in the head tax) for both types of households make it clear that the property tax is not a benefit tax for the combined property tax rate increase and head tax reduction; rather, the property tax only becomes a benefit tax for future purchasers – after the calculated intrajurisdictional capitalization effects occur.

Finally, a property of the THF benefit tax view model is that the net change in land values due to intrajurisdictional capitalization is zero, as the aggregate discount for larger homes equals the aggregate premium for smaller homes. The capitalization effects (3-4) satisfy this property, as

\[
V_H ds_H + V_L ds_L = [N^b q_H \bar{H}^b] f_{vh} \tilde{s}_H + [N^l q_L \bar{H}^l] f_{vl} \tilde{s}_L = 0.
\]
IV. Intrajurisdictional Capitalization under the Capital Tax View

Generating the capital tax view within the context of the model constructed above requires only that the capital stock be allowed to vary (while, as discussed above, the total amount of land used for high and low value houses is fixed in this intermediate run incidence analysis).

That is, under the capital tax view of the incidence of the property tax, households can reduce their housing consumption in response to an increase in the property tax. In addition, allowing variable housing implies that the numbers of high and low income households living within the taxing jurisdiction are no longer fixed. Instead, consistent with the assumption of perfect household mobility that characterizes the THF approach, the populations $N^h$ and $N^l$ are assumed to adjust so that the exogenously specified utility levels for each type of household are attained in the new equilibrium.

Specifically, the capital tax view is obtained in the model as follows. As above, the government budget constraint implies (1) and perfect mobility of households implies (2). Housing demands for each type of household are obtained by using Roy’s identity to yield

$$H^i(q_j, y - Z, G) = -W^i_q(q_j, y - Z, G) / W^i_j(q_j, y - Z, G).$$

With fixed supplies of land of each type and a uniform property tax, housing production can be modeled using the restricted profit function approach, with before-tax profits (total gross land rents) for each type of housing represented as $\Pi^i(q_j, rT, V_j)$, and housing supply, housing capital demand, and the gross price of land equal to the partial derivatives of the three arguments of the restricted profit

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16 The partial equilibrium model utilized of course cannot capture the effect of nationwide use of the property tax on the return to capital, which is assumed to be exogenous. However, it is possible to capture this effect by examining the incidence of the use of a capital tax in a small taxing jurisdiction in a general equilibrium context (Zodrow, 2001a, b). In addition, the model assumes that the supply of any perfectly homogeneous communities is limited so that some households must live in communities that use the distortionary property tax.
function, respectively. Equality of supply and demand in the two housing markets requires
\[
\Pi^i(q_j, rT, V_j) = N^i H^i(q_j, y - Z, G), (i, j) = (h, H); (l, L).
\]

In contrast to the benefit tax view analysis, under the capital tax view the changes in the property tax cause a reallocation of housing capital that is the key factor in determining the incidence of the tax. Specifically, differentiating the factor demands for housing capital
\[
K_j = -\Pi^i_r(q_j, rT, V_j) \text{ yields } \tilde{K}_j = -[(\Pi^i_{rq} / K_j) \tilde{q}_j - (\Pi^i_{rq} rT) / K_j] \tilde{T}.
\]
Denoting the own-price factor demand elasticity for housing capital of type j (defined to be positive) as
\[
\mu_j = (rT / K_j)\Pi^i_r = -(q_j / K_j)\Pi^i_{rq} = -(q_j / K_j)\Pi^i_{qr} > 0,
\]
and the own-price supply elasticity for housing of type j as
\[
\varepsilon_j = q_j \Pi^i_{rq} / H_j = -rT \Pi^i_{rq} / H_j > 0,
\]
implies that
\[
\tilde{K}_j = (\varepsilon_j / f_{kj}) \tilde{q}_j - \mu_j \tilde{T},
\]
where the capital share in housing costs is
\[
f_{kj} = rTK_j / q_j H_j.
\]
Moreover, since
\[
\varepsilon_j = f_j \mu_j,
\]
this simplifies to
\[
\tilde{K}_j = \mu_j (\tilde{q}_j - \tilde{T}),
\]
which, substituting from (1) and (2) yields
\[
K_H = -\frac{\beta \mu_l n^l (\alpha^h - \alpha^l)}{\alpha^l (n^b \alpha^h + n^l \alpha^l)} (-\tilde{Z}) < 0; \quad \tilde{K}_L = \frac{\beta \mu_l n^b (\alpha^h - \alpha^l)}{\alpha^l (n^b \alpha^h + n^l \alpha^l)} (-\tilde{Z}) > 0.
\]
This is the central result of the capital tax view, expressed in terms of the effects of the use of the property tax within a single heterogeneous taxing jurisdiction. The tax is distortionary, as it causes capital to flow out of the production of large houses where property taxes are high relative to benefits received, and into production of smaller homes where the property tax bill is low relative to benefits received.

Differentiating the expressions for the gross prices of the two types of land
\[
s_j T = \Pi^i_r(q_j, rT, V_j) \text{ yields the price effects of this property-tax-induced reallocation of capital, or}
\]
\[
\tilde{s}_j + \tilde{T} = [\Pi^i_{rq} q_j / (s_j T)] \tilde{q}_j + [\Pi^i_r rT / (s_j T)] \tilde{T} = [q_j H_j / (s_j TV_j)] \tilde{q}_j - [rTK_j / (s_j TV_j)] \tilde{T}.
\]
Substituting from (1) and (2) yields the changes in net land prices under the capital tax view

\[ \tilde{\sigma}_H = -\frac{1}{f_{\ell H}} \frac{\beta n (\alpha - \alpha')}{\alpha (n \alpha^H + n' \alpha')} (-\tilde{Z}) < 0, \]

\[ \tilde{\sigma}_L = \frac{1}{f_{\ell L}} \frac{\beta n (\alpha - \alpha')}{\alpha' (n \alpha^H + n' \alpha')} (-\tilde{Z}) > 0. \]

Thus, the capital outflow from production of large houses unambiguously reduces the productivity of, and thus the net rents earned by, land used for such houses, while the capital inflow into production of small houses increases the net rents earned by land used for small houses.

It is these changes in land rents — caused by the tax-induced reallocation of housing capital described above but precluded under the benefit tax view — that are capitalized into land prices under the capital tax view of the property tax. However, a comparison of (6-7) with (3-4) reveals immediately that the changes in land prices — and thus the predicted land value capitalization effects — under the capital tax and benefit tax views of the property tax, in the context of the partial equilibrium models utilized in this paper (when evaluated at the undistorted initial equilibrium, with \( T=1 \) and the consumption of both types of housing at their initial efficient levels in the head tax equilibrium), are identical. The analysis thus suggests that the existence of capitalization of intrajurisdictional property tax differentials into land values is of little help in distinguishing between the two competing views of the property tax.

The model generates several additional results. Since the land price changes under the capital tax view are identical to those calculated under the benefit tax view, the aggregate value of land in the taxing jurisdiction is again unchanged, as the two capitalization effects exactly offset. Somewhat surprisingly, the aggregate capital stock is also unchanged, as the
capital outflow from the production of large homes is exactly offset by the increase in capital used in the production of small homes. To see this, note that in the initial equilibrium (with equal capital-land ratios, housing prices, and land rents per unit of land),

\[ K_H / K = q_H H_H / (q_H H_H + q_L H_L) = n^h \alpha^h / (n^h \alpha^h + n^l \alpha^l) \quad \text{and} \quad K_L / K = n^l \alpha^l / (n^h \alpha^h + n^l \alpha^l) . \]

Substituting from (5) yields the change in the total capital stock

\[ (8) \quad \tilde{K} = (K_H / K) \tilde{K}_H + (K_L / K) \tilde{K}_L = \frac{\beta n^l n^h (\alpha^h - \alpha^l)}{(n^h \alpha^h + n^l \alpha^l)^2} (\mu_L - \mu_H) (-\tilde{Z}) = 0 . \]

That is, since the restricted profit function is linear in the fixed factor (land zoned for housing of each type) for a constant returns to scale production function, and the prices \( q_j \) and \( rT=r \) and thus the capital-land ratios are identical in the initial equilibrium, the two own-price capital factor demand elasticities are identical \( (\mu_H = \mu_L) \). Thus, despite the fact that the local economy is open to capital flows (with a fixed after-tax rate of return), the net effect on the total capital stock in the taxing jurisdiction is zero — housing capital is reallocated but the total stock is unchanged.

The changes in the total amounts of the two types of housing are obtained by differentiating the supply equation \( H_j = \Pi^j(q_j, rT, V_j) \) to yield

\[ \dot{H}_j = \epsilon_j (\bar{q}_j - \bar{T}) = f_{k_H} \mu_j (\bar{q}_j - \bar{T}) = f_{k_H} \tilde{K}_j , \text{ so that} \]

\[ (9) \quad \dot{H}_H = -f_{k_H \mu_H} \frac{\beta n^l (\alpha^h - \alpha^l)}{\alpha^h (n^h \alpha^h + n^l \alpha^l)} (-\tilde{Z}) < 0 ; \quad \dot{H}_L = f_{k_L \mu_L} \frac{\beta n^l (\alpha^h - \alpha^l)}{\alpha^l (n^h \alpha^h + n^l \alpha^l)} (-\tilde{Z}) > 0 . \]

Thus, as expected under the capital tax view, the total amount of high-value housing unambiguously decreases, while the total amount of low-value housing unambiguously increases.
Neverthel
despite the distortion of the allocation of housing capital under the
capital tax view, local use of the property tax, as noted above, still has some features that are
characteristic of a benefit tax, at least after all capitalization effects occur. Specifically, in the
post-tax equilibrium, residents pay for net local public services received (those not financed
with head taxes) in the form of higher housing prices. Simultaneously, since fiscal
differentials have been capitalized into land values, the net effect of the property tax burden
and land value capitalization of the fiscal differential is that purchasers of both types of homes
effectively pay only for services received. Thus, in the context of this partial equilibrium
model of heterogeneous communities with the net national return to capital fixed, the essential
difference between the two views of the property tax is not that residents “pay for what they
get” as stressed by proponents of the benefit tax view — as that occurs under both views —
but that, under the capital tax view, land value capitalization occurs due to capital
reallocations across housing types, implying inefficiency in the housing market. By
comparison, under the benefit tax view, capitalization occurs with respect to fixed housing
capital stocks, so there can be no distortion of the allocation of housing capital. And, to
repeat, existing landowners suffer property-tax-induced capital gains and losses at the time of
the imposition of the tax that are unrelated to the benefits received at the time of the increase
in the property tax.

Consider next the changes in per capita housing consumption and the population
changes induced by the tax change. Totally differentiating the housing market equilibrium
equations and substituting from (1) yields
\[ \dot{H}_j - \dot{N}^i = -\eta^i q^j \tilde{q}_j + \beta \eta^j \tilde{Z} = -(\omega^i + \alpha^i \eta^j) \tilde{q}_j + \beta \eta^j \tilde{Z}, \]
where \( \eta^i \) are the uncompensated
elastici1es of housing demand, \( \eta^y_i \) are the income elasticities of housing demand, and

\[ \omega^i_q = \eta^i_q - \alpha^i \eta^i_y \]

are the compensated elasticities of demand. Substituting from (2) yields

\[ (10) \quad \tilde{H}_j - \tilde{N}^i = -\left( \frac{\omega^i_q \beta}{\alpha^i} \right) (-\tilde{Z}) < 0. \]

Thus, per capita housing consumption declines unambiguously for both types of households — the standard capital tax view result that the property tax inefficiently reduces housing consumption.

Finally, substituting into (10) from (9), the changes in population are

\[ (11) \]

\[ \tilde{N}^l = \left[ \frac{\omega^l \beta}{\alpha^l} + f_{KH} H_L \frac{\beta \eta^h_h (\alpha^h - \alpha^l)}{\alpha^l (\eta^h \alpha^h + \eta^l \alpha^l)} \right] (-\tilde{Z}) > 0; \quad \tilde{N}^h = \left[ \frac{\omega^h \beta}{\alpha^h} - f_{KH} H_H \frac{\beta \eta^l (\alpha^h - \alpha^l)}{\alpha^h (\eta^h \alpha^h + \eta^l \alpha^l)} \right] (-\tilde{Z}). \]

Thus, in this partial equilibrium model, if the total amounts of housing were fixed (the second terms above were zero), the total number of both types of households would have to increase to attain an equilibrium, given the declines in per capita housing consumption and the fixed amount of land of each type in the jurisdiction. However, the second terms in (11) capture the effects of the tax-induced reallocation of housing capital, as the amount of low-value housing increases but the amount of high-value housing decreases. Thus, the number of households who purchase small houses must unambiguously increase for an equilibrium to obtain. However, the net effect on the number of households who purchase large houses is theoretically ambiguous, since the decline in per capita consumption is accompanied by a decrease in the total amount of large housing.

This implies that the change in total population, expressed in percentage terms, is
\[ (17) \quad \eta^h \tilde{N}^h + \eta^l \tilde{N}^l = \left\{ \frac{\eta^h \omega^h \beta}{\alpha^h} + \frac{\eta^l \omega^l \beta}{\alpha^l} + \beta \eta^h \eta^l (\alpha^h - \alpha^l) \right\} \left( \frac{f_{KL} \mu_L}{\alpha^h} - \frac{f_{KL} \mu_H}{\alpha^l} \right) \left( -\tilde{Z} \right) > 0. \]

Since the capital shares and the own-price capital demand elasticities are identical in the initial equilibrium and \( \alpha^h > \alpha^l \), this expression is unambiguously positive. Thus, the total population in the jurisdiction unambiguously increases, as the increase in population attributable to the increase in consumption of small houses outweighs the reduction in population due to the decrease in consumption of large houses. Note that these results obtain only because the supply of land in each jurisdiction is fixed and population is perfectly mobile in the partial equilibrium context utilized in this paper. If instead land were variable and population were fixed, the use of property tax finance would cause the community to shrink in size (e.g., land at the perimeter would be converted to agricultural use). This in turn explains why the total capital stock and aggregate land values do not decrease with use of the property tax but instead remain constant, at least for the first increase in the property tax from the initial Tiebout equilibrium. That is, these results obtain only because the total population of the taxing jurisdiction increases, which increases aggregate demand for housing and housing capital as well as land prices. These immigration-related effects precisely offset the reduction in the demand for housing capital and the associated reduction in aggregate land values that typically arise under the capital tax view of the property tax.

V. Some Simulation Results

The analysis above obtains the strong result that intrajurisdictional capitalization effects are identical under the capital tax and benefits tax views. Since the reduction in the use of the head tax is identical in the two models and both are characterized by perfectly mobile individuals and assume that land (and capital in the case of the benefit view) used for both
types of housing is fixed, it is plausible that the differential effects of local use of the property tax under both views are captured as capitalization effects. However, these capitalization effects under the two views are precisely identical only because all of these differential effects, including those involving capitalization, are calculated at the same efficient initial (head tax) equilibrium, so that all of the excess burden effects associated with property tax increase are second-order effects and drop out of the differential analysis. Accordingly, the two capitalization effects would not be expected to be identical when evaluated at a distorted initial equilibrium that included a positive level of property taxation. A natural question is the robustness of the finding of equal capitalization effects to a finite reduction in the head tax coupled with a finite property tax increase. Similarly, the finding of the differential incidence analysis that the total capital stock in the taxing jurisdiction is unchanged despite an increase in the property tax rate depends on the absence of property-tax induced inefficiencies in the initial efficient head tax equilibrium. One would expect that the inefficiencies that would arise for a finite tax increase would drive capital out of the taxing jurisdiction, as in the traditional analyses of the capital tax view (Mieszkowski, 1972; Zodrow and Mieszkowski, 1986). This section describes a simulation exercise that explores these questions.

Specifically, consider the models described above, assuming the utility function is Cobb-Douglas; to allow for large potential capitalization effects, suppose that the housing expenditure shares are relatively large, 35 percent for high demanders and 15 percent for low demanders, who are present in equal numbers in the initial equilibrium. Suppose further that the housing production function is also Cobb-Douglas, with a capital share in production costs of 75 percent (Albuoy, 2008). Local government expenditures (including those financed with

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17 The analysis is thus strictly accurate only for an infinitesimally small change from the initial efficient
external funds such as intergovernmental grants) are assumed to be 9.2 percent of income \( (\beta = 0.092) \).\(^{18}\) Within this context, consider the effects of a finite reduction in head taxes, coupled with a balanced-budget increase in property taxes. Using Texas, a relatively high property tax state, as an example, the share of local expenditures financed with local property taxes in 2010 was 30.1 percent\(^{19}\) and the share of total property taxes attributable to residential property in 2010 was 44.8 percent,\(^{20}\) which implies that 13.5 percent of local expenditures are financed with residential property tax revenues. Within the context of the model utilized in this paper, I assume that all public services are initially financed with head taxes; this assumption is of course unrealistic to the extent that other taxes (e.g., sales or income taxes) cause their own distortions and because in reality all residents within a jurisdiction will not have the identical incomes assumed in the model. To approximate the introduction of the property tax from such an initial equilibrium, the simulation examines the effects of incremental reductions in head taxes from an initial equilibrium in which all public services are financed with head taxes until \(-\Delta Z / Z = 0.15\).

Table 1 provides the simulation results. Columns (3) and (6) of the first panel show the capitalization effects that would occur under the benefit tax view, with land rents falling for \( V_H \) and increasing for \( V_L \) as predicted. Columns (4) and (7) show the analogous effects

\(^{18}\) This figure reflects total local expenditures as a fraction of national income in 2010; see U.S. Bureau of Economic Analysis, National Income and Product Accounts, Tables 1.7.5 and 3.21.

\(^{19}\) See U.S. Census Bureau, 2010 State and Local Government Finances, Table 1.

under the capital tax view, and columns (5) and (8) calculate the differences between the two views. As expected, the changes in land rents under the two views are virtually identical for the first increase in the property tax rate \((-\Delta Z / Z = 0.1 \text{ percent})\). This relationship is no longer exact for finite property tax increases, as each incremental increase in the property tax creates two types of first-order efficiency costs under the capital tax view: (1) it further distorts the intrajurisdictional allocation of housing capital, and (2) it drives capital out of the taxing jurisdiction – in contrast to the analysis above where the total capital stock was unchanged for the first increase in the property tax from the initial efficient head tax equilibrium. Note that in the latter case, the property-tax-induced outflow of capital is zero only for the first incremental increase in the property tax, and ranges up to nearly 0.75 percent (column 9).

Nevertheless, the differences between the capitalization effects in the two cases (columns 5 and 8) are relatively small: roughly 5 percent for \(V_h\) and 12.5 percent for \(V_L\) for the full increase in the property tax (from zero to the current level in a fairly high residential property tax state), and roughly 1-2.5 percent for each incremental property tax increase (for each increase in \((-\Delta Z / Z)\) of 3 percentage points, which corresponds to an increase in \((\Delta T / T)\) of roughly one percentage point). Such differences seem small enough to be broadly consistent with the main thesis of this paper – that the benefit tax and capital tax views generate rather similar intrajurisdictional capitalization effects so that tests of capitalization are of little help in distinguishing between the two views. In particular, although admittedly speculative, it seems unlikely that most empirical estimates of the extent of capitalization – which would typically examine incremental changes in the property tax – would be precise enough to identify such small differences. For example, the results of
Palmon and Smith (1998), which they and Fischel (2001a) characterize as roughly consistent with complete intrajurisdictional capitalization of property tax differentials, range from nearly 40 percent under-capitalization to slight over-capitalization. Similarly, the work of Lutz (2009), cited by Fischel, Oates, and Youngman (2011) as consistent with full interjurisdictional capitalization, finds 75-95 percent capitalization. Thus, in my view, the results of this admittedly simple simulation do not undermine the basic implication of the theoretical model — it is difficult if not impossible to use empirical results on intrajurisdictional capitalization to distinguish between the benefit tax and capital tax views of the property tax.

Finally, the remaining results shown in the second panel of Table 1 are consistent with various other results presented above. For example, for the case of a 15 percent drop in head taxes, (1) the amount of $H_H$ declines by nearly 5 percent (column 10), while the amount of $H_L$ increases by over 9 percent (column 11), with total $H$ declining slightly (column 12), (2) the population of households with high-value homes declines by nearly 3 percent (column 13) while the population of households with low-value homes increases by nearly 17 percent (column 14), with an overall population increase of nearly 7 percent (column 15), and (3) per capita housing consumption declines for both groups, by 2.1 percent for households with high-value homes (column 16), and by 6.5 percent for households with low-value homes (column 17).

**VI. Conclusion**

The analysis in this paper suggests that, at least in the context of the “benefit tax-type” partial equilibrium model analyzed in this paper, *intra*-jurisdictional capitalization into land values of fiscal differentials — the differences between property taxes paid and the benefits of
public services received in communities that are heterogeneous with respect to house value — is entirely consistent with, and indeed predicted by, the capital tax view of the property tax. Coupled with earlier similar findings on inter-jurisdictional capitalization, these results suggest that empirical evidence supporting full capitalization of property taxes does not provide compelling evidence that allows researchers to distinguish between the capital tax and benefit tax views of the property tax. Instead, other empirical tests must be utilized to choose between the two views.\textsuperscript{21} In addition, the analysis shows that these intrajurisdictional capitalization effects imply that even under the stringent assumptions of the benefit view, it is clear that the property tax is \textit{not} a benefit tax when its rate increases to finance an expansion of local public services; rather, the property tax only becomes a benefit tax for future home purchasers – after all of the various intrajurisdictional capitalization effects, which do not correspond to benefits received, are borne by the owners of high- and low-value homes existing at the time of enactment of the tax change.

Finally, it should be again stressed that the results presented in this paper, while using a modeling approach consistent with the THF literature, are limited by the partial equilibrium nature of the analysis. In particular, the model utilized (1) does not specify the effects of the property tax increase in the jurisdiction analyzed on housing and land prices, per capita housing consumption, capital stocks, population, etc., in other jurisdictions, or (2) calculate the economy-wide efficiency effects of the property tax increase in the taxing jurisdiction

\textsuperscript{21} For example, Wassmer (1993), Carroll and Yinger (1994), and Lutz (2009) provide empirical evidence that they conclude is consistent with the capital tax view of the property tax. However, the property-tax-induced reallocations of capital found by Wassmer are fairly small, Carroll and Yinger focus solely on rental housing, and, as noted above, Fischel, Oates, and Youngman (2011) interpret Lutz’s results as supportive of the benefit view. More generally, Lutz (2009) concludes that existing empirical work has largely failed at distinguishing between the two views; see also Nechyba (2001) and Zodrow (2001a). Clearly new studies providing more definitive empirical evidence would be extremely helpful in choosing between the two competing views of the effects of the property tax.
(recall that the assumption that residents are perfectly mobile implies that their utility levels are fixed). In addition, the analysis focuses solely on the residential property tax and thus ignores non-residential property taxation, and does not consider the roles of other taxes on housing decisions, especially the favorable treatment of owner-occupied housing under the personal income tax, which provides deductions for home mortgage interest and property taxes while exempting imputed rents from tax and taxing housing capital gains very lightly. A full-scale general equilibrium analysis of both the interjurisdictional and the intrajurisdictional effects of the property tax, coupled with a comprehensive calculation of the excess burdens associated with its use that would include consideration of the special treatment of housing under the personal income tax – for example merging the model constructed in this paper with an expanded version of the general equilibrium modeling approaches used in Muthitachareon and Zodrow (2010, 2012) – is left to future research.
References


Appendix Table A1. Variable Definitions

- $N$: Total number of households in the taxing jurisdiction
- $N^h, N^l$: Number of households with high and low demand for housing
- $n^h, n^l$: Population shares of high and low housing demanders
- $y$: Fixed level of income per household
- $Z$: Head taxes per household
- $G$: Fixed level of public services per household
- $\beta$: Ratio of government services to net income (both types of households)
- $H^h, H^l$: Housing consumption for high and low housing demanders
- $\bar{H}^h, \bar{H}^l$: Fixed housing demands under the benefit tax view
- $q_H, q_L$: Price of high-value and low-value housing
- $\alpha^h, \alpha^l$: Housing expenditure shares for high and low housing demanders
- $\eta^h_q, \eta^l_q$: Uncompensated elasticities of housing demand, high and low demanders
- $\omega^h_q, \omega^l_q$: Compensated elasticities of housing demand, high and low demanders
- $\eta^h_y, \eta^l_y$: Income elasticities of housing demand, high and low demanders
- $\bar{U}^h, \bar{U}^l$: Fixed level of utility for high and low housing demand households
- $W^h, W^l$: Indirect utility function for high and low housing demand households
- $V^h, V^l$: Amount of land used for a high-value and a low-value house
- $V_H, V_L$: Fixed total amounts of land used for high-value and low-value houses
- $f_{VH}, f_{VL}$: Land share of production costs for high-value and low-value homes
- $K_H, K_L$: Total amount of capital used for high-value and low-value houses
- $f_{KH}, f_{KL}$: Capital share of production costs for high-value and low-value homes
- $t$: Property tax rate ($T = 1 + t$)
- $r$: After-tax return to capital
- $s_H, s_L$: After-tax return to land used in high-value and low-value housing
- $\Pi^h, \Pi^l$: Restricted profit function for high-value and low-value homes
- $\mu^h, \mu^l$: Own-price capital demand elasticity, high-value and low-value housing
- $\varepsilon^h, \varepsilon^l$: Own-price supply elasticity, high-value and low-value housing