
The Consequence of Taxing Land Value

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The literature examining the link between the intensity of urban land use and methods of local finance is examined. The widely held notion that the switch from a general property tax to a land value tax would increase land use efficiency, reduce urban sprawl, and help preserve the environment is challenged. The traditional view of land development holds that a tax placed on land is capitalized and leaves resource allocation unaffected. No excess burden is created because developers and landowners can do nothing to reduce their tax liability. Taxes on improvements to land, however, create burdens that can be reduced by lowering development density and causing the city to spread more than it would under neutral tax. Recent theories challenge this view and suggest that, under certain conditions, the land value tax promotes urban sprawl more than does the property tax. Variants of the land value tax as applied in special districts appear attractive, but the empirical literature is inconclusive as to the spatial consequences of land taxation.

Moral imperatives drove the quest for land value taxation in nineteenth-century England. During the 1960s, economic arguments added support for the instrument. By contrast, need drives today's interests. Financing is crucial to the maintenance and management of cities; and money to pay for services, intramunicipal coordination efforts, the development of jobs/housing balance, and a number of other growth management strategies is often inadequate. The quest is for "creative and innovative" methods of finance that will generate revenues without much pain. In this quest, "every means of finance that could be envisaged has

been tried" (Nicholas 1993, 201). Nevertheless, taxes on land appear worthy of further consideration because they can be tied to the land value increases that are brought about by public infrastructure investments. Impact fees cover infrastructure costs directly, and these instruments have been examined by many people including Snyder and Stegman (1986), Porter (1988), Nelson (1988), Alterman (1988), Connerly (1988), Kirwan (1989), Skaburskis (1990), Singell and Lillydahl (1990), Skaburskis and Qadeer (1992), and Altshuler and Gomez-Ibanez (1993). This article considers a pure tax—a payment for which nothing *specific* is offered in return. It looks at the consequences of moving from a general property tax to a land value tax.

The article begins with the historical views that establish the attractiveness of land value taxes, including the expected consequences, and the relationship between choice of tax base and city form. The possible consequences of a policy to tilt tax rates to favor buildings at the expense of their land component are also reviewed. The traditional analysis that favored the land value tax is presented briefly before engaging the more recent articles that should qualify the recommendation to pursue this option. The literature review documents the substitution effects and then the timing consequences of a shift toward land value taxation. Efficiency and equity issues are raised, as are practical concerns. Finally, the empirical literature is reviewed, followed by the conclusions.

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EARLY HISTORY

Adam Smith dispelled the notion of land rents as a cost that drives up the price of produce. Land rents are a payment for the use of land. They are a residual created by the difference between the market price of produce and its cost of production. Land rents always arise because "land, in almost any situation, produces a greater quantity of food than is sufficient to maintain all the labour necessary for bringing it to market" (Smith [1776] 1970, 133). There is always a land rent, even in "the most desert moors in Norway and Scotland" (p. 133). And what are the consequences of land rent? They feed the gentry and maintain one of

the three great, original, and constituent orders of every civilized society. Land rents provide the sustenance for the landowner class, a group of people who are the only one of the three orders whose revenue costs them neither labour nor care, but comes to them, as it were, of its own accord, and independent of any plans or project of their own. That indulgence, which is the natural effect of their situation, renders them too often, not only ignorant, but incapable of that application of mind which is necessary in order to foresee and understand the consequences of any public regulation. (p. 230)

Surely a tax on land rent is justified not only on equity and efficiency grounds but by its promise to structure society. Ricardo's ([1817] 1969) rent was "that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil" (p. 33). He formalized the classical view of land rent as a residual arising from prices being set at margins and particular sites offering advantages that reduce production costs below those of the marginal producers. Taxing rents leaves the margins unaffected. No price effects can be created by such taxes, and no excess burdens are generated as people can do nothing to reduce their tax burden: land is fixed in supply and will be there regardless of taxes. Land rent is created by population growth raising the market prices of produce. Rents do not cause inflation. The public can claim the rent without adverse consequences on the efficiency of resource allocation or on the equity claims of consumers. So it was thought.

Marx ([1887] 1962) reworked Ricardo's differential rents during the late 1800s and introduced the concept of absolute rent after referring to Smith's perhaps questionable observation of rents being paid even in the remote moors of Scotland and the forests of Norway. Absolute rent is not a residual; it adds to costs. Landed property creates the rent as a means by which the following occurs.

One part of society thus exacts tribute from another for the permission to inhabit the earth, as landed property assigns the landlord the privilege of exploiting the terres-

trial body, the bowels of the earth, the air, and thereby the maintenance and development of life. (p. 755)

Taxing land rents is now only a second best option; the best is a restructuring of cities and regions in ways that eliminate all rents. How to do this efficiently has eluded Marxists and neo-Marxists. Lenin had no patience with the moral problem because its solution was simple: leave rents but have the state appropriate them. Land value taxes emerged as a spark on the anvil of revolution.

George ([1879] 1970) brought the plea for land value taxation to the New World and encouraged experiments in Australia and New Zealand. Not only was taxing land morally and politically correct, it was a panacea. If rents are the residual between market prices and production costs, then all the benefits of technological progress that reduce costs will increase both the residuals and the girth of landowners. The benefits of progress, many thought, would all go to the landowners. The true land value tax base was progress itself.

The panacea was dispelled when Wicksteed (1933) proposed and Wicksell (1934) proved that land rents, as the classists' residuals, were the same as the neoclassicists' factor payments. As factor payments, landowners would receive only the share of revenues that is appropriately attributable to the productivity of land. Factor payments are set by the value of their marginal product. Landowners can gain only a share of progress, and the land value tax base has limits to its growth.

The equity and efficiency arguments brought out by the classical economists provided the reason for experiments in land value taxation in the United Kingdom, Australia, New Zealand, and the United States. It supported the tilting of property tax rates to favor improvements at the expense of land in the western provinces of Canada. The equity arguments and the apparent ease of taxing land made the instrument attractive to city planners. Land could not leave a jurisdiction. The lack of adverse efficiency consequences of the tax on land value and its absence of excess burdens made the tax appear as the exception to prove the rule proclaiming the nonexistence of free lunches. Moreover, the move to land value taxation might solve some of our most pressing planning problems created by urban slums. Rawson (1961) saw the planning advantages of land value taxes:

To exempt improvements and at the same time tax land more heavily would provide a double incentive to the owners of derelict buildings to demolish them and to use the land more intensively. Here surely is a golden key to urban renewal, to the automatic regeneration of the city—and not at public expense. (p. 28)

Browning (1963) saw the move to land value taxes as a means to obtain urban renewal goals and reduce the "need for restrictive measures such as zoning. . . . A well

designed tax structure could offer a much needed supplement to traditional planning controls" (p. 308). Legler (1970) stressed the importance that city planners learn about the likely effects of property and land value taxes. He also questioned "the assumption . . . that changing the form of property tax would . . . eliminate or reduce the need for better planning" (p. 1). While everyone could agree on the neutrality of the tax on land value, difficulties emerged as to the consequences of the property tax. Fifty years ago, Simon (1943) reviewed the literature and concluded that while "there has been common agreement among two generations of economists . . . as to the fundamentals of tax incidence theory, no consensus has been reached with respect to the incidence of a tax on urban real property" (p. 416). The tacit assumptions and the errors Simon pointed out have been corrected now, and there is general agreement among theorists as to the likely consequences of property taxes. Nevertheless, in his recent review of the current empirical literature, Lusht (1992) found, contrary to early expectations, that

the focus has been on how a shift in the tax base from capital value to site [land] value affects the incidence of the tax, and more recently, how it affects development patterns. Results are mixed, and it is fair to observe that there is an empirical outcome to fit almost any set of speculations. (p. 1)

DEFINITIONS

In most parts of the world, property constitutes the main local tax base. The property tax is levied on the value of the improvements to the land and the value of the land. Improvements are not only buildings but also the work needed to make the land buildable or to improve its quality. Retaining walls, drainage systems, and soil or subsoil stabilization measures are all improvements that constitute a part of the property tax base; yet, in theory, all of these improvements are excluded from land value calculation. In practice, the distinction between improvement and land value can be problematic. Land value as reflected by its market price is the present value of the future stream of rents that the land will yield. But the rents are connected to improvements because the stream of rents attributable to the land depends on the building that is on it. In a changing environment, the interdependence of the value of improvements and the value of land can become complicated, as illustrated by Schall's (1971) hypothesis, which was tested by Skaburskis (1982), explaining how property prices can drop as a result of consequences that increase land value. The increase in the value of a site in its best use may reduce the value of the current improvement.

The purpose of this article is to search for the effects of a policy that tilts the tax rates in a way that reduces the burden on improvements while increasing it on the

land component. A 100 percent tilt would replace the property tax with a tax on land value. Alternative taxes are mentioned only in passing. A land rent tax or site rent tax considers only the current value of the land in its present use. If the use of land is fixed for all time, then the distinction between land value and land rent is unimportant and taxing the rent would be equivalent to taxing its present value. Development profits taxes are taxes on the increase in land value resulting from the change of its use. These taxes have been analyzed by Evans (1982).

In this literature review, only the land value and the property tax are considered because there is little disagreement about the neutrality of the traditional land rent and development profits taxes. The focus is on the substitution and then the timing effects of a move from a general property tax to a land value tax. A tilt in the tax rates that reduces the rate on improvements while increasing it on land will reduce the apparent cost of capital and encourage developers to use land more intensely. This means that the policy should promote larger buildings on a given lot or smaller lots for a given building volume. Density and the intensity of land use are considered here as a measure of the amount of capital placed on the land. Capital is usually translated into floor space but may also be attained by building more luxurious houses. An increase in the capital intensity of land use will, in general, be seen as an increase in building and population density.

Efficiency of land use is defined indirectly and simply as the absence of waste. Development timing decisions and project densities are inefficient if they are, in part, influenced by the behavior whose prime purpose is avoidance of tax burdens. An excess burden is the loss in welfare caused by the behavior modification induced by a tax in the absence of externality considerations.

CHANGING VIEWS ON LAND VALUE TAXES

The traditional assessment of the general property tax separates the tax base into a land and a building component. Netzer (1966) pointed to the neutrality of a tax on the land portion of real estate "since no possible response to the tax can . . . improve the situation, assuming that landowners have been making maximum use of their sites prior to the imposition of the tax" (p. 204). The tax on improvements, however, distorts the returns a property owner can gain from the building relative to the returns that can be gained from alternative investments. The tax on improvements to land raises the perceived cost of buildings, and an owner can reduce his or her tax burden by choosing options that use more land and fewer improvements. This leads to lower than optimum densities and forces the city to spread more than it would had a perfectly neutral tax been used to finance the needed local services and infrastructure. The

planning and growth management implications are obvious.

Recent developments in economic theory examine the time dimension of profit-maximizing behavior and show how a tax on land can affect behavior by changing the landowner's propensity to hold land vacant while waiting for more profitable future development options. The recent literature shows that taxes on land value can affect the conditions determining a developer's decisions about project type and density. Because demand for housing changes with time, the relative price of different types of housing is also expected to change. With city growth, optimal project densities increase and taxes that change timing decisions change density profiles and affect the spatial structure of cities.

The new urban economic models suggest that a land value tax is not neutral; at least, a tax on what most people consider as land value is not neutral. A neutral land tax would require assessment practices that ignore the specific circumstances of sites and would redistribute wealth regressively. In some cases, the switch from a general property tax to a land value tax would increase rather than reduce the price of land. Under other circumstances, land value taxes would stimulate suburban expansion and counter the goals that give rise to the quest for methods of financing the local government services and infrastructure that can reduce some of the costs of growth. The traditional view of land taxation is now qualified by factors relating to developer behavior.

SPRAWL, SPECULATION, AND WELFARE

Continuing rapid urban growth coupled by increasing sensitivity to environmental issues has raised the profile of urban growth issues and forced planners to think again about the virtue of city growth and the way it should be managed. The spread of cities has created congestion costs and pushed away the countryside. "The law of urban growth," writes Mumford (1961), "meant the inexorable wiping out of all the natural features that delight and fortify the human soul" (p. 426). The control of sprawl has early precedents:

The Lord commanded Moses to protect pasture lands in perpetuity around Levites' cities, stretching in an arch 1000 cubits all round: Numbers 35; 1.4 and Leviticus 25:34. (Nixey 1991, 2)

Until quite recently, the spread of cities was confined by defensive walls. The spillover population formed "faubourgs," the early suburbs pushed outside the walls but clinging to the city gates. Contiguity of development was ensured by the value of a quick run to the gates and the residents' hope that enclosure by a city wall would come sooner rather than later. Saalman (1968) and Degrove and Metzger (1991) list current techniques for combating sprawl.

The spread of cities is determined by the density of the built form and by the amount of land held vacant within the urban periphery. It is affected by the turnover rate of buildings and their redevelopment date, which are both affected by taxes. The substitution between land and buildings and the timing of development affect how much is built on a lot and, therefore, how many and what size lots are needed to accommodate the population. The timing of development affects the amount of vacant land within the extended urban realm and the intensity with which the land is used. Because the more intense use of land reduces the spread of the city and because development timing affects both the density of projects and the amount of vacant land within the city, the substitution and timing consequences of taxes affect the shape of cities.

Traditionally, urban sprawl was defined as the non-contiguity of development that forced the urban boundary farther than it need be (Clawson 1962). Harrison and Kain (1974) compared density profiles and concluded that the "differences in urban form among U.S. urban areas are due to differences in the timing of their development" (p. 64). Gross densities, they observed, are decreasing. Los Angeles is less dense than Boston because most buildings in Los Angeles were built later than those in Boston. The decline in gross densities over time is a result of the reduced density of suburban houses and the "scattered" nature of development. The observed spread and diffusion of city boundaries raised welfare concerns that were documented in the Real Estate Research Corporation's (1974) publication, *The Cost of Sprawl*. Noncontiguous development was caused by speculators holding land vacant for future development, and many planners thought that speculation in land was a bad thing.

Neutze (1970) thought that some speculation was socially beneficial in that it keeps some sites vacant until their most valuable long-term use is clearly established. Most speculation, however, just increased land price and contributed to an ugly landscape. Bentick (1972) saw speculation as reducing the costs of unplanned and uncertain land use by reducing the extent of capital obsolescence. Better planning would reduce the social value of speculation and the holding of vacant land within the urban periphery.

Ohls and Pine (1975) and later Ottensmann (1977) asked whether there were conditions under which non-contiguous development could actually increase social welfare. They determined that the answer depends on the discount rates and the population growth rates. Increasing density reduces the value of housing services; people see themselves as being better off when they occupy lower rather than higher density housing. According to Ohls and Pine, social welfare can be improved in a growing city when inner-city land is left vacant

for later high-density development. The current cost of the extra commuting time spent by the leap-frogged suburbanites reduces welfare less than an increase in current densities, provided the discount rate is neither very low nor very high. Welfare is improved by noncontiguous development by postponing the time when more people have to live in more dense housing, and these projects have to be closer rather than farther from the city. They conclude that "speculation may be exactly the mechanism that leads to efficient allocation" (Ohls and Pine 1975, 232). Speculators hold land vacant until its sale yields the highest expected profit. Speculation is the act of deciding development timing issues in favor of waiting.

Mills (1980) considered commercial and housing land uses and introduced uncertainty to demonstrate how noncontiguous development can, overall, be the most efficient pattern. He distinguished the misallocation of land in an *ex post* and an *ex ante* sense:

It is true, in an environment of uncertainty, that the land market will waste or misallocate land in an *ex post* sense. It is all but certain that some early decisions would be altered if landowners could foresee actual future conditions, rather than being uncertain. And these changes, it is needless to say, would diminish sprawl. But this is an empty concession. A fair criticism of the land conversion process and the development patterns produced must be based on *ex ante* considerations; to do otherwise is to confuse good *decisions* with good *outcomes*. . . . The collective result of any decentralized decision-making is *ex ante* efficient. (p. 223)

In an uncertain world, some level of inefficiency will prevail. The policy question that is beyond the scope of this article asks for the balance in the relative power of market and planning processes that determine how much and what type of land should be reserved for future development. Capozza and Helsley (1989) observe that "discontinuous development can be pareto efficient in a dynamic context" (p. 296). Apparent sprawl is not all bad as it may yield the highest density of development in an uncertain and changing world.

Altshuler and his colleagues (1981) challenge *The Cost of Sprawl* in a literature summary presenting a "defense of market dominance" (p. 382). Most Americans like low-density living, and the costs of sprawl have been overstated. "Fears of crop land shortages are unwarranted, and the advocates of high density typically exaggerate both the magnitude and ecological significance of the differences" (p. 383). "Most of the alleged evidence that high densities entail large energy savings dissolves upon close examination" (p. 385). "Construction cost and community service economies claimed . . . as benefits of high density were mainly attributable to dubious assumptions" (p. 389). Peiser (1989) showed that sprawl costs only 3 percent more than planned development. Peiser (1989, 1990) demon-

strated empirically that the land that was skipped over by the first phase of city expansion was developed at higher densities. Over the long run, noncontiguous development can help contain the spread of cities. Speculation can help save the countryside.

Scholars of the urban fringe Arthur Nelson and Gerit Knaap have documented the external costs of peripheral growth and dealt extensively with policies for controlling sprawl (see Nelson 1986, 1992; Knaap and Nelson 1988; Knaap 1985). Nelson (1992) pointed to the distortions that keep agricultural land prices artificially low while inflating the price of urban land. He concluded that, as a result, "vastly more farmland is removed from production than should be" (p. 484). The distortion caused by fiscal, regulatory, and infrastructure policy makes farmland preservation policies ineffective and "unwittingly accelerate[s] the conversion of farmland districts to hobby farms or low-density urban subdivisions" (p. 484). The need for regulatory policies including "urban growth boundaries, urban service limits, urban stop lines . . . has been extensively and persuasively made" (p. 479). The radical correction of sprawl, however, can create perverse consequences. Exurban, rural residential urbanites may flee edge cities, and "the effect of edge cities may be to push the urban field [farther] out than would be expected without this influence" (Nelson 1993, 1683). "Solitude," Aldos Huxley observed, "is retreating at the rate of two and half meters an hour."

In his award-winning review of the literature on discontinuous urban growth, Rodrigues-Bachiller (1986) concluded that the published academic work deals mostly with the American city in which "anomalies like discontinuity are explained as *unfinished* cities, as unfulfilled processes" (p. 100). The definition of sprawl as a problem is colored by professional orientation. Economists tend to look to decentralized decision processes while city planners are usually less tolerant of obvious, perhaps temporary, problems. The evaluation of the means by which development ought to occur is made difficult by the uncertainty as to the nature of the "finished" city that serves as a goal for planning. While there is no agreement as to the magnitude of the costs and benefits of sprawl, most will agree that better decisions are made by planners who are knowledgeable of policy side effects and landowners who are unswayed by distortionary taxes.

SUBSTITUTION EFFECTS

Brueckner's (1986) comprehensive analysis of the substitution effects of property taxes considered the equilibrium conditions that result when competition among developers drives profits to zero. The general assumptions are that all returns to development are in the form of normal profits included in construction

costs and that the returns to landowners are in the form of site rents. Brueckner examined three contexts. The first develops the long-run effects of a change in the tax base while housing prices are set exogenously, as might be the case when the policy is implemented in one of many metropolitan area municipalities. The second considers a metropolitan-wide policy and recognizes that housing prices will change as a result of the new policy. The third identifies the short-run effects, the immediate winners and losers.

Case 1: Geographically Limited Changes in Tax Rates

Brueckner's analysis shows that an increase in the tax rate on land value, while holding revenues constant, usually allows a reduction in the tax rate on improvements. The increase in the tax rate on land value does not affect the intensity of land development while all other factors remain constant. A reduction in the tax rate on improvements, however, increases development intensity in the jurisdiction that attracts new development as a result of the policy. Tilting the tax rates away from the building and toward the land component of property encourages the more intense use of the land and promotes the evolution of a more efficient spatial structure by reducing distortions. These conclusions correspond with the traditional view of land value taxation and provide support for considering this alternative seriously.

The increase in the tax on land value is capitalized into land prices and reduces the apparent size of the tax base. Brueckner's analysis shows that the reduction of the tax on improvements increases development activity and that the higher demand for land by builders puts upward pressure on land prices within the jurisdiction. The net effect of the increase in the tax rate on land coupled with a revenue-equalizing decline in the rate on improvements normally leads to an increase in land values.

The surprising implication of the analysis is that the positive effect of the lower improvements tax dominates, so that *graduation unambiguously raises the value of land.* (Brueckner 1986, 52, emphasis added)

This conclusion departs from the traditional view that would have all land tax burdens capitalized back into land value. It depends on the exogeneity of housing prices. Land prices can, at least, be unaffected when the tilt in tax rates is implemented over a small enough part of the housing market to leave the overall supply of housing in the region unchanged. The policy simply redistributes development activity. Density goes up as the substitution effect of the property tax is eliminated. A land value tax implemented in a special district can increase development activity, raise project density, and stimulate the market price of land. Land taxes do not always hurt landowners.

Case 2: Metropolitan-wide Tilt in Tax Rates

When the tilt in tax policy applies across the urban region, housing prices are affected and the profit-maximizing conditions have to be established after considering the adjustments between demand and supply that reestablish equilibrium. Brueckner determined that the regionwide tilt increases property density and the amount of development in the region. Housing prices must drop to allow the market to clear as a result of the initial burst in development activity, and a drop in housing prices normally reduces land values when housing demand is inelastic. A general equilibrium analysis by Grosskopf (1981) also concluded that the move from a general property tax to a site value tax will usually, but not necessarily, reduce land prices. The housing price reduction lowers land prices, but the drop is partially offset by the increase in the demand for land from the resulting increase in the amount of development that takes place in the region.

Other implications of interest are developed by recognizing that the price effect of the tilt in tax rates is governed by the elasticity of demand for housing. Higher income people are likely to have more elastic housing demand schedules because they can more easily substitute other goods and services for housing in response to price changes. The tilt in tax rates across a metropolitan area will, therefore, favor the owners in the wealthier municipalities when the price elasticity of demand is greater in absolute magnitude for wealthier people. When this is true, the tilt policy brings about regressive income redistributions across land and homeowners in the region. The move to a land value tax may not be entirely fair.

Case 3: Short-run Redistribution Effects

In the long run, "housing producers should be indifferent to the features of the property tax system since profit is identically zero" (Brueckner 1986, 55). This quite normal assumption may reduce the persuasiveness of the conclusions. "An old tax," George Break used to say, "is a good tax" (verbal communication in a lecture on public finance at the University of California, Berkeley, 1973). With time, anomalies and secondary consequences are capitalized into land prices, and decisions are made in light of future tax obligations and burdens. In the theoretical long run, no one makes above-normal profits by virtue of the assumptions used in the model. In the short run, a change in tax rates creates adjustment costs in the form of capital gains and losses.

Brueckner's analysis of the short-run effects of the tilt in tax rates considers exogenously set housing prices that decline with distance from the city center. The capital intensity of real estate as well as land value declines with distance from the city center. The tilt in tax

rates changes the revenues collected in different parts of the city because the ratio of land to property value changes systematically with distance from the center. Areas with proportionally higher ratios of land value face greater burdens as a result of the tilt policy.

The ratio of land to improvement value was shown by Brueckner to decline with distance from the city center whenever the elasticity of substitution between capital and land is less than 1. As land value declines with distance from the city center, the land component of housing services becomes less expensive to use. As the cost of a factor declines, relatively more is used. The tilt policy would have no spatial effects if a decline in the price of land would result in a proportionally equal decrease in the amount of the improvements placed on the land (while keeping the output of housing services constant). It would have no redistributive effect if a 10 percent decline in land value resulted in a 10 percent increase in the amount of land used to produce the same level of housing services. Because complete one-to-one substitution between land and improvements is not possible for technical reasons, the ratio of land to improvement value declines with distance from the center in Brueckner's model. This led him to conclude that the tilting policy would create greater short-term losses on the most intensely developed parcels.

This result might, at first, appear counter intuitive since parcels with high improvements per acre stand to gain the most from lower improvements tax. This observation, however, ignores the fact that such parcels also have a high land value which makes an increase in [the land value tax rate] especially burdensome. (Brueckner 1986, 55)

Brueckner extended the conclusions to illustrate the incidence of the gradation on different land uses. Referring to impact analysis carried out elsewhere, he concluded that

typically findings show that many commercial and industrial properties would face higher taxes, while single family homes would generally benefit from lower tax bills. (Brueckner 1986, 56)

This conclusion is dependent on the assumption that the elasticity of substitution between land and capital is less than 1. This assumption is reasonable and was verified empirically for single-family housing by Ellson and Roberts (1982) and by Sirmans et al. (1979). It may hold true within a residential building type and possibly across a relatively uniform suburban municipality. It may not hold across an urban region containing many land uses. The ratio of construction cost to land value for Class A office buildings in a large downtown is in the seven-to-one range. Ratios for single-family suburban houses are in the three-to-one range depending on market conditions and amenity attributes. Within the office sector, the elasticity of substitution between land

and built space may even be greater than 1 should zoning constraints allow variation of building bulk. If the elasticity of substitution is greater than 1 when considering that distance also changes building type, then the tilting of tax rates would create windfalls for inner-city commercial developments while generating losses for the owners of deteriorated inner-city apartment buildings. The suburban residents with the highest land-to-improvement ratios would lose the most. The empirical studies discussed briefly at the end of this article support this conclusion. The land value tax, it appears, should hurt the middle-income homeowners the most while reducing the burden for the owners of healthy inner-city commercial property. Low-priced inner-city housing on good land will be lost as a result of the tilt policy.

TIMING CONSEQUENCES

Development Timing and Land Value

Marx (1887/1962) recognized the connection between development timing and land value.

The mere legal ownership of land does not create any ground-rent for the owner. But it does, indeed, give him the power to withdraw his land from exploitation until economic conditions permit him to utilize it in such a manner as to yield him a surplus, be it used for actual agricultural or other production purposes, such as buildings, etc. He cannot increase or decrease the absolute magnitude of this sphere, but he can change the quantity of land placed on the market. Hence . . . it is a characteristic fact that in all civilized countries a comparatively appreciable portion of land always remains uncultivated. (p. 739)

Markusen and Scheffman (1977) discuss the monopoly characteristics of land holdings in the Toronto area, but most analysts consider urban fringe land markets as being competitive and driven by a variety of expectations and plans (Brown et al. 1981). Even so, Markusen and Scheffman (1978) show that "the existence of monopoly power is not sufficient for the exercise of monopoly power and, therefore, for resource misallocation" (p. 423). The monopolist gains an increase in ground rent by holding land vacant but forgoes development profits. The profit-maximizing monopolist may develop land faster than can a competitive industry.

Holding land vacant allows its price to increase, and

if the value of land increases faster than inflation, then density can always be increased by delaying development. Fortunately, one has to live somewhere while one is waiting, so towns get built anyway, though perhaps not optimally. (Breslaw 1990, 467)

Additional equal increments of price increases are continually translated into lower rates of return on the land investment. For an equilibrium to be attained at which

land is worth holding as an investment, the value of land must appreciate in tandem with other investments. How land value and property taxes affect the equilibrium development timing conditions and project density are discussed next.

The Costs and Benefits of Waiting

Hotelling (1931) showed that a market equilibrium requires that developable land appreciate in value at a rate equal to the interest rate. If vacant land is to be held as an investment, then an equilibrium can be maintained only if it yields a return equal to the yield offered by the next best alternative available to investors. Wicksell (1934) developed timing conditions by examining the potential profits of a landowner waiting for his or her trees to grow before being harvested. Waiting is profitable in that it allows the trees to grow larger and yield more lumber after they are cut down. Waiting, however, involves the loss of the opportunity for early gains from the sale of lumber and the use of the funds. As the owner of land near the built-up part of a city waits, the city usually grows and the intensity with which the site can be developed increases. As in the timber case, waiting to build later may allow more intense uses of the land and, thereby, yield more profitable developments. Waiting, however, is costly because it postpones the collection of rents and precludes the alternative use of the money.

The relative benefits and costs of waiting are affected by policy and by changes in the rates at which land and buildings are taxed. The following sections show how land value and property taxes can change the value of waiting and thereby the intensity with which land is used and the amount of vacant land within the city. Changes in project density will eventually affect the extent to which the city expands into the countryside.

Shoup (1970) examined the profit-maximizing timing conditions for a landowner considering the development of vacant land. He dispels the traditional notion that "development or redevelopment would or should occur as soon as the development value of a site, net of clearance costs, exceeds the value of the existing improved property, as is sometimes stated" (p. 40). The landowner's profit-maximizing development timing is achieved when the rate of change in the value of the development that could take place on the site (i.e., the investment value of holding vacant land) is equal to the interest rate available on comparable alternative investments. The value of the profit-maximizing development that can be built on a particular site increases with time when the city is growing because the nature of the best project that can be built on the site changes. Waiting is profitable while the rate of increase in the present value of the most profitable project exceeds the rate on alternative investments. When options change over

time, timing decisions affect project density directly and city spread indirectly.

Arnott and Lewis (1979) expanded on Shoup's work by explicitly considering the change in the capital intensity of real estate development. The city is assumed to grow at a constant rate, and housing prices increase accordingly. Landowners wait while land values grow at a rate greater than those that can be obtained through other investments. Landlords pick the development time that maximizes the difference between the present value of rents and the construction cost. To simplify, land rents before development are zero, buildings do not depreciate, and rental rates are expected to increase at a constant rate. Arnott and Lewis maximize the landowner's profit function with respect to T , the development time, and K , the capital applied to land. They maximize

$$\frac{\max}{T,K} L(T,K) = \int r(t)Q(K)e^{-it} dt - pKe^{-iT} \quad (1)$$

where $L(T,K)$ is the present value of a unit of land if it is developed at time T with capital stock K (i.e., a building whose construction involves K abstract units of capital); $r(t)$ is the rental rate of a unit of housing at time t and this is assumed to grow exponentially at a constant rate; $Q(K)$ = output of housing on a unit of land using K units of capital; $K[Q'(K) > 0, Q''(K) < 0]$, showing that the amount of housing services increases with the level of capital investment at a decreasing rate; i is the interest rate; and p is the price of a unit of capital (pK is the construction cost and e^{-iT} is the discount factor. (p. 162)

Their analysis shows that the profit-maximizing time of development occurs when the ratio of the cost of improvements to the property value (improvement plus land value) is equal to the ratio of the interest rate less the rate of growth in rents to the interest rate; that is,

$$\frac{\text{Construction Cost}}{\text{Construction Cost} + \text{Land Value}} = \frac{\text{Interest Rate} - \text{Rate of Growth Rents}}{\text{Interest Rate}} \quad (2)$$

This condition suggests that profit-maximizing developers wait until the rents forgone by not developing are equal to the interest paid on the construction cost of the project. The analysis shows that the profit-maximizing developer uses the land at the intensity that sets the output elasticity of capital in producing housing services equal to the ratio in equation 2. This condition implies that the extra cost of increasing the size of the building that is placed on a lot should equal the present value, at the time of construction, of the resulting increase in future rents. This conclusion is of little surprise and provides comfort in the assumptions used in its development.

Two conclusions of interest to city planners fall out of Arnott and Lewis's work. Changes in construction costs do not affect the optimum intensity of land devel-

opment. Increases in city growth rates, however, increase the rate at which property values appreciate and lead to more intense land use patterns. As expected, an increase in the city's growth rate makes development more profitable. This does not mean that a profit-maximizing developer would make housing units proposed for a site more expensive or more luxurious but means that the increase in expected future returns allows the additional extra units even when they cost more to produce. Optimum project density should increase. When zoning constraints apply, an increase in city growth rates will make the development of more difficult sites profitable.

Arnott and Lewis (1979) introduced a property tax into their development timing model and allowed the pre- and postdevelopment rates to vary. Only the pre-development tax is seen to affect project density and, therefore, city spread. Anderson (1986) confirmed the effects on timing and showed how changes in land values determine how taxes affect timing decisions. Taxes increase the cost of holding property vacant and favor its early development. This means that the project's profit-maximizing land/capital ratios are established in the context of lower housing prices. Early development means that less capital is used to improve sites. Project densities are reduced.

Distinguishing between Land Value and Land Rents

Bentick (1982) expanded on these conclusions. He considered the relative value of projects yielding immediate returns and projects that can be developed only at some future point in time either because of an expectation of technological change or because landowners are waiting for the "market to ripen." He illustrates the importance of the distinction between a tax on land value and a tax on land rents.

Taxes on the market price of land favor projects offering earlier returns. The value of future projects is capitalized into current land value as defined by its market price. The value of future projects is, therefore, subject to taxation today, and the move toward land value taxation increases the cost of waiting. Both the property and the land value tax penalize the holding of land for late development projects by taxing the value of the projects well before they are built and yield revenue. Bentick and others have shown that a tax on land rents does not distort development timing because the tax burdens arising from the potential development are felt after the project is built and yields financial returns. A tax that does not change behavior creates no excess burden to society. It creates no cost other than that attributable to the taxpayer's loss of control over the forfeit revenue.

Land taxes which are based on the current market value of land, as opposed to its current rentals, divert land and

saving from investment projects with a long gestation period to those which produce returns relatively quickly. This is because the market value of land reflects its future rentals, so that a tax on market value causes taxes to be levied ahead in time of the returns on which the tax is based, thus creating a liquidity problem which cannot be resolved by a perfect capital market. The effect is similar to an increase in the rate of interest, and the tax therefore has important implications for the efficiency of allocation of land and saving within and between forestry, agriculture, urban construction, and mining, none of which can avoid the use of land. (Bentick 1979, 860)

Mills (1981) considered endogenous land market adjustments caused by the distortions brought about by land value taxes. He recognized that a policy favoring projects with early returns leads to the undersupply of projects offering higher but later returns; this raises the market value of the late yielding projects, and this should, in turn, encourage the holding of vacant land. Despite this secondary consequence, the general conclusions developed earlier hold true: a land value tax hastens development, as does an increase in interest rates. High interest rates and high land value tax rates favor development plans yielding immediate rather than late returns. And early development is less dense than late development. Moving from a property tax to a land value tax substantially raises the rate at which the land is taxed and may, therefore, create a considerable timing distortion that creates a welfare loss through reduced density of development:

The neutrality claim can no longer be maintained in the case of a tax based on land value. (The claim is sustained for a tax on land-generated income, but administration of such a tax is fraught with formidable problems.) This should provoke a reconsideration of the presumption that a site value tax is more efficient toward resource allocation than is a property tax. Granted, two distortions are operative in the latter: the traditional one penalizes capital-intensive projects and the other favors projects with early-payoff income streams. But if a property tax is to be replaced with a site value tax producing equal revenue, the tax rate applied to land value must rise significantly with the switch. While this eliminates the first distortion, it enlarges the second. It is therefore possible (although by no means certain) that the resource cost of the site value tax is actually greater than that of the property tax. (Mills 1981, 129)

The Importance of the "Land Value" Definition

Wildasin (1982) built on Mills's work. He accepted the Bentick-Mills results but emphasized that land "value taxation at *non-differential* rates amounts to per unit taxation . . . at *differential* and hence distortionary rates" (p. 105). A tax rate applied uniformly to the market value of property differentiates or creates greater burdens for property that should be developed later rather than sooner. Land value taxation based on the

market value of land is, in a sense, an excise tax that singles out a particular type of project; this creates excess burdens because people try to avoid that type of project simply to reduce their tax burden. Under market value assessment, sites that are similar in most respects will be assessed differently because of the market recognition that one site is better left for later development while the other should be developed now. Market value assessment makes the land value tax discriminate against the sites that are best left for later use. In theory, a tax on current land rent rather than on its market price will not create distortions.

Wildasin is also skeptical of the neutrality of the kind of land rent tax that could be implemented in practice. Timing distortions can be avoided completely only when the tax rate on land rent is held constant over time and when subsidies are paid for some uses some of the time. Subsidies (negative taxes) have to be offered while projects yield negative current income—during the demolition, construction, and marketing periods, for example. Wildasin showed that neutrality is maintained when the current and expected future tax liabilities are independent of the use to which land is put.

The land value tax, most agree, is neutral if it is based on a general assessment of the best use of the land independent of the *actual or prospective* uses of the particular site. The *standard value* may be based on the general characteristics of the land as established by a “*physically defined standard state*” as Vickery (1970) proposed” (Wildasin 1982, 107). The hypothetical land value of a site would be assessed without any reference to the particular characteristics of the site. Assessments would establish the hypothetical price the site would gain on the market if it met a set of conditions—for example, if it were vacant with adequate drainage and stabilized slope and, presumably, faced a set of generally neat hypothetical buildings. Wildasin is optimistic.

Whether a land value tax of the Vickery type is administratively feasible can be left to the reader’s judgment. On the face of it, such a tax would certainly seem far simpler to administer than the non-neutral tax on current market value, since the latter would require use-dependent imputations of current values, and in many cases, the market will not aid the assessor with a convenient separation of ownership of land and structures, with the land ownership frequently traded and valued in the marketplace. Perhaps in the case of land value taxation, there is a happy complementarity between neutrality and ease of administration. (p. 107)

Tideman (1982) furthered the qualifications by suggesting that our general understanding of the concept of land value is formed in the absence of specific views on the current or exact future uses of a site. In the case of existing property, land value is not generally thought of as a present value calculation but rather as a notion of the price the land might fetch on the open market if

it were vacant. Such an assessment of land value is independent of the current or specific future uses of the particular site.

When the value of land is defined independently of how the land is actually used, not only is land value closer to something that could actually be observed, but also the amount of the tax on a given site under a land value tax is independent of how the site is used, and therefore the tax is neutral. (Tideman 1982, 111)

Defining the value of land independently of its use means that downtown land is downtown land and low-priced housing in transition areas is on downtown land, more or less. The quest for efficiency counters that for equity.

The Importance of Mutable Development Options

Bentick and Pogue (1988) illustrated the dependence of conclusions regarding the timing effect of property, land, and development profits taxes on the nature of the underlying model of urban development and the assumptions regarding the extent to which future development options are seen as variable in the developer’s deliberations. The first Bentick-Pogue model depicts the case in which only one use and building type is considered. No one needs to wait for changing options. The present value of land is formed by three components: (1) the stream of net rentals based on the current use of the land up until the time it is developed, (2) the present value of the postdevelopment stream of rents, and (3) the present value of the conversion, development, and construction costs. Because the nature of the development that can be placed on the land does not change with the development date, land value cannot be influenced by changing the development date. In this case, a land value tax reduces the return to all development proportionally and does not affect the amount of development that takes place on any site. Prospective projects offering a low yield before the tax would offer a smaller but still a positive return after the tax. A property tax, however, reduces project profits by increasing the annual cost of capital and precludes development in some cases. The property tax reduces development activity, raises housing prices, and reduces the expansion of the built-up part of the city more than would an equal yield land value tax.

Bentick and Pogue’s second model presents the usual case by considering changes in development options over time up until the moment the land is developed. Construction fixes the use of a site forever. In this case, both property and land value taxes hasten development, but land taxes have the greater effect. A property tax has a smaller effect because the tax rate is smaller since it is applied to a larger base. The main difference, however, arises because the property tax has two conflicting effects on timing decisions (Bentick and Pogue

1988, 319). The increased holding cost is, in part, countered by the delaying effect of the increased cost of capital. When development options change with time, the conclusions developed earlier hold. An increase in the effective discount rate delays development when the growth rate in rents is approximately less than half the real discount (Bentick and Pogue 1988, 319).

The Net Effects of Changing Tax Rates

A move toward land value taxation hastens development and reduces land use intensity relative to the results produced by a hypothetical perfectly neutral tax. The timing effect of the land value tax counters the substitution effect induced by the excise characteristics of the property tax. At any given point in time, how much development will the city have under the two tax regimes?

The net effect of a tax on land was examined by Oates and Schwab (1992) with the use of a two-period model. An increase in the tax rate on land, holding all other conditions constant, reduces land value in the first period. This encourages early development and reduces density; the capital/land ratio (density) falls because land becomes less expensive due to the capitalization of the tax. The reduction in land costs stimulates more development in the first period than would be the case with a perfectly neutral tax.

The net effect of an increase in land value taxes on the amount of development that occurs in the first period is ambiguous and depends on the relative magnitude of the elasticity of demand and the elasticity of substitution between structures and land. Oates and Schwab note, however, that

we can also offer a conjecture on the sign of this result in practice. Typically, we would expect to find that the elasticity of demand is larger (in absolute value) than the elasticity of substitution. If the market is "small" in some sense, then demand will be very elastic, while the elasticity of substitution is unlikely to be larger than 1. Thus, except in very large urban markets where the elasticity of demand might be small, we would expect that an increase in a Bentick-Mills type land tax will increase current period investments. (p. 188)

Changing Expectations

Several articles have examined the effects of uncertainty on development timing. Clarke and Reed (1988) suggested that an increase in uncertainty delays development. Uncertainty increases the value of options, and vacant land offers more options than does developed property. Ellson and Roberts (1982) and Ellson and McDermott (1987) considered the developer's landholdings under conditions of uncertainty created by the approvals process affecting the amount of raw land that will be rezoned for urban development. Uncertainty

increased the price of developed land as expected. Changes in the level of uncertainty also affected the supply of developed land. Should developers believe that their chance of having plans approved by zoning boards is being reduced, they will reduce the supply of developed land and increase their holding of land that has been zoned for development. They will reduce their holding of reserve land (Ellson and McDermott 1987, 221).

Increasing difficulty in getting reserve land rezoned for urban development will reduce the extent of early purchases of land outside the current urban fringe, but it will also make the holding of vacant land within the city more profitable. Housing prices will rise as regulations make expansion more difficult and the corresponding increase in the value of vacant land makes it an even better investment. Uncertainty arising from the development approvals process or from the increasing resistance to urban growth will make it worthwhile to hold vacant land that has been approved for development.

When zoning regulations establish minimum lot sizes and restrict land use to single-family detached houses, the move to a land value tax may increase the capital/land ratios by encouraging the construction of larger and more luxurious houses. Zoning may preclude the supply of more dwelling units per land parcel as might have been achieved by a less restricted market. In this case, the spread of the city will remain unaffected and the intensification of land use will do little to reduce housing prices for lower- and middle-income people or to help satisfy environmental concerns. Changes in inner-city zoning, rather than a change in the tax base, may be a more effective means of increasing the intensity of urban land use and reducing the extent of the environmental costs produced by city growth.

In *The Suburban Squeeze*, Dowall (1984) has attributed the observed San Francisco Bay area's shift toward luxury houses in part to the local constraints placed on development. If a developer can build only a few houses a year, then they might as well be big. If it is difficult to gain development permission, then once gained it pays to wait for growth in the demand for expensive houses. To the extent that a move toward land value taxes increases the developer's propensity to substitute capital for land, the change in tax policy coupled with increasing uncertainty in the supply of raw land will benefit most the consumers of high-priced housing.

When developers diversify their housing output in response to variations in the absorption rates of the units offered in different price ranges, a shift from a property tax to a land value tax will encourage developers to target the higher priced market. When the unsold inventory is taxed, the difference in the holding costs of high- and low-priced houses is reduced by the

switch to land value taxation. The increase in the relative cost of holding lower priced houses will reduce the supply of this stock.

Not only do thoughts about the future affect development timing and project density, but the extent of surprise at the changes that do occur affects city form, as illustrated by Arnott (1980). If legislation, the development of a green belt, or the move to land value taxation is anticipated, then the effects of the policy would be felt before its passing. Land with development approvals might be withheld to await future potentials associated with the anticipation of a restriction on the supply of raw land. The transition to higher density development will be more gradual, and the industry would adapt over a longer time period. The unanticipated imposition of a raw land supply constraint would cause a sudden jump in land value, and development would stop until housing rents increased enough to justify the development. Inflections in urban density gradients can be attributed to unanticipated demographic and transportation changes (Skaburskis 1989).

Planners can affect the shape of the city and the structure of housing prices by changing the level of uncertainty about zoning decisions and by attempting to solicit and communicate concerns in ways that lead problems to the table before they grow to require radical solutions. Incremental, but not disjointed, group-oriented processes may provide the best information base for development decisions. Within a participatory planning context, a move to land value taxation not only will change timing and substitution ratios but will likely signal the emergence of a thoughtful attitude toward development and conservation. The side effects of the deliberation needed to implement land value taxation will affect the approvals process within the municipality and the development plans of its landowners. To address the possibly regressive consequences of the tilt policy, it should be accompanied by an expenditure program expanding lower priced housing options.

EMPIRICAL EVIDENCE

The preceding conclusions were developed by considering abstract profit-maximizing models that may either depict the conscious decision process of developers or reflect the process that is implicit in the decisions made by the survivors of market competition. The theoretical conclusions can be developed only by using highly simplified models of decision-making. Despite the simplification, the mathematical prowess needed to appreciate the assumptions challenges most of us and makes it difficult to judge their true importance. We may remain skeptical as to the policy relevance of highly theoretical conclusions unless they are backed by convincing empirical evidence.

Several jurisdictions have implemented land value taxation for the efficiency and equity reasons mentioned earlier. A limited review of the empirical literature is presented here in a search for support to the theoretical conclusions. The question is: Has the shift to land value taxation really made a difference? The following sections review the econometric studies that have tried to identify the effects of a shift from a general property tax to a land value tax. A hypothetical case constructed by using Hawaii data on hotels is examined, as is the published work describing land value taxation in the city of Pittsburgh, Pennsylvania, the country of Australia, and more specifically, in the city of Melbourne.

The Hypothetical Hawaii Case

Pollock and Shoup (1977) estimated the effect of a shift to land taxation on the capital intensity of urban development. They developed a theoretical Cobb-Douglas revenue production function for land development that can be used to show how the shift in tax base would affect the incentive to invest in improvements. They estimated the revenue function using data on thirty large resort hotels built in Waikiki between 1965 and 1973. The estimated coefficients were used to derive the marginal rates of return to successive investments of capital for any fixed site.

Pollock and Shoup (1977) used their estimated model to determine the optimal investment in improvements in the presence of the property tax. Their estimated elasticity of investment with respect to the property tax rate was $-.25$. They concluded that

if the actual elasticity were of this size, a complete elimination of the property tax on improvements would in long-run equilibrium lead to approximately 25 percent increase in optimal capital investment. . . . At higher interest rates . . . reductions in the tax rate would have a relatively smaller effect on investment. (p. 75)

The findings provide, as the authors recognize, "tentative support to the view that a shift from general property taxation toward site value taxation can have a significant impact on the degree of capital intensity of improvements to land" (p. 75). That is, the shift can increase density by as much as 25 percent should no other factors constrain the amount of building that can be placed on a site. The Pollock-Shoup study did not explicitly address the effect of increasing the land value tax. Site taxes were assumed to be neutral. Bentick (1972) described some of the redistributions and liquidity problems created by the state's 1963 tilting of its tax rates toward land value.

The Pittsburgh Case

Pittsburgh shifted its tax rate away from improvements and onto the value of land to penalize the holding of vacant or underdeveloped land. Between 1914 and

1925, the ratio of developed vacant land of 2:1 was achieved; this ratio was maintained until 1979. Since then, the tilt has varied. In 1983, the ratio was 5.6:1. In addition, generous tax abatements were granted for new construction, and the city did not tax new construction for three years (Weir and Peters 1986, 75). The Urban Redevelopment Authority also offered low interest loans for commercial and residential rehabilitation and construction (Oates and Schwab 1992, 5).

The first published study of the effects of land taxes in twenty-seven Pennsylvania cities found no evidence that the policy to tilt the tax rates had induced development (Mathis and Zech 1982). The study, however, was marred by a misspecification pointed out by Coffin and Nelson (1983). Bourassa (1987) estimated an econometric model using the value of building permits for housing during the period from 1978 to 1984 and found that changes in the land tax rate had no effect on development, while the tax on improvements affected the number of units constructed but not their average price. Bourassa concluded that "Pittsburgh's land value tax has had an incentive effect but not a liquidity effect with respect to new housing" (p. 54).

Weir and Peters (1986) examined the effects of the tilt from a 2:1 to a 5.6:1 ratio during the early 1980s and observed a major increase in the value of building permits issued for new office towers. However, key informant interviews with bankers, contractors, investors, developers, and real estate managers led them to conclude that the increase in commercial development was attributable to pent-up demand and not to the extra tilt in tax rates. The 2.4 percent carrying charge placed on vacant land by the tilt policy was not a sufficient penalty to force owners to develop their property (p. 74). The authors suggested that developers are not all that sensitive to small changes in carrying costs.

Weir and Peters (1986) examined 970 properties and grouped them by zoning district. The properties were ranked according to the ratio of their assessed improvement to land value and then grouped in quartiles. Development activities in the form of sales activity, permits issued, and permit value were compared for each quartile for the 1976-1978 and 1980-1984 periods. Correlation coefficients were computed to assess the relationship between the extent of development activity as measured in various ways and the ratio of improved value to assessed value. The finding of a strong negative correlation would indicate that the underdeveloped properties (as determined by low improvement-to-land assessment ratios) were receiving the most development attention. The authors could not reject the hypothesis suggesting that there was no relationship between the extent of development or underdevelopment sites and development activity. The link between

development activity and the extent to which land is already improved was not changed by the tax policy.

The correlation between development activities and the annual quartile rankings were low and there were no significant differences between the earlier period, pre-1979, and the later period, post-1979. (Weir and Peters 1986, 77)

The Western Division of the Pennsylvania Economy League that undertook the analysis "concluded that there is no discernible relationship between the state of development and development activity for city properties during the period 1976 through 1984" (Weir and Peters 1986, 78). The authors concluded that the penalty imposed by the land value tax was not enough to change development patterns or activity.

The Weir and Peters incidence assessment shows the tilt in tax rates to increase the burden on industrial and most commercial property. Most of the high-rise commercial buildings in the downtown area either were not affected by the tilt or saw their property taxes go down. Land value taxation favors new office buildings at the expense of older commercial and industrial buildings. Retail outlets bear most of the additional burden. Most middle-class residential properties benefited by the tax policy change while poorer neighborhoods were penalized. In particular, single-family homes benefited at the expense of multifamily property in poorer neighborhoods. The additional burdens, however, are small because the assessed value of property in the poorer neighborhoods is low.

Ten years after the major tilt in tax rates, Oates and Schwab (1992) set out to assess the Pittsburgh experience. They accepted Weir and Peters's findings but believed that the move to land taxation would affect commercial property the most. It is no surprise, therefore, that residential development patterns were not affected. Their initial observation suggested that

the findings, taken at face value, are dramatic. Relative to fourteen other mid-west cities in our sample, Pittsburgh is a striking outlier: it is the only city to have experienced a large and significant increase in levels of building activity during the 1980s. (p. 1)

Oates and Schwab examined the history of the Pittsburgh economy and the specific character of the tax reform. Manufacturing in Pittsburgh provided half of the jobs in 1940 and 16 percent in 1985. The city's population fell from more than 700,000 in 1950 to 400,000 in 1980, largely because of suburbanization. Public-private partnerships led to the construction of new offices in the Golden Triangle during the 1950s. Shortages of office space led to a new renewed effort during the late 1970s.

The effect of the 1979-1980 tilt in Pittsburgh tax rates is revealed by comparing the 1960-1979 and 1980-1989

annual (real) values of building permits for fifteen cities and metropolitan areas in the Midwest region. All but two cities showed a substantial decline in construction. Columbus, Ohio, increased slightly while Pittsburgh's annual building permits rose by 70 percent after 1980 (Oates and Schwab 1992, 6). The authors estimated several econometric models and consistently found that building activity in Pittsburgh was shifted upward after 1980. The coefficients from the time variables were negative for most cities because of the general economic decline. For Pittsburgh, the shift (dummy) variable picked up the post-1980 increase in building activity and offset the general trend of the declining economy. All approaches used by Oates and Schwab suggested that "following the change in [tax] regimes at the end of the 1970s, Pittsburgh experienced a striking building boom, far in excess of anything that took place in the other major cities in the region" (p. 9).

The main effect of the tax change was in the commercial sector residential building activity, where it increased only slightly. The development effects were attributed mostly to the tax abatements rather than to the extra tilt in rates. The abatements "offered a substantial and directly visible cost reduction for new building activity" (Oates and Schwab 1992, 10). The authors doubted that the tax change induced a "timing effect" that hastened development. They concluded that

it is important to remember that these fiscal incentives were put in place in a setting of strong demand for office space. We cannot conclude, from the Pittsburgh experience at least, that such fiscal incentives are in themselves capable of generating major urban renewal efforts. But in the general Pittsburgh context, it is our sense that they have played a supporting role for new urban construction. Our findings thus do not support some of the more extravagant claims that land-tax proponents have made for the effects of the tax in stimulating economic activity. But urban land taxes, while they may not provide much direct stimulus to development activities, can substitute for other taxes that penalize such undertakings. (p. 11)

The switch to a land value tax would penalize the downtown stores that are on the margin of survival. Bankruptcies would become a political issue, as pointed out by Kochanowski (1991). He also suggested that the most common means in the United States of intensifying inner-city land use is through government purchase of properties through some kind of an urban renewal program. In most smaller cities where office jobs are not growing rapidly, land use intensification is generally achieved by the local government offering a large exemption against assessed improvements, and

the end result of these selective exemption policies are quite obvious. First, the ratio of improvements to land for properties receiving the exemptions drops, thereby making such properties less likely to gain from a site value tax. (p. 52)

The Australian Experience

The state of Victoria, Australia, adopted land value taxation in 1877, and by 1915 all Australian states used land as a tax base (Hagman and Misczynski 1978). In the first major assessment of the Australian experience with land value taxes, Hutchinson (1963) compared states using primarily the land value tax to states using the more general property tax. Among his twenty-one impact indicators were the rate of increase in the number of dwellings per 100 marriages, the value of improvements on land holdings, and the mortgage assets of financial institutions. The ratio of new dwellings per 100 marriages was higher in the states taxing primarily land value (65.4 vs. 61 percent). The value of improvements to land was almost twice as high with the land value tax, and the registered mortgage assets were about five times higher in states using the land value tax. All of Hutchinson's measures pointed to the superiority of the land value tax. But because no effort was made to account for the other factors that might have produced the differences, there are reasons to suspend belief in these conclusions.

Woodruff and Ecker-Racz (1969) went to Australia to talk to assessors and others to find out about the effects of land value taxation. Although it appears that they looked hard, they could find absolutely no attributable consequences. Bentley et al. (1974) also failed to find any effect attributable to residential land value taxes; they concluded by expressing the heretical (for an economist) belief that households simply treated the taxes as cost without changing behavior. Neutze (1970) believed, however, that land value taxes discourage large-scale developments where most of the developers' returns are in the form of increased land value. This belief runs counter to the Pittsburgh experience and to the theoretical deductions. Large-scale projects involve land assembly so as to make possible more intense use of land and thereby increase the building/land value ratios. Large-scale projects should benefit from the tilt in tax rates. The Neutze argument points to the importance of assessment practices. If land value is site specific, then indeed the developer's unique contribution is being taxed.

Edwards's (1984) published master's thesis presented an analysis of inner-state differences between 1952 and 1965 attributable to differences in tax regimes. She specified a reduced-form equation that regressed the total value of houses completed against the log of the average weekly earnings per employed male, the difference between long- and short-term interest rates, the housing consumer price index, the per capita expenditure on local governments, and the proportion of local governments in each state using the land value tax (Edwards 1984, 488). A second model used the estimated value of the housing stock in each state on the left

side and promised a "more accurate description of the intensity of land use" (p. 489). The results showed the time series to be highly autocorrelated, and corrections were made. After a number of model variants, Edwards observed that "some sort of multicollinearity must exist" (p. 491). After a considerable model adjustment, Edwards found that her results "coincide with the conclusions of A. R. Hutchinson" (p. 491). Her normative conclusions suggest that "a community must see to it that it avoids the difficulties of an exceptionally watered down system of taxation" (p. 493). Overall,

the weight of the evidence now at hand strongly indicates that if a new or reformed system is administered honestly, efficiently, and equitably, then a site value tax will result in a more rapid pace of development. (p. 494)

The analysis was carried out at about the same time as the unit root problem was being identified and tests for cointegration of time series were developed. Edwards's correction for serial autocorrelation may have in effect "differenced" the equations and limited the estimated coefficients to a short-run interpretation—and we have no expectations of a tax having a short-run impact on land use intensity. The presence of a unit root could account for the apparent skittishness of the model and could bias estimates of confidence intervals in ways that make results appear more reliable than they are (Chin 1992; Crone and Mills 1991). This unrecognized problem has plagued the analysis of land price changes, as demonstrated here. The Edwards conclusions may illustrate the importance of preconceptions. They certainly illustrate the apparent need for policy-relevant conclusions in published work.

The Melbourne Case

The Melbourne metropolitan statistical district currently houses more than three million people within fifty-six municipalities. Almost half (twenty-seven) of the municipalities used site value taxes in 1986, half used the general property tax, and one municipality used a combination of both. The property tax is based on a net annual value calculation. Residences are assessed at 5 percent of their market value, rental properties are assessed at one year's rent, and commercial properties pay tax on between 7 and 10 percent of property value (Lusht 1992). Most of the shift to site value taxes occurred before the mid-1960s.

Lusht (1992) estimated a number of econometric models to determine the extent to which the site value tax increases: the residential value per acre, the number of occupied units per acre, the population density per acre, the number of building permits issued, and the dollar volume of the permits issued. The econometric model accounted for the location of the municipality, its distance from the center, the age of the residential stock,

the number of industrial establishments divided by the size of the municipality, and the size of the municipality.

The findings were consistent in all cases: the site value tax led to 50 percent more development. The analysis suggests that new development is inspired by changes in tax policy that favor improvements and

that the use of the site value tax stimulates development and that the advantage persists in the long run, although somewhat eroded. The results also suggest that the level of the property tax in Melbourne, which is similar to levels in typical U.S. cities, is sufficiently high to affect behavior. (Lusht 1992, 11)

Summary of the Empirical Evidence

The review of empirical studies suggests that a shift from a general property tax to a site value tax coupled with an aggressive prodevelopment program may encourage commercial development and increase densities in the central business district. The change to land value taxes within parts of a metropolitan area is likely to redistribute development spatially toward jurisdictions taxing the land values. The overall effect of a regionwide change on the density of residential development has not been determined by means of econometric analysis. The Pittsburgh case generally supports the incidence conclusions developed by theory. The tilt in tax rates favors new office buildings and middle-class homeowners at the expense of commercial, industrial, and multifamily buildings in poorer neighborhoods. In general, the Australian studies are inconclusive and are biased by the research workers' commitments to the land value tax. The Melbourne case appears to show that municipalities with the land value tax attract development activity and have higher density projects because of the substitution effect of the tax. This finding is in complete accord with Brueckner's (1986) theoretical deduction. When some municipalities within an urban region switch to a land value tax, more development activity and denser projects can be expected.

CONCLUSIONS

Tilting tax rates to favor improvements at the expense of land increases the intensity of land development when all other factors are held constant. The policy can increase land values when it is applied to a small portion of a housing market and can reduce land values when applied across the entire housing market. The land value reduction is less than the capitalized tax that arises from the increase in development activity brought about by reduced housing prices. The spatial incidence of the tilt policy depends on the elasticity of substitution between land and improvements, which can vary within an urban area and with distance from the center of the city.

Theory is conclusive about the substitution effects of the property tax, and there is no disagreement about the excise characteristics of the portion that rests on buildings. The property tax leads to the use of more land than would be the case had a perfectly neutral tax been available to municipalities. It creates an excess burden because land is used less intensely than it would be without the distortion. However, perfectly neutral taxes or poll taxes are not a practical option. The land value tax is no longer thought to be neutral, but in many situations it is expected to create fewer distortions than is the property tax. A move toward a land value tax is expected to promote land use efficiency, to increase development activity, to increase densities, and possibly to reduce urban sprawl.

The beneficial effects of moving toward a land value tax are not clearly evident to people working with data. A planner's satisfaction from knowing—if not seeing—that the tilt policy reduces distortions is at the cost of the regressive redistributions that are clearly observable. Not only do efficiency and equity appear to compete in the policy debate over property taxation versus land taxation, but the relative importance of abstraction and reality is also at issue. From a political viewpoint, the real redistributive consequences of a major change in tax policy will outweigh the unobservable efficiency gains. Michael Teitz's critique of the policy relevance of welfare-maximizing models applies here (personal observation, 1990). He observes that politicians have a great deal of trouble identifying with notions as abstract as "consumer surpluses." The tax literature led Boadway and Kitchen (1984) to conclude that although

site-value taxation may be superior to the present system of real property taxation, any conversion to such a scheme for local taxation in Canada would undoubtedly impose severe transitional costs on certain groups or individuals leading to unforeseen windfall gains or losses. For this reason and because there are no reliable estimates regarding the value of either the benefits of site taxation or the costs of making this change . . . it would be quite unwise to consider seriously such a transition at this particular time. (p. 248)

The switch to the land value tax need not be complete; the gradual tilting of the rates can reduce the severity of the immediate impact. Is this worth doing? The tension now is between illusion and consequence. Will the tilt really make a difference? Is it too small a change? According to theory, the tilt should increase densities, reduce distortions, and speed up development, but the empirical findings presented earlier tend to support mostly the prior expectations of their authors. Major impacts are not attributable to the policy. Problems emerge when the people implementing a policy believe erroneously that the policy is actually doing something. Illusion may deflect attention. The hope for

the theorized consequences of the tilt in tax rates may deflect attention from the problems created by the external costs of growth and by infrastructure price distortions. Without further empirical work, the policy can best be avoided.

But municipalities need "innovative" and "creative" sources of revenue. Nicholas (1993) points out that "no painless methods of finance have been found other than those that do not raise money" (p. 207). Nevertheless,

one source of revenue that has received scant attention in the past has been the increase in land value that results from the provision of infrastructure. Extending water and sewer to previously unserved areas greatly increases the value of the land served. Providing initial or enhanced access to roads again increases the value of the land given access. It is for these reasons that developers are commonly willing to pay for these facilities (Porter 1988). . . . This long known source of recapturing land value is beginning to be tapped by means such as tax increment finance, special taxing (benefit) districts, and concurrency or adequate facilities requirements. (Nicholas 1993, 208)

The theoretical conclusions would support the use of the land value tax in designated areas scheduled for more intense development. The tax can be used in financing services to special districts. Public infrastructure can increase land values, and a part of this may be returned to the municipality. Brueckner (1986) showed that the switch to land value taxation within a small part of the region can raise land values. The policy may, therefore, be implementable within a special district by voluntary means.

More general conclusions can also be developed from this literature review. They relate to the role that uncertainty and expectations can have on land markets and city structure. Planners can change the spatial organization of cities in part by reducing the uncertainty that clouds the development process and by helping developers form reasonable expectations regarding future market conditions and development environments. The public's reaction to growth is likely to affect future development costs more than will a switch in tax bases.

The way the theory on land value taxation has evolved over the last twenty years can also yield conclusions. Anas and Arnott (1993) suggest that we can no longer rely on "the back of envelope deductions about policy consequences" (p. 186). Theories incorporating time dimensions and accepting uncertainty have started to develop new conclusions regarding the consequences of policy. The new models are more realistic, but this gain comes at the cost of strict assumptions about the environment within which the models operate. Sophistication is gained by the model builders using methods that most of us find very difficult to appreciate. This means that the conclusions from the apparently more

realistic models are also harder to evaluate and are therefore difficult to apply with confidence.

Alex Anas has suggested that economists and planners differ in that economists make very poor assumptions so that they can be very precise in their deductions, while planners make very good assumptions about a problem that precludes its solution through precise deduction (personal observation, 1989). This article started with broad views of land rent and of the societal implications of taxing that rent. Relatively clear and understandable deductions were possible in the early days of economic theory. True, the theory had to be viewed with a squint to blur its shape in ways that made its explanations correspond with experience. The recent advances in land use theory use more sophisticated tools that increase the distance between economists and city planners. As the partial economic models accept more realistic assumptions (e.g., see Mills 1980), they become exponentially more irreproachable and introduce other assumptions (e.g., end-of-the-world conditions) that make a planner's assessment of their conclusions rest on nothing more than faith in contemporary economics. The increasing complexity of theoretical models reduces their immediate value in land use planning where conflict resides, where emotions run, and where agendas, independent thought, and deliberation are often discounted.

The difficulties facing planners who choose to approach problems with analysis are resolved not by developing larger or more sophisticated models but by becoming more familiar with the currently available theory to sharpen intuition, expand sensibility, and develop greater awareness of the possible side effects and aftereffects of policy. Economic models gain value in practice when people with direct knowledge of land markets can say, "Now that you have pointed this out, I can see how it is true." The integration of theory and the experiential knowledge on which policy is based may be advanced through group processes and modes of inquiry, as described by Innes (1987, 1989, 1992), Forester (1989), and Healey (1992). Theory alone will not provide adequate views of cities, and knowledge gained through experience alone is often blind to important secondary consequences.

The integration of theory and experiential knowledge in land use planning will require dialogue and patience on the part of economists and a willingness by planners to accept formal arguments. It is likely that the amount of patience and acceptance of formal argument will not be forthcoming. Given current trends in economics and city planning, I am not hopeful that much integration will take place. The extent to which this is bad for cities depends on the ease with which decentralized market, political, and planning processes can come together to form new land use patterns.

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