

TAX INCIDENCE AND RENTAL HOUSING: A SURVEY AND CRITIQUE OF RESEARCH

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A longstanding question in economic research has been the incidence of taxes on land and on developed parcels of real estate. In the case of agricultural land, is it the landlord or the tenant farmer who ultimately pays a land tax? In the case of urban rental housing, is it the apartment owner or the renter who pays the property tax? This paper surveys the modern economic literature that has addressed these questions. Although some progress has been made in providing answers, this paper argues that several key issues have not yet been addressed in the literature. We need additional research before we can know with confidence the extent to which renters bear the property tax.

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I. INTRODUCTION

A longstanding question in economic research has been the incidence of taxes on land and on developed parcels of real estate. For example, regardless of who sends the tax payment to the revenue collector, who actually bears the economic burden of a property tax levied on a rental property?

Analysis of tax incidence began long ago and permeates the writings of Smith (1776), Ricardo (1817), and Mill (1848). Interest in tax incidence and real estate markets continued into the early 20th century with contributions by Davenport (1917), Brown (1924), and Simon (1943), among others. In the midst of World War II, Simon (1943, pp. 398–399) commented on the state of the literature at that time:

It is a curious fact that ... no consensus has been reached with respect to the incidence of a tax on urban real property ... In part, these differences of opinion may be traced to explicit differences in the assumptions ... [regarding] elasticities of supply and demand for land and structures. In part, they may be traced to the fact that some writers give greater emphasis to frictional forces than do others.

This comment by Simon provides a good starting point for an evaluation of the modern literature on the incidence of an ad valorem tax on rental properties. To be specific, Simon's remark implies that we must recognize that theoretical and empirical studies of tax incidence rely upon a number of key choices made by the analyst:

- Partial versus general equilibrium models as analytical frameworks,
- Open versus closed economy and mobility of factors and products,
- Static versus dynamic models and the speed of adjustment of prices and quantities to new equilibrium values,
- Perfect or imperfect competition within all relevant markets,
- Analysis of factor and product prices alone or also asset prices,
- Single-product or multi-product economy and the scope of tax, and
- Differential incidence versus balanced budget incidence.

In this paper, I survey the relevant literature of the last 50 years and try to demonstrate the link between the assumptions of researchers and their conclusions about renters and tax incidence. I also point to several important issues that have not yet been addressed in the literature that need to be taken into consideration before we can assert with confidence whether tenants or landlords bear the brunt of taxes on rental properties.

II. RENTERS AND TAX INCIDENCE: EARLY CONTRIBUTIONS

Although the theory of tax incidence dates back at least as far as Smith, it was not until the last half of the 20th century that economic researchers began to use computers and econometric techniques to empirically test hypotheses about the impact of taxation on renters and landlords. An early example of this blending of theory and empirics is the scholarly exchange involving Orr (1968, 1970), Heinberg and Oates (1970, 1972), Black (1974, 1977), and others.

In contrast with traditional incidence analysis, Orr argued that the supply of rental housing capital might not be perfectly elastic and, if so, a substantial portion of the tax on improvements might be borne by landlords instead of tenants. As Orr (1968, p. 256) correctly pointed out,

The conventional assumption of a perfectly elastic supply of improvements relies upon depreciation and the restriction of new investment to make the necessary equilibrating adjustment in the capital stock. For capital as long-lived and immobile as housing, however, investment and depreciation can make substantial changes in the existing capital stock only over very long periods of time.

He also argued that the division of most metropolitan regions into numerous taxing jurisdictions has an important implication:

There are ... good reasons to expect the demand for housing within any taxing jurisdiction to be relatively elastic. The small size and multiplicity of taxing jurisdictions typically found in American urban areas offers the household an ample array of alternative locations ... with characteristics roughly comparable to those of its own (Orr, 1968, p. 257).

If indeed the supply of housing within a jurisdiction is somewhat inelastic over a period of many years and the demand for housing within that jurisdiction is somewhat elastic because other communities within the same metro region offer comparable rental housing units, then the bulk of the tax on improvements would be borne by landlords and only a small fraction shifted forward to tenants.

Anticipating the general equilibrium logic of Mieszkowski (1969, 1972) and Aaron (1974), Orr (1968, pp. 257–258) summarized his theoretical reasoning as follows:

Admittedly, this argument applies only to tax differentials, which may be avoided by locating in a different taxing jurisdiction. That portion of the tax ... common to all taxing jurisdictions in the area cannot be avoided and may indeed be shifted forward in the form of higher rents throughout the area.

The contribution of Orr (1968) to our understanding of tax incidence in the rental housing market was not mainly theoretical, however. His major contribution was an effort to use empirical data and econometric methods to measure the shares of the property tax burden borne by landlords and tenants. He described his empirical strategy as follows:

[One] empirical test of whether differential property taxes on residential housing are shifted forward is the relationship between tax rates and residential rents. If intraurban tax differentials give rise to rent differentials, *ceteris paribus*, we must conclude that tax differentials are shifted forward to tenants (Orr, 1968, p. 258).

Using data for 31 towns and cities in the metropolitan Boston region, he estimated an ordinary least squares (OLS) equation in which the median gross rent of a community was regressed on its equalized property tax rate on single-family homes and on presumed supply and demand determinants. These control variables included average price of land, a dummy for private provision of water and sewer service, access to employment in surrounding towns, education spending per pupil, and percentage of dwelling units that were dilapidated.

Although innovative at the time, this econometric exercise was rather simplistic by contemporary standards. For one thing, Orr used a single OLS equation to analyze the interaction of supply and demand instead of estimating a simultaneous equation system. Just as troubling, he used the property tax rate on single-family homes to predict monthly gross rent on rental housing units, presumably because house price data were easier to obtain. But apartments and single-family homes are different segments of the broader housing market and hence his statistical results are suspect.

Orr found that the property tax rate was not a significant predictor of median gross rents in a taxing jurisdiction within the Boston region during the years of his study. Because a higher tax rate was not associated with higher apartment rents, Orr (1968, pp. 261–262) concluded that differential property taxes on improvements are not shifted forward to tenants, but instead are borne by property owners.

Heinberg and Oates (1970) were among the first to respond to Orr's analysis of property tax incidence in the housing market. They objected to his use of the property tax rate on single-family homes to predict median rents within the same community because of differences in average assessment ratios for owner-occupied and renter-occupied housing units within the Boston region. They also objected to his use of median gross rent in rental units divided by median number of rooms in all housing units and the fraction of all housing units dilapidated, not just rental units, as explanatory variables. Finally, Heinberg and Oates (1970, p. 95) expressed concern that "several of Orr's independent variables are in fact determined at least in part by his dependent variable — the level of rents ... This would suggest the use of an estimation technique designed to deal with the problem of simultaneous-equation bias."

In a response to Heinberg and Oates (1970), Orr (1970) replied that the OLS estimation results he had published two years earlier "were virtually identical" to unpublished results based upon a multi-equation, two-stage least squares model. One wonders why those empirical results based upon a more sophisticated econometric approach were not reported in Orr (1968). Based on revisions of his empirical models, Orr (1970) concluded that almost half (46 percent) of property tax differentials on urban rental housing in metro Boston were shifted to tenants and over half of those differentials were borne by landlords.

Using a cross-sectional approach similar to Orr (1968), Hyman and Pasour (1973) explored whether the degree of property tax shifting on rental housing might be different in another region of the country. Estimating an OLS model using data from 115 municipalities across North Carolina, the authors found that the property tax rate was a statistically significant predictor of the median rent per rental dwelling unit. They estimated that 60 percent of the property tax differential was shifted forward to the tenant in the rental market conditions of North Carolina at that time.

Black (1974) returned to metropolitan Boston for empirical clues about the impact of property taxes on renters. Using census-tract data for the City of Boston and a modified version of Orr's methodology, the author regressed monthly rent on two-family buildings on the effective tax rate on two-family properties, average lot size of duplexes, and structural condition of those buildings. For a 1950 cross section, he found that 64 percent of property tax differentials were shifted to tenants whereas the comparable percentage for 1960 was 53 percent.

Three articles of the 1970s pointed the way to more advanced research on the incidence of property taxes in rental housing markets. In their rejoinder to Orr (1970), Heinberg and Oates (1972, p. 221) raised a very important theoretical point, namely the need to address

[T]he time lags present in the adjustment of rents to changes in costs which owners of rental housing incur in supplying housing services ... Cross-section studies of the sort that Orr and we undertook assume that the observed values of the variables represent equilibrium values ... This assumption, however, is in all likelihood a very tenuous one for the study of levels of rents ... This suggests that a dynamic model ... is probably much more appropriate for the study of the effects of property taxes on rents.

As we shall see, this point has not yet been adequately addressed in the research literature.

In a critique of both Orr (1968, 1970) and Heinberg and Oates (1970, 1972), Coen and Powell (1972, pp. 211–214) contended that

[T]he [empirical] relationship between tax differentials and rent differentials can, in general, tell us nothing about the incidence of tax differentials ... Orr restricts the demand function [of his model] to include the level of rent in community i only ... This is certainly an unwarranted and undesirable property of the model, for it presumes that migration in response to rent differentials is unimportant ... Recognition of cross-elasticities of demand due to migration would call for the inclusion of other communities' rental levels ... But we would then have a unique rent equation for each community in our sample, and cross-section data for a single time period would not be sufficient to estimate the parameters of these equations.

That is, in order to evaluate the impact of a tax increase in, say, community A on rents in communities A, B, C, etc., one would need time series data of sufficient length for each community in the region.

In a theoretical piece that still offers a road map for future research, LeRoy (1976, pp. 167–168) commented as follows:

A general analysis of property tax incidence can be performed only in a model which [includes] ... substitutions between (a) housing services and other expenditures, (b) land and improvements as determinants of total housing services, and (c) housing at different locations ... [Land] rents will be unaffected by the change in the improvements tax if the elasticity of substitution between land and improvements equals one, but not otherwise. Under that assumption, the burden of the improvements tax is borne entirely by tenants ... If the elasticity of substitution between capital and land does not equal one, the classical conclusions about the incidence of property taxation are incorrect.

III. RENTERS AND TAX INCIDENCE: THEORETICAL ADVANCES

After these earlier contributions of the 1960s and 1970s, research on the incidence of land and property taxes in rental housing markets became more sophisticated. That progress was stimulated, in part, by the theoretical work of Mieszkowski (1967, 1969, 1972) and Aaron (1974). These authors argued that general equilibrium models provide the appropriate framework for studying the taxation of corporate profits, retail sales, real property, and other broad-based revenue sources. In his single-output, multi-period analysis, Feldstein (1977) also raised the possibility that a tax on the rental income from land ownership could have long-run growth effects because of its impact on personal saving and capital accumulation. Mieszkowski (1969, p. 1103) had argued,

[T]axes that do not apply to all types of income, or to all commodities, change relative commodity prices, influence factor use in particular industries and change the production structure of the economy. A full analysis of the incidence of taxes that produce such effects requires a general equilibrium approach which accounts ... for tax-induced changes in commodity and factor prices.

In contrast with the earlier claim that the property tax was a combination of an excise tax on improvements shifted to housing occupants and a land tax borne by landlords and homeowners, Mieszkowski (1969, pp. 1107–1108) suggested that

[A] drastic reorientation is needed to work on the incidence of the property tax. Surely the starting point must be that property taxes are taxes on income producing wealth that may lead to changes in relative commodity prices and shifts of capital and population between communities.

The author then illustrated this claim with a detailed discussion of a numerical example found in Brown (1924). Mieszkowski (1969, p. 1115) ended his essay with what in my view is the dubious claim that introduction of monopoly elements into the analysis “does not necessarily lead to a drastic revision of the results on incidence derived from competitive models.”

Aaron (1974) focused his attention on the “new view” of property tax incidence (Mieszkowski, 1972), a view that is critical of the traditional argument that the property tax is borne by homeowners and renters in a regressive fashion. One reason for Aaron’s skepticism about the traditional view is that empirical estimates of property tax incidence had typically employed current, not permanent, income measures. Disregarding this income measurement issue, Aaron (1974, p. 216) also reasoned as follows:

If factor supplies are fixed in amount and perfectly mobile, and markets are competitive, a uniform tax on capital will be borne completely by owners of capital. But, the property tax does not apply equally to all capital goods. First, a large part of real capital is wholly exempt ... Second, average effective rates

of property tax vary widely across jurisdictions. Third, within jurisdictions effective rates vary widely among and within classes of taxable property, occasionally with legal sanction, often because of extralegal decisions by assessors.

These considerations reflected a practical knowledge of how the property tax works in the real world and led Aaron (1974, p. 217) to a useful conclusion about its incidence:

The incidence of the property tax thus consists of three effects: (a) a capital tax effect (the burden of the average tax rate on capital is distributed in proportion to the ownership of capital); (b) an excise tax effect (deviations around the average tax rate cause shifts in capital among regions or industries, possibly raising or lowering the gross yield of capital ... and (c) an immobility effect (deviations of tax rates around the average would [raise or lower] ... prices of local goods not subject to external competition ...¹

A few years later, Feldstein (1977, p. 349) made an important theoretical contribution to our understanding of the incidence of a tax levied on the land component of real property. He set out to show that ever “since Ricardo, economists have believed that the annual net rental income of unimproved land falls by the amount of the annual tax and that the price of the land falls by the capitalized value of this tax. The present paper will show that these [traditional] conclusions are false.”

Feldstein argued that the essential error of the traditional analysis was to ignore the fact that land and produced wealth are alternative components of life-cycle wealth. If each generation wishes to enter retirement with a certain level of wealth, then a tax on pure land rent that reduces the value of land can induce an increase in the stock of produced capital, the other retirement asset. Furthermore, the traditional claim that a land rent tax is fully capitalized in land price assumes perfect substitutability among assets in individuals’ portfolios. But with imperfect substitutability of land and capital as assets, land price falls by less than the capitalized value of the land rent tax. Hence, given differences in risk aversion or risk perception, the owners of land may be able to shift some of a land rent tax.

Feldstein (1977, p. 350) concluded

[The traditional] analysis is false if the tax on pure land rent has income effects that alter the supplies of labor or capital ... But even if income effects are excluded, the traditional analysis is wrong in two important ways. First, it overlooks the fact that, because land is an asset, a tax on rent can change the supply of other factors even if there are no income effects ... Second, the traditional theory ignores the effect of portfolio balance requirements

¹ Black (1977) makes the interesting observation that these excise tax effects could result from unequal effective tax rates within a jurisdiction linked to assessment practices.

Aaron, Feldstein, and Mieszkowski paved the way for a series of theoretical studies of property tax incidence in residential real estate markets. These later contributions drew upon insights from urban economics as well as public finance and general equilibrium theory.

Arnott and MacKinnon (1977) modeled a closed city of variable size in which everyone has identical tastes and incomes. In their “Muth city,” the municipal government owns all of the land, collects land rents and spends those rent receipts outside the city. The local government also adopts a uniform tax on residential property values. In contrast with traditional analyses of property tax incidence, Arnott and MacKinnon (1977, p. 390) make two plausible assumptions:

First, the overall supply of land in residential use is not perfectly inelastic because the size of the city and the proportion of urban land in residential use can change in response to the imposition of a property tax. Second, the supply of structures is not perfectly elastic ... [because] an increase in the quantity of structures in a city causes the average height of buildings to increase ... [But] the marginal cost of building a story increases with the number of stories.

The authors incorporated these two assumptions in a computable general equilibrium model calibrated for Toronto, Canada. They find that the burden of the property tax falls heavily on housing occupants. More specifically, tenants bear the full burden of the structures component of the property tax. They also bear a portion of the burden of the land component of the property tax because the supply of land in residential use is somewhat elastic.²

Blake (1979) offered a theoretical analysis of property tax incidence leading to a highly unusual conclusion. In contrast with the “new view” of Mieszkowski (1972) and Aaron (1974), the author posited a world in which the property tax falls upon only a small portion of the aggregate capital stock. He argued that there are

[E]xtensive opportunities for the suppliers of capital to escape the property tax without decreased savings. These individuals may invest in human capital ... and in publicly owned capital (through public bond purchases), neither of which are subject to the property tax. Furthermore, these individuals may, through firms, invest in research and development, in brand name capital and advertising capital ... Finally, through international firms and funds, the suppliers of capital have investment opportunities in the rest of the world, where property taxes are not all that common ... Given all these opportunities for ... [capital mobility], the supply of capital to domestic occupations ... subject to property taxes might be ... accurately represented as nearly perfectly elastic (Blake, 1979, pp. 524–525).

² Carlton (1981) provides another theoretical analysis of the incidence of property taxation in an urban spatial model.

This view of the world led Blake to conclude that the entire property tax, not simply its land value component, is capitalized into the price of land at the moment when the tax is imposed or increased. Thus, in his view, the burden of the property tax is borne entirely by landowners. This analysis does not appear to have been accepted in the literature, in part because Blake offered no empirical data to support his claim about the elasticity of capital supply and because he did not present his reasoning in the form of a mathematical model.

In another theoretical analysis of property tax incidence inspired by the “new view” of Mieszkowski (1969, 1972) and Aaron (1974), Brueckner (1981) observed that while earlier contributions had acknowledged the importance of capital mobility among jurisdictions in response to property tax rate differences, those earlier papers had largely ignored labor mobility, especially within a metropolitan region. According to the author, the “purpose of the present paper is to ... [incorporate] labor mobility in a property tax incidence model. Mobility implies that utility levels of the economy’s (identical) workers must be uniform among communities in equilibrium ...” (Brueckner, 1981, p. 174). In a two-factor, two-good, two-community model, Brueckner explored the impact of raising the property tax rate in community 1 but not the other locality. In order to simplify the analysis, he ignored the benefits from the public expenditure financed by the higher property tax in the first community. The comparative statics of his model indicate that the property tax results in: (1) Higher gross-of-tax housing prices in both communities; (2) Higher wage rates in both communities; (3) Lower land rents in community 1 but higher land rents in the other; (4) Lower utility levels for all workers; and (5) Higher utility levels for landowners in the second community but lower utility levels for landowners in the first community. Although Brueckner (1981, p. 182) readily conceded that his model was highly simplified and that it ignored dynamic adjustments, he concluded correctly that “labor mobility must be accounted for in analyzing property tax incidence ...”

General equilibrium analysis of property tax incidence was taken to a still higher level of sophistication by Lin (1986). Lin faulted earlier general equilibrium analyses for positing a single production sector and for focusing entirely on capital mobility among taxing jurisdictions:

The purpose of the present paper is to provide a more general analysis of property tax incidence ... Innovations in the model include ... two sectors (housing and non-housing), three factors (capital, labor and land), and multiple jurisdictions ... [C]apital and labor are fully mobile” (Lin, 1986, p. 114).

In Lin’s model, labor mobility results in equalization of utilities, not wage rates, because of differences among jurisdictions in the cost of living, public services, or environmental amenities. Additional assumptions of the model include: (1) No transportation costs (so that the price of the non-housing output is uniform among communities); (2) Fixed supplies of capital, labor, and land with housing produced by capital and land whereas non-housing is produced by labor and land; (3) Production technologies are the same for all communities and display constant returns to scale; (4) Perfectly competitive factor

and output markets; (5) Workers live and work in the same community; (6) Owners of capital and land are immobile; and (7) Local governments pursue a balanced budget by returning a lump sum to each resident equal to taxes paid.

In a model of this complexity, predicting tax incidence becomes a complicated matter:

[An] increase in the local property tax in community 1 causes an outward flight of capital and depresses the overall capital return, results which coincide with the “new view” ... In the present model, the property tax is a tax on [housing services] ... produced with land, so that a higher tax depresses the derived demand for land in housing production, leading to a lower land rent [in community 1] ... The property tax increase in community 1 also results in an excise effect [on housing prices] ... [A] tax on the housing sector produces an output effect through demand reduction ... Both capital and land, as the housing inputs, suffer a loss on their returns ... [The] expansion of the non-housing sector is made possible by the transfer of land from the housing to the non-housing sector ... and the immigration of workers ... to the taxed community ... (Lin, 1986, pp. 122–124).

Lin (1986, p. 126) concludes that workers gain because the tax component of the gross housing price is fully offset by the extra benefit received from public expenditure. Hence, a higher wage level implies higher utility levels for workers. Capital owners, however, are worse off because the advantage of a reduced net housing price is offset by a lower factor return. The net impact on landlords is indeterminate and depends both upon the magnitudes of the decreases of net housing price and land rent, and also upon the fraction of their income used in housing consumption.

In the same way that various authors advanced the theoretical work of Mieszkowski and Aaron during the 1970s and 1980s, Chamley and Wright (1987) pushed forward the earlier work of Feldstein (1977). Chamley and Wright (1987, pp. 3–4) observe:

In recent years many studies of fiscal incidence in a general equilibrium framework have used the overlapping generations [OLG] model. A standard assumption of these studies is ... perfect substitutability between consumption goods and investment goods as the outputs of the production technology ... [All] incidence effects occur through changes in the size of the stock of non-labor assets rather than through changes in asset prices. In reality, however, a significant fraction of saving is invested in assets [like land] that have a very long lifetime and are not easily substitutable with consumption ... The gains or losses in land value that accrue to its owners at the time when an unanticipated tax is introduced occur outside the steady state and so cannot be assessed by the conventional comparative static analysis ... [We need to] construct a dynamic life-cycle analysis of the effects of fiscal interventions.

Chamley and Wright construct a two-period, OLG model without bequests and with production requiring inputs of capital, labor and land. They assume a fixed supply of land but the stock of capital is variable. Savings by the younger generation are invested partly in non-depreciating capital and partly in land purchased from the older generation. Two sources of revenue are available to government, a wage tax and a land tax. Agents enjoy perfect foresight so that capital and land yield the same rate of return.

Following the introduction of a land rent tax, the original steady state of the model is disturbed and a dynamic path leads to a new steady state. The immediate and longer-term effects of imposing a tax on land rents depend upon such parameters as the interest elasticity of the supply of savings, the degree of substitutability in preference and production functions, and capital's share in the production function. As noted by Chamley and Wright (1987, p. 20),

[A] striking general result is that an uncompensated land rent tax may in some cases raise land values immediately but never by more than half of the tax. Hence, the incidence on the older generation is at least half of the tax revenue. If the land price falls immediately, the loss in value is never greater than indicated by full Ricardian capitalization of the land rent tax if capital and land are complementary [and Hicksian stability holds in the market for capital].

Let me turn next to an important paper that does not fit the themes of this survey precisely. In their extensive survey of the theory of taxation within a Tiebout-style metropolitan region, Mieszkowski and Zodrow (1989) focused their attention on whether the local property tax is a non-distortionary benefit tax or a distortionary tax on capital borne primarily by owners of capital. They also explored the famous Henry George Theorem, the proposition that under certain circumstances decentralized provision of local public services will be efficient if land rents are taxed to finance those local public expenditures. They noted that the Henry George Theorem does not hold when sites vary in quality or natural resources and regions are not of the same size. Because this article focused more on efficiency issues than the question of property tax incidence, I turn next to other, more germane contributions.

Pasha (1990) raised the issue of how the incidence of a land tax might vary by location within a metropolitan region. To be precise, he asked "Is the sharing of burden between consumers and landowners uniform at all locations within a metropolitan area or is it variable? If the latter is the case then what determines the [spatial] pattern of differential incidence?" (Pasha, 1990, p. 592). The author explored these questions by constructing a monocentric-city model in which all households have identical incomes and preferences. Household utility is a function of consumption of land, a composite private good, and a composite public good. Land within the city is owned by the government or by absentee landlords. Revenues from a land rent tax are used to finance provision of the public good. Budget balance is maintained via interjurisdictional grants. The boundary

of the city is endogenous, where the rental price of urban residential land equals the exogenous rental price of agricultural land. Pasha (1990, p. 595) concludes:

[T]he pattern of differential incidence of a land [rent] tax depends upon the magnitude of the elasticity of substitution between land and the composite private good in the utility function of residents. In particular, uniform incidence is a special case when the elasticity of substitution is unity. Otherwise, the relative burden on landowners increases (or decreases) as the periphery is approached, depending upon whether the elasticity of substitution is greater (or less) than unity.

In a reply to Pasha (1990), Bentick (1996, p. 1730) agreed that at least some of a land rent tax is always shifted forward to consumers of urban services in the form of higher land rents.

However, in analyzing a tax ... [on] urban land rents, Pasha inadvertently violated the assumption of a universal tax. For if people can live on what is zoned or called 'rural land,' albeit at lower density, an exclusive tax on ... 'urban land' could be avoided by merely shifting to the other side of the urban margin.

Although Pasha could have deflected this criticism by making the additional theoretical assumption that only crops and livestock inhabit acreages beyond the urban fringe, Bentick posed the interesting question of what we mean exactly by the boundary of an urban or metropolitan area.

Another theoretical paper that merits attention is Carroll and Yinger (1994), who observed that prior studies of the relationship between rents and property taxes had assumed implicitly that renters are not fully mobile:

[M]obile renters would not be willing to pay a higher rent simply because property taxes are higher. Renters do consider public service quality when deciding where to live ... so that differentials in public service quality, which are made possible in part by differences in property tax rates, can be a source of tax shifting even with fully mobile renters. This general equilibrium effect ... has not been considered in any previous research (Carroll and Yinger, 1994, p. 296).

According to Carroll and Yinger (1994), earlier studies also suffered from several methodological and econometric defects:

- The inclusion of an inadequate set of housing attributes during empirical testing and resulting omitted variable bias,
- The use of public expenditure as a measure of public service quality,

- A focus on public schooling as a local public expenditure to the neglect of sanitation, police, and fire protection and other services relevant to renters, and
- A failure to recognize that rents and tax rates may be determined simultaneously, resulting in simultaneity bias.

In their theoretical model of rent determination, Carroll and Yinger linked the renter's choice of a community, the landlord's valuation of an apartment building, and the community budget constraint. Each renter selects a community based on rent and public service level. Property taxes do not enter the renter's utility maximization directly. The amount that a landlord is willing to pay for an apartment building equals the present value of the net rental income it yields minus the present value of the property tax payments on the building. Public expenditure per capita equals the public service level multiplied by the average cost per unit of service quality. This expenditure per head, in turn, equals the sum of the property tax rate multiplied by per capita property value and per capita revenue from other sources. The final component of the model is a simple supply-and-demand analysis of a community's median rent.

The solution of this model has a number of implications for property tax incidence. If tenants are perfectly mobile and if the price elasticity of demand for rental housing is infinite, then landlords alone bear the burden of any tax hike. In general, however, the extent to which property tax increases are shifted to tenants depends upon the characteristics of a community: "A community's property tax rate, cost [of service quality] index, average property value, and average residential property value, all influence the degree of shifting" (Carroll and Yinger, 1994, p. 301). Summing up their analysis of rental housing and tax incidence, Carroll and Yinger (1994, p. 310) concluded,

According to the 'new view' of the property tax, property tax differentials will be borne by renters only to the extent that renters are immobile ... This paper shows that when associated changes in service quality are recognized, some of the burden of these differentials falls on renters even if they are mobile ... because tenants are willing to pay higher rents or receive the better services purchased by higher property taxes.

In a fairly recent contribution inspired by the earlier work of Feldstein (1977), Petrucci (2006, pp. 921–922) observed that Feldstein's conclusion about the incidence of a tax on land rent depended upon his assumption of an economy closed to flows of capital and labor:

In a non-altruistic OLG closed economy, ... a tax on land rent is associated with a higher capital stock and output per person in the steady state. The rationale for this result ... is that a land tax hike, by initially reducing the value of land, diverts saving away from land into real capital ... The positive effect of the land rent tax on capital formation ... is grounded in the portfolio choice. Since capital and land are the only assets of the economy, any 'flight from land' ... is by necessity a 'flight into real capital'.

Once one opens a model economy to capital flows, however, imposition of a land tax leads to very different results:

In a ... small open economy having unrestricted access to the world capital markets and a fixed labor supply, saving diverted from land by a rise in land taxation is not directed towards real capital [at home]; under perfect capital mobility, in fact the portfolio mechanism discovered by Feldstein implies ... a 'flight into foreign assets' (Petrucci, 2006, p. 922).

Petrucci augmented an OLG model of an economy open to capital flows with an analysis of endogenous labor supply. To be specific, he assumed a constant population but a variable supply of labor determined by individual utility-maximizing decisions about real consumption and leisure. A fixed endowment of land was fully utilized in production. After-tax rates of return on land and capital were equalized by capital flows and adjustments in land prices. He showed that in an open economy with endogenous labor supply, the consequences of land rent taxation depend critically on how the tax proceeds are used by the government (Petrucci, 2006, p. 923):

Land taxation does not spur capital accumulation as in a closed economy, but instead depresses capital formation and economic growth when the tax revenues are lump-sum transferred to consumers. Labor supply and domestic output are reduced by the shock, while nonhuman wealth and national income are increased. If, instead, the proceeds from land taxation were used to finance unproductive government expenditure, the tax on pure rent would be neutral in its effects on the capital stock and aggregate wealth. In this case, the reduction in land price stemming from higher taxation only implies a compensating decrease in foreign investment. When the tax proceeds are used to cut taxes on labor income taxes, land taxation ambiguously affects labor supply and capital stock while it raises domestic wealth and aggregate consumption.

In this last case, the ambiguity of the land tax effects on capital and labor depends on two influences: a composite income effect (due to the exporting of tax burden and an intergenerational wealth transfer) and the consumption-leisure substitution effect. To sum up, Petrucci (2006) demonstrated that, once one complicates a theoretical analysis of tax incidence by introducing more real-world considerations, the more imperative it becomes to wed theory to empirical data.

IV. RENTERS AND TAX INCIDENCE: EMPIRICAL EVIDENCE

Unfortunately, since the early contributions of Orr (1968, 1970) and those of his critics, there has been surprisingly little econometric research on the incidence of property

and land taxes on renters. One notable exception is Dusansky, Ingber, and Karatjas (1981), who employed a simultaneous-equations model and three-stage least squares econometric method to estimate rents, housing values, land prices, taxes, and public expenditures. A stated goal of their research was

[T]his paper formally tests the degree to which the two markets [i.e., rental and owner-occupied housing] are actually linked ... [T]o the extent that rents are a proxy for imputed rents ... property tax shifting in rental markets and property tax capitalization [faced] by homeowners are intimately linked. If rents do not serve as a proxy for imputed rents, or rental and owner-occupied housing markets are not strongly linked, then shifting and capitalization may be operationally independent phenomena (Dusansky, Ingber, and Karatjas, 1981, pp. 241–242).

To their credit, Dusansky, Ingber, and Karatjas (1981, pp. 242) acknowledged that their empirical model could have been better grounded in theory, stating that, “While the [econometric] model is not formally derived from a theoretical general equilibrium system, it does reflect and capture intrajurisdictional general equilibrium forces ...”

The authors used a 1970 cross-section of data for 62 school districts in Suffolk County, New York, to estimate their empirical model of rental and owner-occupied housing. Their housing price equation implies a degree of property tax capitalization somewhere in the range between 0.43 to 0.96. Their apartment rent equation implies a similar degree of property tax shifting from landlords to tenants, somewhere in the range between 0.6 and 1.1. Somewhat unexpectedly, the authors found that the test for linkage between the rental and owner-occupied segments of the housing market does not support interdependence of those segments. Their empirical results suggest that capitalization and shifting are independent phenomena.

Two recently published papers have also reported on the empirics of property tax incidence in housing markets. Tsoodle and Turner (2008, p. 64)

... investigate the impacts [of property taxes] on local residential rents. We do so by examining ... housing unit data from the American Housing Survey (AHS) for a sample of U.S. cities in 1999, 2001 and 2003, and city-level data provided by these [14] cities ... [We] estimate multiple specifications of a hedonic rent equation that controls for detailed unit attributes, neighborhood attributes and city-level expenditure data on public services to identify the impact of effective tax rates on rents.

Tsoodle and Turner (2008) used AHS data to calculate the effective tax rate for owner-occupied housing units in 14 cities for each of three years and then calculated citywide average effective tax rates. Although the authors tried to account for state-level property

tax relief for owner-occupants and differences between the stocks of rental and owner-occupied housing units, it is worrisome that they used the effective property tax rates on owner-occupied, single-family homes to proxy for the effective tax rates on rental units in their hedonic rent equations. It is also troubling that they included four categories of per capita municipal spending in their hedonic equations but did not include per pupil school spending or any measure of educational quality. This specification assumes that renters are childless and do not derive external benefits from better schools for neighborhood children.

In their two-stage econometric exercise, the authors first used AHS rental unit data to estimate the average rent in a city at a point in time, net of rental unit attributes and neighborhood characteristics. Their second stage regressed the average rent from the first stage on city-level variables including real local government expenditures, local regulatory restrictions, and the effective property tax rate. Across four versions of their model, the coefficient on the effective property tax rate was “positive, significant and robust ... [An] increase of 0.34 percent in the property tax rate from its sample mean of 1.4 percent increases rents by an amount between \$402 and \$451 annually” Tsoodle and Turner (2008, p. 77). Hence, Tsoodle and Turner found empirical evidence of partial shifting of property taxes to tenants.

The most recent contribution to the literature included in this survey is that of Muthitacharoen and Zodrow (2012). This piece of research is notable for the realism of the analysis:

[The authors] analyze the excise tax effects of the property tax in the context of a small open economy model with four production sectors and three factors of production (capital, labor, and land) in each sector. The property tax is assumed to apply to both capital and land used in the production of housing and two of the non-housing goods, broadly defined as manufacturing and services, while the fourth production sector, agriculture, is assumed to be exempt from property taxation Muthitacharoen and Zodrow (2012, p. 556).

In contrast to earlier studies that characterized the property tax incorrectly as a tax on the capital employed in the housing sector or a tax on land rents, the authors characterized the property tax as a tax on land and improvement values at a single rate in some sectors of the economy. Because of generous and widespread tax breaks for undeveloped land used in agriculture (Anderson and England, 2014), their assumption of property tax exemption in the agricultural sector is roughly correct.

Muthitacharoen and Zodrow (2012, p. 557) is also notable because of its handling of time:

... most other studies of the excise tax effects of the property tax have taken a very long-run view of property tax incidence; these studies typically assume that labor is perfectly mobile across all jurisdictions ... and that land is perfectly mobile among all uses, implying that all landowners within a jurisdiction bear equally any part of the tax that is capitalized in land values.

The authors instead focused on an “intermediate run” case characterized by fixed supplies of land in each sector and partial mobility of labor. During the time period of analysis, labor cannot change its jurisdiction of residence but it can move freely among the four production sectors within its home jurisdiction. This assumption of incomplete mobility of productive factors recognized that local zoning rules impede reallocation of land to other uses (until zoning regulations are amended), that physical buildings have long lives and are far from malleable, and that decisions of households to move are not taken lightly.

The authors constructed a simulation model employing these and other theoretical assumptions and calibrated the model using 2009 input-output data for the U.S. economy. Their simulation results differed significantly from earlier empirical studies:

With labor immobile across jurisdictions, the imposition of the 5 percent property tax decreases wages by 1.9 percent [in the taxing jurisdiction] and raises the prices of housing and services by 2.1 percent and 0.4 percent, respectively ... Land rents fall in all taxed sectors, but especially in manufacturing ... In the untaxed agricultural sector, however, land rents increase slightly (1.2 percent) due to inflows of both capital and labor ... Overall the amount of capital employed in the taxing jurisdiction falls by 3.5 percent (Muthitacharoen and Zodrow, 2012, pp. 566–567).

The implications for property tax incidence are as follows:

Downward pressure on wages, declines in net land rents in the housing sector, and modest increases in the prices of nontradable goods imply that the majority of the tax burden borne by the residents of the taxing jurisdiction (63.7 percent) is concentrated on the sources side of incidence, and over three-quarters of this burden is due to the decline in labor income ... Overall, the total tax burden borne by residents accounts for 96.2 percent of total tax revenue. Declines in nonresidential land rents suggest that some portion of the tax burden is exported to residents of the other jurisdictions. This portion of the tax burden accounts for 5.4 percent of the total tax revenue. In the aggregate, the total tax burden borne by both residents and nonresidents exceeds the total tax revenue by 1.6 percent, primarily reflecting the efficiency costs of use of the property tax (Muthitacharoen and Zodrow, 2012, pp. 568–569).

V. SUGGESTIONS FOR FUTURE RESEARCH

From the preceding survey of the literature, one can conclude that significant progress has already been made in analyzing the incidence of property and land taxes on renters in housing markets. There are, however, opportunities to pursue additional research that would improve our understanding of tax incidence. Let me close with several suggestions for future research.

A. Nonprofits as Rental Housing Providers

Earlier studies of the incidence of property taxes on renters have assumed that rental units are owned by private landlords who have made risky investment decisions in a competitive quest for maximum profit. That assumption is not appropriate in those cases where tenants can choose between apartments offered by private landlords and dormitory rooms or suites offered by public and private nonprofit colleges and universities. The 100 largest campuses in the United States had Fall 2011 enrollments of 25,000 or more students (National Center for Education Statistics, 2012). Although some of these students were housed in tax-exempt campus dormitories, others competed for apartments in taxable off-campus properties. In such situations, predicting the impact of a higher property tax on apartment buildings in the private rental market would seem to require predicting decisions by the adjacent university or college about room and board rates, dormitory construction, and other dimensions of campus housing policy. It would also seem to require analysis of municipal government decisions to encourage or discourage off-campus housing via zoning regulations, assessment practices, and other means.³

B. Recognition of Time Lags and Disequilibria in Housing Markets

As noted at the beginning of this essay, Heinberg and Oates (1972, p. 221) raised a very important theoretical point, namely the need to address “the time lags present in the adjustment of rents to changes in costs which owners of rental housing incur in supplying housing services ...” Writing at roughly the same time, Fair (1972, pp. 207–208) stated,

[D]isequilibrium effects have not been accounted for in an adequate way in most models [of the housing market] ... If the housing and mortgage markets were always in equilibrium, the price of housing services would clear the market and the mortgage rate would clear the mortgage market. Equilibrium in the housing market would correspond to a positive number of vacancies, the number being the amount needed to meet the normal requirements of market turnover.

These notions were examined by deLeeuw and Ekanem (1973) with a study of time lags in the rental housing market. As the authors pointed out,

Two facts about the housing market suggest that time lags may be of importance in the adjustment of rents. One is that leases are often negotiated for a year or more at a time ... The second is that buildings are sold, refinanced or extensively remodeled only infrequently, making landlord outlays depend on cost conditions some time in the past as well as current cost conditions (deLeeuw and Ekanem, 1973, p. 42).

The authors concluded that three lags are relevant to predicting rental market outcomes: “behavior of households in deciding what quantity of housing services to consume ...

³ A colleague and I are presently exploring these questions in a project entitled “Town-Gown Fiscal Interactions.”

the behavior of landlords in deciding what level of rents to change [sic] ... [and] the behavior of builders and landlords in deciding by how much to alter the stock of housing available on the market” (deLeeuw and Ekanem, 1973, p. 39).

These comments suggest that care should be taken in the design of empirical studies of tax incidence in the rental housing market, especially incidence in the short run. One should not expect, for example, that an increase in the property tax rate levied on rental properties would have an immediate effect on monthly rents paid by tenants. If there is tax shifting to tenants, it might occur in future years, not during the present year. Any data set used to test the hypothesis that tenants bear a portion of a property tax increase has to take these housing market lags into account.

C. Housing Unit Vacancies and Tax Incidence

Another important feature of housing markets that previous tax incidence studies have failed to address is the fact that there are (almost) always vacant units available to be occupied. The portion of the existing stock of housing units that consists of unoccupied units is the vacancy rate. As Rosen and Smith (1983, pp. 779–780) pointed out,

The price-adjustment mechanism and the rental housing market can be viewed as operating in a typical stock-flow manner ... [The] stock may be considered as fixed in the short run ... [Since] numerous frictions and imperfections cause the market to adjust slowly, the rent level ... may not completely clear the market in the sense that actual vacancies equal the normal or optimal vacancies. The natural or optimal vacancy rate ... is defined by market factors such as the cost of holding inventory, search costs, the variability of demand, and the costs of recontracting. Market frictions such as high transactions and search costs, slow supply responses, credit market imperfections and the existence of long-term contracts may all impede the quick adjustment of rents.

For a sample of 17 U.S. cities, the authors regressed the rate of change of nominal rents from 1969 through 1980 on the actual vacancy rate and the rate of change of rental operating expenses. They found that the partial correlation of rent increases with vacancy rates was highly significant and negative in 13 cities. They concluded that “our results strongly confirm the traditional view that vacancy rates ... are pivotal in explaining the price of housing services” (Rosen and Smith, 1983, p. 781).⁴

If indeed the vacancy rate is a key variable affecting price adjustments in the rental housing market, that fact should be taken into account in future studies of tax incidence in that market. My conjecture would be that a relatively high vacancy rate would reduce the portion of any tax hike shifted forward to tenants, at least in the short run.

⁴ In an earlier study, Eubank and Sirmans (1979) did not find a significant correlation of the vacancy rate with changes in apartment rents. That study, however, covered only four cities for seven years. Subsequent studies by Gabriel and Nothaft (1988, 2001) provided additional empirical evidence that a relatively high vacancy rate does indeed impede the rate of increase of housing rents.

D. Housing Tenure Choices and Tax Incidence

At several points in this essay, I have used the phrase “rental housing market” while discussing tax incidence research. That expression is actually a misnomer; within any metropolitan region, there is a single market for housing services in which some housing units turn out to be rented and others owner-occupied after various agents have made optimizing decisions. A “single family home” may be occupied by its owner or rented to a tenant household.⁵ Owners will occupy many of the units in a large condominium complex, but some condo units will be rented to tenants.⁶ A multi-unit building that has previously housed only renters can undergo condominium conversion and become a domicile for owner-occupants.

These examples raise the theoretical and empirical question of “housing tenure.” As Mills (1990, pp. 323–324) pointed out,

Potential landlords and owner-occupants compete for each dwelling. The dwelling goes to the investor to whom the dwelling is worth more . . . Owner-occupancy occurs if the present value of net cash outflows associated with ownership is less than the present value of net cash outflows associated with rental for a given market value of the dwelling . . . [The respective] cash flows depend on the tax status, transactions costs, and length of occupancy . . . [A] rational decision maker makes housing tenure choices based on cash flows discounted at the return on alternative and similarly risky investments, here taken to be somewhat below the average return on stock exchange investments. All data should be after-tax.

King (1980), Henderson and Ioannides (1983), Borsch-Supan (1990), and Kan (2000) extended our understanding of housing tenure choice by pointing out that choices about consumption of housing services, housing tenure, and location and duration of employment are interdependent choices. This set of choices, in turn, is influenced by municipal tax policies, as Goodman (2006, p. 6) pointed out:

[S]mall rental properties pay a tax rate one-third higher than do single-family owner-occupied properties . . . Why the higher [effective] tax rate for apartments? First, many jurisdictions as an explicit policy tax [income-producing] apartments more heavily than single-family homes. Apartments are often classified as commercial real estate . . . [Sometimes] jurisdictions cap taxes and tax increases for single-family homes, without setting corresponding caps for apartments.

⁵ In university towns, parents sometimes buy houses or condos for occupancy by their undergraduate children. After graduation, the property can then be sold (hopefully at a gain) or rented to non-family tenants.

⁶ The bylaws of condominium associations will often permit, but limit the number of, rented condo units in an effort to protect the market value of all units.

The implication of this literature for tax incidence research is that one should not posit renters as a distinct group and then try to predict the incidence of higher taxes on that group in isolation from the remainder of the housing market. Rather, there is one group of households seeking shelter in the housing market and each member of that group could end up being either a tenant or an owner-occupant. Hence, the analyst needs to discover how an increase in property taxation might simultaneously affect house prices for owners, gross rents for tenants, and the distribution of consumers between those two tenure categories.⁷

E. Renters' Illusion and Tax Incidence

One final recommendation that I would like to offer is that researchers studying the incidence of property taxes on renters should be aware of the debate about the "renter effect" in local public finance. Oates (2005, p. 421) characterized this issue very well a few years ago:

There is ... a substantial and compelling body of evidence that associates the presence of renters with high levels of local public spending ... The conventional response has been to attribute renter support for larger public budgets to a form of fiscal illusion, the erroneous perception on the part of renters that they face a zero (or very low) tax-price for local services. But ... it may be the case that property taxes are not fully and expeditiously shifted onto renters [so that] ... they [actually] face a relatively low tax-price.

In a similar vein, Banzhaf and Oates (2013, p. 520) recently argued,

A number of papers have found that communities with more renters appear to support higher levels of [local] public expenditure ... [This] finding is consistent with the notion of 'renter illusion,' in which renters mistakenly believe that property taxes are not passed onto them. Others have argued that this is not an illusion, but actually true, because such taxes are capitalized into housing values or because renters, consuming smaller housing bundles, can partially free ride off of owners of larger housing units.

If renters literally believed that property taxes could not be shifted forward to their monthly rental bills, then landlords might at least attempt to shift the burden of higher

⁷ Admittedly, Dusansky, Ingber, and Karatjas (1981) did not find empirical evidence of the interdependence of the rental and owner-occupied segments of the housing market. However, in my opinion, that single study does not provide sufficient evidence to discard the theoretical argument that there is a single housing market.

taxation to their tenants. However, recent research suggests that differences in market and voter behavior between tenants and homeowners may not reflect misperceptions held by renters. Martinez-Vazquez and Sjoquist (1988, p. 429) have argued

With property tax financing, homeowners have an incentive to support efficient levels of government service provision. Renters of equal income and tastes, however, are indifferent among alternative levels of government service provision ... The main difference between renters and homeowners is that the former can always escape paying the property taxes required to fund the government service by [moving] ... Homeowners wishing to exit, on the other hand, may have to take a capital loss arising from the capitalization of 'excessive' public spending into their home values.

The authors conclude that landlords can shift property taxes to their tenants only if their tenants are willing to pay for the local government services financed by those taxes. In their empirical study of open-space bond referenda, Banzhaf and Oates (2013, p. 533) fail to detect a renter effect in voter behavior.

Oates (2005, p. 428) draws the proper conclusion, I think, from this literature:

[To] distinguish between the fiscal illusion explanation and the incidence explanation (or some combination of the two) would require a fully specified structural model along with a rich body of micro-level data that explicitly differentiates between preferences of home owners and renters. It presents a challenging and important task for further research.

VI. CONCLUSIONS

Let me close by returning to the questions that began this paper. What do we know about the incidence of taxes on rental housing? What additional research needs to be done in order to improve our understanding of the extent to which renters bear the brunt of taxes levied in the housing market?

An answer to the first question hinges fundamentally on assumptions about the elasticities of rental housing supply and demand. Orr (1968) initiated the modern discussion of tax incidence by observing that the supply of rental housing capital is probably less than perfectly elastic and that demand for rental housing in a single jurisdiction within a metropolitan region is somewhat elastic. In his partial equilibrium framework, these elasticity assumptions imply that landlords would bear most of the tax differentials levied on land and improvement values. As Heinberg and Oates (1970) pointed out, however, the econometric estimates reported by Orr (1968) were less than persuasive.

Somewhat later, several authors argued (and correctly so) that one needs a general equilibrium framework in order to generate hypotheses about tax incidence in housing

markets. In perhaps the most sophisticated of these efforts, Lin (1986) posited an economy with housing and non-housing production sectors, three factors of production including land, and multiple taxing jurisdictions with full mobility of capital and labor. In a model of this complexity, predicting tax incidence is a complicated matter. Lin (1986) predicted that a higher property tax in one jurisdiction might benefit workers and harm owners of capital but would have an ambiguous impact on owners of land.

Empirical testing of more complicated general equilibrium models of tax incidence in housing markets is still in its infancy. One recent advance is that of Muthitacharoen and Zodrow (2012). Using a simulation model calibrated using U.S. input-output data, the authors found that the incidence of a higher property tax would fall mainly, but not entirely, on the residents of the taxing jurisdiction. However, declines in nonresidential land rents elsewhere suggest that a portion of the burden of the tax hike would be exported to other localities.

What needs to be done to advance our understanding of tax incidence in the rental component of housing markets? One line of research would recognize that nonprofits are a major source of rental housing supply in some U.S. cities. Hence, additions to the housing stock in those cities are not motivated entirely by builder expectations of private profit. Another line of future research would carefully analyze the ponderous dynamics of the housing market and the need to incorporate realistic time lags in empirical tests of hypotheses about tax incidence. The possible importance of apartment vacancies in limiting rent changes after a tax hike also needs to be explored. Finally, future research needs to acknowledge that consumers make simultaneous choices about quantity and quality of housing services and housing tenure. Owner occupancy and tenancy are outcomes in the housing market as a whole, not features of two distinct markets. Whether renters' illusion is a facet of housing demand that is relevant to tax incidence studies is also worth exploring.

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