THE SHORT-RUN EFFECTS OF SITE VALUE TAXATION ON LAND VALUES AND TAX LIABILITIES

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ABSTRACT

The primary objective of this thesis is to simulate the changes in land values and tax liabilities which could be expected to accompany a changeover from the existing property tax to a site value tax in the city of New Westminster, British Columbia.

Site value taxation, an alternative to the property tax, consists of a tax solely on urban land values or "site" values while totally exempting all improvements on the land. This tax has been widely espoused by economists because of the more efficient utilization of land and capital which it would foster.

In contrast to the resource allocation effects, the income distribution consequences of adopting site value taxation are much less certain. It is this issue with which the present work is primarily concerned.

By estimating expected changes in land values and annual tax liabilities for all properties, it is possible to predict which groups of property owners would benefit from a site value tax scheme. A simple land value model which recognizes the interdependence of land values and the property tax system is used for this purpose. The model incorporates the practical fiscal constraint facing local governments: any alternative to the property tax must be capable of providing similar amounts of tax revenue.

The simulation using actual assessment data predicts several effects of instituting the site value tax. First, there was a

tendency for the values of advantageously located sites to increase in value under the site value tax scheme while peripheral sites often declined in value. Second, the site value tax, placed a heavier tax burden on the owners of vacant land as well as land intensive, "under-improved" properties such as motels, gas and service stations, and storage and warehousing facilities. These properties typically had relatively high ratios of land/improvement value both as a result of their low improvement values and their relatively expensive land. Some types of residential property could also be expected to incur capital losses and higher tax bills if site value taxation was adopted.

The land value model developed in this thesis was quite sensitive to changes in the tax incidence parameters which were assumed. This suggests the desirability of further research to develop a more sophisticated, general equilibrium model which would be capable of treating tax incidence endogenously. Such an approach which would enable a more accurate assessment of the site value tax proposal requires data (particularly on the land-capital substitution possibilities for various groups of property owners) that is not presently available.

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CHAPTER 1: INTRODUCTION

1.1: The Property Tax: Its Administration

The property tax has traditionally been the primary source of revenue for municipal governments. Although the effective tax rates[1] in different municipalities vary substantially, the method used to levy the tax is fairly standardized. Each municipality has an assessment office responsible for assessing the value, for tax purposes, of all land and improvements within its jurisdiction. Local assessors attempt to assign an "assessed value" to each property such that the ratio of assessed to estimated market value is in accordance with the legally prescribed ratio established by the municipality. This ratio which assessors try to maintain is called the assessment ratio.

Municipalities often have different assessment ratios for different properties depending on their "predominant use" as classified by the assessment office. To further complicate the taxation procedure, improvements are often taxed at only a fraction of their assessed value. British Columbia municipalities, for example, tax assessed improvement value at 50 to 75 percent of the rate applied to assessed land value. The local government sets this latter rate, the mill rate, each year in light of its revenue requirements and the total value of the property base.

To help meet expanding revenue requirements over time without excessive mill rate increases all properties are periodically reassessed.

Through reassessment, typically at five year intervals, assessors adjust assessment values to reflect the appropriate fraction of current market values. This helps to eliminate assessment imperfections as well as to reduce the inequities which develop as market values change over time.

In spite of mill rate uniformity throughout the municipality and even ignoring assessment problems, the effective rates of tax for different property owners vary substantially. These differences in tax rates result primarily from two factors: (1) the variability of the assessment ratio depending on property use and (2) the taxation of only a portion of the assessed value of improvements. Because of these factors some taxpayers within a given tax jurisdiction are taxed much more heavily than others. Many people consider such treatment inequitable as well as economically inefficient.

It should also be noted that assessment ratios vary between different municipalities. These variations coupled with differences in the percentage of assessed improvements subject to the tax make it impossible to compare property tax burdens in different communities merely by looking at their respective mill rates. Although their mill rates may be similar their effective rates of tax could be quite different. Furthermore, the expenditure benefits which accrue to residents in different municipalities can also vary. Consequently, intercity comparisons of the property tax must be undertaken with care.

1.2: Criticisms of the Property Tax

Each year, municipal governments are responsible for providing certain public services and social infrastructure for its residents and those of the outlying areas. With the ongoing trend towards urbanization there has been an unprecedented growth in the quantity and quality of these publicly provided goods and services. In spite of this rapid growth the property tax has continued to provide the majority of the revenue required to finance government expenditures.

In spite of its importance in generating revenue, the property tax has many critics. These people have attacked virtually every aspect of the tax: its adequacy from a revenue-raising standpoint, its lack of neutrality in resource allocation, its income distribution effects and its administration.

One criticism of the property tax is that it is becoming inadequate as a revenue source because the growth in government expenditure over time has been more rapid than the growth in the value of the property tax base. Consequently higher and higher tax rates have been required to meet the municipalities' growing financial commitments. This increasingly onerous tax burden is a serious disadvantage of the property tax, particularly in light of its other weaknesses.

The property tax allegedly causes a misallocation of economic resources by reducing the profitability of capital investment. Not only is investment in new buildings and other improvements reduced by the tax on capital improvements. Expenditures on maintenance, upgrading and rehabilitation are also discouraged. Thus the tax appears to be contrary to the social priorities of providing an adequate stock of well-maintained residential and business structures.

The taxation of capital improvements also affects the combination of land and capital which firms and households wish to use. It encourages people to use less capital on each parcel of land to reduce their property tax burden. In some cases land may be substituted for capital to a certain extent. In sum, it is apparent that the changes in the demands for land and improvements caused by the property tax result in a reallocation of resources away from that which would have prevailed in an efficient, tax free, competitive market. Land will not be developed to the level which would be optimal in the absence of the property tax.

In addition to encouraging less intensive development of existing sites, the property tax promotes urban sprawl and premature subdivision of agricultural land by increasing the demand for land at the periphery of the urban area. This is caused by the tax's incentive to use less capital and substitute cheap land with low annual taxes for capital to the extent that this is possible. The scattered type of development which results significantly increases the costs of providing public goods and services thereby placing unnecessary financial burdens on the municipality.

In addition to having an undesirable effect on resource allocation, the property tax has also been accused of being regressive and hence unacceptable on equity grounds. This conclusion which was based on the assumption that the income elasticity of housing expenditures is less than one has recently become the source of much debate. (See Aaron, 1974). If property holdings are concentrated among the high income groups of society, as some believe they are, the property tax may act more like a tax on wealth than a tax on consumption as it was viewed previously. Further research is needed to determine where the final incidence of the property tax lies. At this point the conventional wisdom that the property tax is extremely regressive should at least be viewed with skepticism.

1.3: Overcoming the Problems of the Property Tax

In spite of the many faults of the existing property tax, its importance as a revenue source makes outright abolition of the tax impractical. Various ways of overcoming its disadvantages while maintaining government revenue have been suggested:

(1) Direct user charges could be used to reduce the cost to the municipality of providing certain goods and services. This would reduce the revenue which the local government would have to raise by property taxation.

(2) The fiscal responsibilities of the three levels of government -- federal, provincial and local -- could be realigned in a way which would recognize their relative revenue generating capacities.

(3) The property tax could be supplemented or replaced by a municipal income tax.

(4) The existing property tax system could be modified to eliminate some of its disadvantages.

Although these suggestions are not mutually exclusive, the focus here is on the fourth possibility, modification of the existing property tax. One way of changing the nature of the property tax (as opposed to improving its administration) involves changing the importance of land and capital improvements in the tax base. The tax rate on improvement would be greatly reduced while the tax on land is increased. Presumably, this would be done in a way that would leave total tax revenue unchanged. In the case where improvements are untaxed completely the scheme is called site value or land taxation.

1.4: Site Value Taxation

Unlike the property tax which falls on land and its improvements the site value tax is levied only on land values. The economic effects of the property tax and the site value tax differ because of the nature of their respective tax bases. Land is fixed in supply and therefore unaffected by economic inducements such as changes in taxes or relative prices. The present study which is concerned solely with urban land is based on a similar assumption: any economic inducements may alter the amount of urban land devoted to various uses but not the total available supply of such land.[2] In contrast to land, the supply of capital goods can be expanded or contracted. The production, maintenance and ultimate replacement of capital improvements do respond to economic inducements. Thus we expect the response of capital owners to a change in the tax on capital improvements to be much more pronounced than that of landowners to a change in the tax on land.

The cost-value relationships of land and improvements also differ. In the long run, the values of improvements are governed by their marginal costs of production. In contrast "the value (or price) of most land bears no relation whatsoever to the cost of bringing it into existence...except at the moment of time that it is brought into use." (Becker, 1969, 20). Rather it is the synergistic effects of an urban population with its multitude of economic activities which gives urban land its value.

Government investment in infrastructure and public services is at least as important in the creation and maintenance of urban land value as the owners' efforts to make their land productive. The taxation of land provides a means by which local governments can capture part of the property value increments which they are instrumental in creating. Because the appreciation in land values is largely an "unearned increment" from the point of view of individual landowners, the taxation of these values is seen as a particularly equitable form of taxation.

To summarize, the unique characteristics of land and improvements imply that taxes will affect their supplies in different ways. The existing property tax which is levied on both land and improvements must therefore be considered as two quite distinct taxes. When assessing the advantages and disadvantages of property taxation and site value taxation, it is essential to recognize the different ways in which the markets for land and improvements respond to various economic incentives. These differences in responses affect the economic efficiency as well as the distributional effects of the alternative tax schemes.

1.5: Previous Studies on the Effects of a Change to Site Value Taxation

The theoretical literature discussing the numerous effects of replacing the existing property tax with a tax based solely on land is voluminous. Only recently, however, have economists begun to examine the expected impacts of adopting site value taxation in particular communities.[3] The pioneering applied work on the effects of site value taxation has focussed primarily on one particular aspect of the change-over from the property tax: its equity. These studies attempt to determine the redistribution of the tax burden which a change in the relative taxes on land and improvements would cause. Using existing land and improvement values, usually from assessment roles or recent sales data, the mill rate required to leave revenue unchanged under the new tax system is calculated. Thus the appropriate site value tax rate is considered to be the current revenue yield of the property tax divided by the total assessed land value. The rate is then applied to the land value of each property to obtain its hypothetical site value tax burden. By grouping these properties in different ways, for example, according to predominant use, location or income of the owners, the initial change in the distribution of the tax is ascertained.

From the above procedure which predicted the changes resulting from the implementation of the site value tax on the basis of current land and improvement values a simple ratio rule emerged: any property with an improvement/land ratio above (below, equal to) the ratio for the entire community would pay less (more, the same) tax if site value taxation was instituted.

It is often pointed out that the approach of these earlier studies reveals only the initial impact of adopting the site value tax. The many equilibrating adjustments to the tax change by the various sectors of the economy are left unconsidered. Such adjustments necessarily occur as the relative prices of land and capital improvements react to the new tax environment. These price changes imply changes in the efficiency of resource allocation as well as the distribution of income.

In some cases the ensuing changes in property values may be drastic as households and business firms adjust their demands for land and capital in light of their new (after-tax) opportunity costs. Depending on tastes and differing technological constraints, some property owners will find it profitable to substitute capital for land as the increased tax burden makes the latter relatively more expensive. Changes in production costs will cause some firms to contract. Others will expand. The resulting effects of the price changes themselves cause further price adjustments until a new equilibrium is reached.

Changes in land values take on further significance because land values form the legal base for the site value tax. Hence, any change in these values affect the revenue-raising ability of the tax. To maintain the revenue yield requires further adjustments in the tax rate. The initial impact studies neglect this simultaneity of land values and the tax rate.

Estimating the changes in land and improvement values after equilibrating adjustments to a site value tax has not been an easy task. One approach is to undertake a detailed study of the capital and land requirements of individual property users. This information could then be used in predicting how property use might change if the relative cost of land and capital was altered.

The present study employs an alternative approach. It assumes that existing property values accurately reflect a present equilibrium situation. A simple model is then used to predict the changes in these values on the basis of the new tax liabilities on each of the properties within the municipalities.

1.6: Objective of this Study

This study, like the initial impact studies, is primarily concerned with estimating the burden on different property owners of instituting site value taxation on the basis of existing property values. The approach taken here is unique, however, in that it attempts to recognize explicitly the interdependence of land values and their annual tax liabilities. This requires consideration of the extent to which tax burdens can be shifted from the individuals who are legally liable for their payment. The related problem of whether property taxes are capitalized or at least partially shifted has been ignored in previous studies.

Although the model used here does retain a number of the shortcomings of the earlier works because of its short run nature, it does indicate one direction which analyses of the site value taxation might take. Most important, by focussing on relative price changes it recognizes the critical importance of determining the effects on the allocation and distribution of economic resources which follow the initial impact of adopting a site value tax.

FOOTNOTES

1 The effective tax rate is the total tax liability of a property as a percentage of its market value. Generally, the effective rate is equal to the mill rate multiplied by the assessment ratio, the ratio of assessed to market value.

2 Two related assumptions should be noted here. First, it is assumed that the allocation of land between urban and agricultural uses will not change in the long run. Second, it is assumed that reasonably competitive conditions prevail. A monopolistic land market would create analytical difficulties because the amount of land supplied to the market may be variable if it is profitable to withhold land from the market to increase prices.

3 For example see Neuner, Popp & Sebold (1974), Lehigh University (1958), Rawson (1961), Sause (1954), Schaaf (1969), and T. Smith (1970).

CHAPTER 2: ECONOMIC EFFICIENCY, ADEQUACY AND EQUITY

2.1: The Advantages of Site Value Taxation

The theoretical case for replacing the existing property tax by a site value tax is a strong one. The neutrality of the land tax is one of its chief advantages. A tax is neutral or most efficient when it will "place the least burden on whoever is to be taxed. Taxes should accomplish their assigned objective but beyond this, they should not interfere with the functioning of the market system. There should be no excess burden that can be avoided." (Musgrave, 1959, 141). As Mason Gaffney (in Rybeck, 1970, 12) points out:

> Site value taxation is a flexible tool which operates in conjunction with the market...It is not designed to amend the market but to get rid of a tax on buildings which allegedly interferes with the operation of the market.

The land tax causes only minimal market distortions because of the unresponsiveness of the supply of land to economic incentives such as changes in taxes or relative prices. In contrast, the property tax (or more correctly, the portion of it that falls on improvements) results in suboptimal levels of capital investment. Consequently, land tends to be underutilized because it is combined with an inadequate amount of capital. Reducing or eliminating the tax on improvements would eliminate this disincentive to investment thereby promoting residential and business capital formation. The supply of structures would thereby be increased towards the optimum levels dictated by the unrestrained market.

In addition to stimulating new investment, the exemption of buildings from taxation encourages their upgrading, maintenance and rehabilitation.

The increased land tax which necessarily accompanies the elimination of the tax on improvements if tax revenue is to be maintained penalizes property owners whose land is underdeveloped. These owners attempt to minimize the burden of their increased land taxes by increasing investment in buildings and other improvements towards optimum levels. This increases the annual cashflow of their property but leaves the taxes on land unchanged. Attempts by the owner to use his land with greater intensity will not affect tax liabilities which are based on the site's opportunity cost regardless of its existing use. Thus site value taxation encourages efficient land use.

Another commonly stated advantage of site value taxation is that it encourages urban development and rehabilitation at no direct cost to the taxpayer. It is claimed that the need for direct government involvement and heavy subsidization of housing and urban development will be reduced once the disincentives of the property tax are removed. The untaxing of improvements will presumably make private developers more willing to finance required investment in new buildings and maintenance of existing structures. The stimulation of investment in residential, commercial and industrial buildings and other improvements would have favourable effects on employment. Increased construction activity will produce new jobs in the construction industry as well as in many related sectors of the economy.

The increased supply of buildings which the site value tax encourages may cause the rental payments on both living accomodations and business premises to fall, assuming constant cost relationships in the construction industry. This would help to insure that adequate, low cost housing is readily available which would be of particular benefit to low income groups.

The exemption of improvements from taxation also increases the optimal density of urban development. As a result, less advantageously-located urban land is left underutilized. With the higher annual tax liability on land regardless of its existing use, it becomes less profitable for landowners to keep their property vacant or under-developed in anticipation of capital gains from resale at a future date. As unused land in developed neighborhoods is released to the market, urban sprawl and premature subdivision of agricultural land should be reduced.

Site value taxation would reverse the bias against vertical development by eliminating the incentive in favor of horizontal development which prevails under existing property tax system. This reduces the cost of social infrastructure as well as many publicly provided services. It also creates a situation in which some of these services must be provided by those people in the private sector who benefit from them. Consider transportation networks, for example. Privately provided vertical transport facilities (elevators, escalators, etc.) would take the place of more elaborate, publicly financed road systems and mass transit which are required in communities with horizontally sprawled development. Local government revenue requirements would be correspondingly reduced to the extent that vertical development reduces costs and forces the private sector to pay for more of the facilities it requires.

It should be recognized that the increased density of urban development which the site value tax would tend to encourage has both advantages (Gaffney, 1969; Real Estate Corporation, 1973) and disadvantages (Lessinger, 1962). To the extent that the effects of high density development are deemed undesirable, land use controls and zoning may be required to mitigate the undesirable effects of land taxation on density.

Advocates of site value taxation have also recommended its use to reduce the fiscal disparities between central urban areas and the outlying districts with respect to their relative revenue-generating capacities and expenditure requirements. It is pointed out that large metropolitan areas generally depend on many public amenities provided by the central city. The central city, however, is usually less capable than the suburbs of generating the required revenue through property taxation to provide the services demanded by the greater urban areas. Although land values in the central city are high, buildings are often old and dilapidated. Consequently they contribute little to the total tax base. Furthermore, because new development in the central city proceeds at a slower rate than in the newer suburbs, there is less potential for expansion of the property tax base in the central city. Advocates of site value taxation maintain that it could revive the tax base of the central city, both directly, by placing greater reliance on the valuable land component of its property tax base, and indirectly, by stimulating redevelopment which would increase land values.

The fact that a site value tax is more likely to fall on unearned income than is a tax on improvements is another of its often-stated advantages. As mentioned in the previous chapter much of the apprecia- tion in land values is unearned increment secured by owners because of the proximity of their property to various economic activities and public investments. Thus heavy taxation of land is considered to be more equitable than a tax on improvements which is more likely to fall on income arising from individual effort. It is because their effect on individuals' economic behaviour is greater that the economic effects of a tax on improvements are more pronounced.

In conclusion, virtually unanimous agreement exists among economists concerning the favourable resource allocation effects of site value taxation. The minimal distortions from the competitive market ideal which occur under site value taxation make it one of the most efficient forms of taxation. That the market distortions it causes are negligible compared to those of the existing property tax is its fundamental advantage.

It should be noted that the effects of adopting site value tax summarized in this section are the result of changes in relative prices.

Consequently, whether these purported advantages actually exist depends on how prices change as they gravitate towards unrestrained market levels when the tax on improvements is removed. The various determinants of changes in land values are discussed in Chapter 3.

2.2: Site Value Taxation: Adequacy and Equity

The advisability of replacing the property tax with a site value tax depends not only on its economic efficiency but also on its adequacy as a revenue source and its effects on the distribution of tax burdens among various property owners. Most of the disagreement about the theoretical, as opposed to the administrative, feasibility of site value taxation has focussed on its adequacy and equity compared to the property tax (See Netzer, 1966, 208-212).

(i) Adequacy

Adequacy is the ability of a tax scheme to raise sufficient amounts of revenue without a tax rate which is considered excessive. The importance of the property tax as a revenue source for municipal governments makes it imperative that any alternative tax scheme meet the criterion of adequacy if its adoption is to be practical.

It is possible to estimate the tax rate on the site value base which would be required if the site value tax is to raise the same amount of revenue as the property tax. Even with a constant revenue requirement, the required tax rate will be different in the short run than the long run because of the dependence of land values on the tax rate. As the tax rate increases,[1] the value of the property being taxed (i.e., the tax base) tends to fall. Using existing assessment values for land and improvements to calculate the site value tax rate required to yield the same revenue, as some studies do, ignores this interdependence. This approach is only correct for assessing the tax's adequacy immediately after its adoption. As property is gradually re-assessed the tax base will shrink to reflect the lower market values which result from increased tax liabilities. Thus a higher tax rate would be required if revenue is to be held constant as the value of the tax base declines.

A preferable way to examine the adequacy of the site value tax is to predict how land values will change when the tax is adopted and to assess its adequacy on the basis of the tax rate which would be required after expected changes in land values have been accounted for. It seems particularly inadvisable to ignore adjustments in the relative price of land and improvements in light of the fact that most of the alleged advantages of the site value tax depend on the existence of such changes. Both short and long run changes in prices will occur. In the short run land prices will adjust to changes in tax burdens although, by assumption, the intensity of development on particular sites and the allocation of sites between different land uses remain unchanged. As the tax-induced price changes are reflected in revised assessment values the required rate will have to be adjusted to maintain the revenue yield of the tax. In the long run the capital intensity of land use and the allocation of land among various uses may affect land prices if its opportunity cost is altered by the tax change. Thus long run adjustments in the tax rate would be required in this case, if the revenue yield of the tax is to be maintained.

Adequacy has a dynamic as well as a static aspect which is important in the long run (Stone, 1975). The site value tax must not only generate sufficient revenue at a particular point in time. It must also be capable of satisfying the ever increasing revenue requirements of municipal governments over time. The tax base's potential for expansion is, therefore, of critical importance. A tax base which is presently inadequate may become adequate at a future date because of its growth potential relative to the growth in government expenditures as the population and the level of economic activity change. In spite of the importance of long run considerations, both static and dynamic ones, this study is concerned primarily with short run changes in land values and tax liabilities.

To summarize, the practical importance of determining the adequacy of the site value tax emphasizes the necessity of examining the various factors which influence land prices if it is adopted. Any tendency for land prices to fall could severely limit the revenue raising capacity of the site value tax. Conversely, rising land prices would bolster its revenue raising ability. Thus any attempt to determine the adequacy of the site value tax must recognize the interdependence between the tax rate and the value of the tax base.

(ii) Equity

The nature of the equity or income distribution effect of a changeover to site value taxation is the source of much debate. This debate has focussed on hypotheses about how land/improvement ratios are related to the income of various groups of property owners. The availability of accurate information of this kind would presumably make it possible to determine whether the property tax system would become more or less regressive if a greater portion of the required tax revenue was secured from the land component of the tax base. Thus, the issue is primarily an empirical one of determining whether or not land/improvement ratios increase as property owners' income rises.

It should be pointed out that in addition to the tax effects with respect to income groups, it is also interesting to determine the beneficiaries and losers according to other characteristics. It may be, for example, that there is a significant redistribution of the tax burden towards or away from particular property uses, age groups or subdistricts within the tax jurisdiction. Estimates of the expected income distribution effects of a shift to site value taxation vary greatly. Mason Gaffney (1971, 408-426; 1972, 139-152), who incidentally maintains that the existing property tax is also progressive, particularly with respect to wealth rather than income, claims that land/improvement ratios rise with the total value of the property. This suggests that land ownership is more concentrated among the wealthy than is the ownership of buildings. Thus, the site value tax would be more progressive than in the existing system. (Also see Aaron, 1974, 1975; Musgrave, 1974).

Other economists have expressed concern about possible regressivity of a shift to site value taxation (Gottlieb, 1969, 1970; Harriss, 1970; Neuner et al., 1974; Schaaf, 1969, 1970). Their predictions of inequitable distribution effects, too, are generally based on hypotheses about the differences in land/improvement ratios for property owners in different wealth or income groups.

Estimating income redistribution effects on the basis of land/improvement ratios, however, ignores the possibility that capital gains or losses in land values are likely to fall unevenly on various property onwers. Ideally, these tax-induced changes in property values should also be taken into account. By analyzing at least short run price adjustments which in turn affect assessment values as properties are reassessed a better estimate of the burden of the tax change can be obtained. This knowledge of the expected capital gains or losses which will follow the shift to land taxation is unobtainable from the less complex analysis which assumes land and improvement values remain unchanged. By considering changes in these values, better estimates of changes in annual tax burdens will also result.

Discussion of the equity of a changeover to the site value tax from the existing property tax generally ignores another important factor, that of tax shifting. The tax is assumed to be borne at its point of initial impact. The equity of any change in the property tax system, however, depends on the final incidence of the tax after shifting. Because the site value tax is levied on land which is fixed in supply, it is highly unlikely that it is shifted. Hence, its incidence is more easily determined than that of the property tax which presumably falls, at least partially, on capital owners.

The income redistribution effects between property owners are found by estimating how much additional tax each property owner is forced to bear (i.e., unable to shift) as a result of the tax being levied solely on land rather than land and improvements. As will be shown in Chapter 4, the change in a tax on land will be totally capitalized into land values assuming that it is completely unshiftable. Thus this tax falls unalterably on the owner of the land at the time of the change in tax policy. If he elects to keep his land in spite of the higher taxes he pays, the increased tax in the form on higher annual tax liabilities. If he sells the land, the price which he can get for it will be reduced by the capitalized amount of all future taxes. Thus the tax is unavoidable. The distribution effects of a land tax, therefore, consist of either the resulting changes in land values or equivalently the change in all future tax liabilities, not both.

The increased tax burden on land which would result from instituting site value taxation is at least partially offset by the elimination of taxes on capital improvements. These benefits will accrue to property owners to the extent that they previously paid the improvements tax because they were unable to shift it. These tax savings which accrue to capital owners should be subtracted from the increased tax burden on land owners (who, in many cases, are the same individuals) to determine the net tax effect on different properties of adopting the site value tax.

One final point should be emphasized with regard to the capital tax. To the extent that it is shifted to landowners by the capital owners, any change in total tax liability which land owners experience will be reflected in exactly the same manner as the change in the land component of the tax. Hence, if the improvements tax is presently shifted to landowners it does not have to be considered separately.

2.3: Summary

Both land and, to a lesser extent, improvement values depend on the tax liabilities which their owners must bear. The changes in their relative prices with the adoption of site value taxation purportedly causes a reallocation of economic resources which is much closer to the unhampered market ideal than the allocation which exists under property taxation. In addition to improving economic efficiency, the resulting changes in relative prices also affect the adequacy and equity of site value taxation. Thus a thorough understanding of the various factors which influence the relative prices of land and improvements when site value taxation is instituted is essential. The validity of the various arguments in favour of the site value tax can then be assessed more critically. Furthermore it will permit more accurate predictions about the revenue generating ability and re-distriction impacts of the tax.

FOOTNOTES

1 The effect of land values of removing the improvements tax is ignored in this paragraph. See Chapter 3, "The Unburdening Effect."

CHAPTER 3: THE MICROECONOMIC EFFECTS OF INSTITUTING THE SITE VALUE TAX

3.1: Overview

Any discussion of the alleged advantages and disadvantages of a change in the property tax sytem is based, at least implicitly, on particular assumptions about the changes in the relative prices of land and improvements which would be expected to result from such a change. Thus a critical evaluation of the site value tax proposal requires a careful scrutiny of the various factors which affect these prices. While the traditional economic paradigm of supply and demand provides the necessary conceptual framework, its application at the empirical level is far from straightforward.

The total demand for land and improvements is comprised of the demands of both final consumers and business firms engaged in a wide variety of economic activities. Consumers desire property for residential use; firms demand land and capital improvements as inputs in their respective production processes. These two groups differ considerably in their desire and their ability to adjust their demands for land and improvements in response to changes in relative prices. In economic terms the varying marginal rates of substitution of land and capital in consumption as well as production can be expected to underlie individual demands and hence the final demand curves for the two commodities.

The market conditions under which the two commodities are supplied also affect market prices. To the extent that the construction sector can be considered competitive, the supplies of different capital improvements will depend on their replacement costs, at least in the long run. The extent to which short run improvement values will deviate from these long run equilibrium levels depends on the speed with which the capital stock responds to changes in market prices and other economic incentives, for example, taxes.

In contrast to the supply of capital improvements which is variable in the long run, the supply of urban land is assumed to be fixed. In other words, there is is no opportunity to convert surrounding agricultural land to urban use as land values change. This assumption does not appear unreasonable in light of the fact that although urban land may expand to encompass outlying areas as land prices at the urban fringe rise, there is much less opportunity for reversion to its agricultural use should land values decline. Because our analysis predicts a fall in land values on the outskirts of a city when site value taxation is adopted the assumption does not appear to be restrictive. It does, however, simplify the analysis of land value changes considerably. With the supply of urban land fixed, changes in the land tax will necessarily be totally capitalized into land values.

In sum, the long run supplies of the land and improvements can be reasonably approximated by assuming that the land supply is fixed and that the supplies of most improvements are relatively elastic at prices not far above their long run costs of production.

In spite of the importance of determining the tax induced changes in land and improvement prices, much of the writing on the effects of a changeover to site value taxation ignores them and proceeds immediately to an uncritical survey of the tax's purported advantages. Other writings suggest a number of factors which would affect prices but make little attempt to weigh their relative importance.

One exception is Arthur P. Becker (1969, 11-49) who distinguishes four simultaneous effects of a change in the property tax: (1) the capitalization effect, (2) the unburdening effect, (3) the holding cost effect and (4) the fixed cost effect. Taken together and assuming a fixed supply of land and competitive market for improvements, these effects describe the equilibrating adjustments in relative prices as taxes change.

This chapter discusses the four effects just mentioned as well as one other, the credit rationing effect, which is often mentioned in conjunction with the capitalization and unburdening effects.

3.2: The Capitalization Effect

The capitalization effect is the consequent change in a commodity price when a tax that cannot be shifted is imposed on it. This occurs whenever the commodity in question is in fixed supply because the sole mechanism by which a tax can be passed on is via the price increases resulting from a reduction in supply. The land tax provides the classic example of an unshiftable tax. With a fixed supply of land any land tax increase is borne directly by landowners and cannot be passed on to consumers or other productive factors. Thus the price of land must fall to reflect the lower after-tax returns to land investment whenever landowners' tax burdens increase.

Becker (1969, 25) predicts the following consequences in the land market:

> The capitalization effect of taxing land values reduces the financial obstacles in the acquisition of land by a would-be-developer. The benefit arises out of the fact that an additional tax burden on land values is capitalized into lower land values and prices. A higher annual cost in the form of taxes is traded for a lower (annual and capital) market value and cost of land. Thus, any tax on land values remains neutral as to the total cost of land acquisition.

It will become apparent after considering the other effects of adopting the site value tax that the total cost of land acquisition may not be unchanged after all equilibrating adjustments have occurred. Becker's comment must be interpreted as referring only to the capitalization effect in isolation.

In contrast to the tax on land an improvements tax is generally assumed to be at least partially shifted in the long run. It may be passed forward to tenants and consumers or backwards to land and/or labor. The final incidence of the tax depends on the interaction of many economic variables including marginal rates of technical substitution between inputs and factor intensities in different industries as well as the degree of substitutability between final products requiring different amounts of the taxed inputs (Harberger, 1962; Mieszkowski, 1972; McLure, 1975).

Different assumptions about the incidence of the improvements tax imply different changes in relative prices of land and improvements as well as the size of the capital stock if site value taxation is adopted. In the short run, if tax savings from the elimination of the improvements tax are not completely passed on by building owners the value of improvements may increase slightly. These increases will not prevail in the long run however. Assuming there are constant returns to scale in the construction industry all tax savings are ultimately passed on because new construction would occur as long as above-normal profits were accruing to capital owners. Thus the effect of abolishing the improvements tax in cases where capital owners previously bore at least a portion of the tax levied on them is to expand the supply of improvements.

In situations where the entire improvements tax is currently shifted no adjustment in the capital stock would result from its removal. The capital stock is already optimal in spite of the tax. (Indirect effects caused by tax induced changes in product demand are ignored here). To the extent that the improvements tax was previously shifted to landowners under the property tax system (as suggested in Break (1974), Gaffney (1972), and Richman (1967)), land values may be affected however. The removal of this indirect tax would increase land values by the capitalized amount of the tax burden. This indirect capitalization effect works in the opposite direction of the capitalization effect attributable to the increased land tax which we discussed at the beginning of this section.

The possibility of the improvements tax being shifted to landowners has generally been neglected when discussing the effects of adopting site value taxation. It has been assumed that the entire land tax is borne by landowners; the entire improvements tax by capital owners. Such assumptions bias analyses of the effects of adopting site value taxation by exaggerating the changes in the relative price of land and improvements which can be expected to occur. Consequently quite pronounced changes in land values and overall resource allocation have been predicted by the adherents of the site value tax proposal.

If, in fact, landowners presently bear the majority of the improvements tax in addition to the land tax under the property tax system, a changeover to site value taxation would change their final tax burdens, and hence their land values, to a much smaller extent. At the extreme, if the entire improvements tax is borne by landowners under the property tax system there is nothing but an administrative gain from levying a tax solely on site values.

3.3: The Unburdening Effect

As described above, the untaxing of capital improvements may result in a tax saving which is capitalized in land values to the extent that the tax had previously been shifted by capital owners to landowners. The removal of the unshifted portion of the improvements tax, however, has a different effect, that of increasing the optimal long run capital stock.

The removal of the portion of the improvements tax which was unshifted from its initial impact on capital owners also affects land values however. This occurs because of the complementarity of land and improvements in most uses. As the optimal capital stock increases in response to the reduced tax burden, the demand for the fixed supply of urban land increases. This increased demand for land manifests itself in increased land values particularly on those sites which are advantageously located. On sites which are poorly located, however, the optimal capital which should be employed may be reduced causing these sites to fall in value. These changes in land values caused by tax induced changes in the amounts of capital which can profitably be employed on particular sites are known as unburdening effects. It must be emphasized that the changes in the capital stock which cause the unburdening effect only result in cases where capital owners are unable to shift at least a portion of their tax burden under the existing property tax system.

Generally it is assumed that the unburdening effect tends to increase land values in the aggregate (although not necessarily for individual sites) thereby tending to work against the capitalization effect. Recall that the capitalization effect caused land values to decline except in the extreme case where it is assumed that 100 percent of the improvements tax is currently shifted to landowners. In this situation the positive capitalization of the indirect improvement tax savings just offset the negative capitalization of the increased land tax when the site value tax is instituted.

It can be seen that there is an inverse relationship between the importance of the unburdening effect which results from the removal of unshifted improvement taxes and the indirect capitalization effect due to the existence of a shifted improvements tax. If the entire improvements tax is shifted to landowners, the capital stock under the existing property tax system is at the optimal level. Suboptimal amounts of capital are only employed when an unshiftable tax distorts optimizing decisions. If the tax is completely shifted no such distortion occurs. Because all properties are optimally developed a changeover to the site value tax in the total shifting case will not result in any unburdening effect. Furthermore the indirect capitalization effect exactly cancels the direct capitalization effect.

At the other extreme when capital owners are unable to shift any of their improvements tax burden onto landowners, the effects of adopting site value taxation are quite different. As landowners do not bear any of the improvements tax, their land values will not increase if it is removed. That is, the indirect capitalization effect is zero. The capitalization of the increase in the direct tax burden on land when the site value tax is instituted will, therefore, cause a much more pronounced decline in land values.

The unburdening effect becomes more and more important the greater is the proportion of the improvements tax which capital owners are unable to shift. It tends to moderate declines in land values. The greater the unshifted improvements tax is, the greater the deviations of the capital stock from optimal levels will be. The magnitude of the unburdening effect depends directly on the size of these existing distortions which would be removed if improvements were untaxed. It is extremely difficult, however, to determine the increase in individual property values which would be attributable to the unburdening effect. Different individuals and firms have altered their behaviour to different extents as a result of the current improvements tax. Unfortunately, there is little information on the degree of variability of the land/improvement ratio for different property users. If this information was available estimating their responses to the relative price changes for land and capital induced by the institution of site value taxation would be more straightforward.

One final point should be made with regard to the size of the unburdening effect. If the improvements tax is shifted by capital owners to productive factors other than land or to final consumers capital improvements may be near their optimal levels. As is the case where the improvements tax was shifted to land, the removal of the tax would, once again, cause very little unburdening effect.

In sum, the magnitude of the unburdening effect depends on the degree to which capital owners must actually bear the burden of the improvements tax levied on them. Further, it depends on the extent to which this tax burden actually causes the capital stock to deviate from the optimal levels which would prevail in the absence of the tax. If any portion of the improvements tax is borne by landowners as a result of shifting, its removal would cause the indirect capitalization effect described in the previous section.

3.4 The Importance of Complementarity and Substitutability of the Land and Capital

The discussion of the unburdening effect in the previous section concludes that the removal of an unshiftable tax burden on capital owners will tend to increase the value of land within the municipality. As explained, this increase would occur because the eliminated tax causes the optimal capital stock to increase thereby increasing the demand for the fixed supply of land. Land values would, therefore, tend to increase. This conclusion that the unburdening effect would tend to increase land values is a consequence of assumed complementarity of land and improvements in most uses. This would occur, for example, if households and firms prefer to use land and capital improvements in roughly fixed proportions. The resulting interdependence of the demands for land and improvements is what causes land values to rise as the unburdening of improvements induces the use of greater amounts of capital.

While this complementary nature of land and improvements is usually acknowledged, the possibility of substitution of capital for land and vice versa is often ignored in discussions of the site value tax. Because of the existence of a certain amount of substitutability between land and capital, elimination of the tax on improvements may cause firms and individuals to decrease their desired land/improvement ratios. This can be achieved, in the long run at least, by constructing buildings with basements and/or several stories to reduce land requirements. Relocation in an area where land values are lower may also be profitable. These actions may enable property owners to take advantage of the exemption of buildings from taxation while avoiding the higher taxes on land.

This tendency to substitute capital for land will moderate or perhaps even negate the potential increases in land values which Becker anticipated in his discussion of the unburdening effect. To resolve the ambiguity concerning the expected direction of unburdening effect on land prices it is necessary to determine whether the demand for land will rise or fall as the untaxing of improvements induces new capital investment. This question can only be resolved empirically by determining the elasticity of substitution between land and capital as well as the elasticities of final products embodying land and capital inputs. At present no estimates of these elasticities exist for different sectors in the economy.

In sum, the nonseparability of the demands for land and improvements creates an unburdening effect which must be considered in conjunction with the capitalization effect to determine the relative price a justments of a shift to the land tax. Becker believes that complementarity in the use of land and improvements would cause the unburdening effect to work against the capitalization effect by inducing tendencies for land values to rise. Determining the magnitude of these two opposing effects is consequently important in order to predict relative price changes. If substitutability rather than complementarity of land and improvements predominates, the unburdening effect may cause land prices to change in the same direction as the capitalization effect. Hence, the direction of the relative price changes as a result of the combined capitalization and unburdening effect is not unambiguous. It depends on the relative importance of the complementarity and substitutability relationships between land and capital.

3.5: The Credit Rationing Effect

One of the often-cited advantages of site value taxation is that it would reduce the credit requirements of potential land developers. As taxes on land are increased land prices are assumed to fall by the present value of future tax payments (i.e., the tax is completely capitalized). It is argued that higher annual taxes as a result of site value taxation are less burdensome than the higher initial capital expenditure which would be required in the absence of the land tax particularly for investors with more limited lines of credit. The substitution of lower capital costs for higher tax liabilities provides developers with what is, in effect, a perpetual loan thereby easing the construction sector's demand for mortgage money.

Mason Gaffney (1973) has observed that because the capitalization or discount rate is probably higher for low income groups and small developers (reflecting higher credit costs) site value taxation may be more beneficial to these groups rather than to major developers. A higher discount rate decreases the present-value of expected cash inflows from land and increases the present-value of the initial capital outlay. "Differential tax capitalization" results from varying effective discount rates. It tends to make the land tax more progressive than the existing property tax by reducing the after tax costs paid by low income groups to acquire land.

The credit rationing and differential tax capitalization effects both of which result from imperfections in the capital market, increase the available funds in the mortgage market. In the absence of such imperfections the effect of the land tax on the capital market would be negligible.

The existence of a favorable credit rationing effect following a changeover to the site value tax is based on the assumption that a fall in land prices will result from the capitalization of the increased tax burden. The discussion of the capitalization and unburdening effects (Sections 3.2 through 3.4) explains that it is by no means clear that land prices will fall with the adoption of site value taxation as most previous studies suggest. It all depends on the combined impact of the capitalization and unburdening effects. A predominant unburdening effect working against the capitalization effect, for example, could cause land values to rise thereby adding increased capital costs to the higher tax liability. In this case the credit rationing effect would work in the wrong direction making it more difficult for potential developers to acquire land.

In sum, the desirability of the site value tax's effect on credit can only be ascertained after the interdependence between the demands for land and improvements has been assessed. This interdependence determines the relative importance of the capitalization and unburdening effects and hence the prices of land and improvements after land taxation is adopted. Only after the equilibrating adjustments in prices are known can the direction of the credit rationing effect be determined.

3.6: The Holding Cost Effect

Becker's holding cost effect refers to the tendency to improve the utilization of land as its annual holding costs increase. The adoption of site value taxation would cause property owners, particularly those with vacant or suboptimally developed land, to attempt to reduce the increased burden of the higher taxes on land. The land might be put to more profitable use to generate greater revenue to offset the higher taxes. Alternatively, the land could be sold to someone who was willing to exploit its revenue raising potential.

Becker (1969) concludes that:

> The holding cost effect of taxing land values tends to cause land values to fall. Land with a low development potential present or future, will find its value depressed as owners try to sell to avoid the higher cost of holding land. Thereupon the benefits of capitalization will ensue. If however, land has a good development potential, its value may not fall but may even rise, because the holding cost effect is more than offset by the fixed cost and unburdening effects (p. 27)...the holding cost effect will provide incentive for earlier development, as well as for a higher level of development. (p. 28).

Netzer (1966, 205) concurs:

> ...switching over to heavy taxation of land values would increase substantially the holding costs of land and thus encourage more intensive utilization: this will not reduce the site value tax, but will make it a smaller fraction of the total gross receipts from the site and its improvements.

These discussions of the holding cost effect ignore the fact that both annual taxes and the opportunity cost of the funds invested (ex., interest costs) must be included in holding costs. If the total change in tax liabilities (both direct and indirect) on land are completely capitalized in land values then, in the absence of market imperfections[1] and any unburdening effect on land values, any increase in taxes when the site value tax is adopted would be completely offset by a decrease in annual interest costs. Thus there would be no change in total holding costs as a result of the capitalization effect.

Now consider the unburdening effect. On the assumption that complementarity in the use of land and improvements dominates substitutability between them, the unburdening effect increases the potential returns to land thereby tending to prevent land values from falling to the level indicated solely on the basis of total capitalization of the land tax. Because of these increased land values interest payments on the land will not fall sufficiently to offset the higher annual tax liability. Consequently, the total holding cost of land rises as predicted by Becker and Netzer tending to force idle land into more productive use. This effect, however, is not based on the existence of the capitalization effect but rather on an unburdening effect which moderates the decline in land values caused by complete capitalization of the land tax.

If, on the other hand, the substitutability of land and capital causes the unburdening effect to cause a fall in land prices, holding costs may be reduced by the adoption of site value taxation. Obviously, no increased incentive to put land into use if the site value tax was adopted would result.

In sum, we must conclude that the nature of the capitalization and unburdening effects must be determined before anything can be said about the holding cost effect.

As an aside, it should be noted that any macroeconomic adjustment in the level of the interest rate when the tax base is changed may also affect the holding costs of land.

3.7: The Fixed Cost Effect

The fixed cost effect arises because of the neutrality of the site value tax with regard to its effect on land use. The land tax is based on market values for land which should reflect their best potential use regardless of its existing use. Consequently land owners are encouraged to develop their land to its economic capacity because their tax liabilities are unaffected by such efforts. In contrast, taxes on improvements are not invariant to the level of development. For example, an annual tax of 25 mills on the market value of a building with an expected life of 50 years is equivalent to a sales tax of approximately 25% (assuming a discount rate of .08). The total property tax liability therefore increases with the amount of capital investment. This causes property owners to opt for suboptimal levels of investment.

The fixed cost effect of the intensity of land use is a "non-effect" in that no price changes occur which are not included in one of the other effects discussed above. The stimulating effect of reduced taxes on improvements, for example, was discussed under the topic of the unburdening effect.

3.8: The Total Effect of Site Value Taxation on Land Values

The final effect on land values of a shift to site value taxation depends on the relative importance of the capitalization, unburdening, holding cost and credit rationing effects. In our discussion of the holding cost and credit rationing effects we concluded that their significance is determined by the interaction of the capitalization and unburdening effects. Consequently, for the sake of simplicity, we focus on these latter two effects in our attempts to develop a model which will predict the effects of a changeover to site value taxation.

FOOTNOTES

1 See the discussion of credit rationing effect in this chapter.

CHAPTER 4: A SHORT RUN, COMPARATIVE STATIC MODEL

4.1: Introduction

The previous chapters have emphasized the importance of considering changes in land values when examining a possible changeover to site value taxation. The interdependence of land values and tax burdens must be taken into account if we are to obtain useful information concerning the economic efficiency, the adequacy and the equity of the tax.

In this chapter, we develop a simple model to indicate the direction of changes in taxes and site values if the existing property tax was replaced by a site value tax (or a differential tax on land and improvements). This model insures that the revenue generated remains constant after short-run adjustments in land values when the tax system is changed. Because of the short-run, partial equilibrium nature of the model, the quantity of land and improvements held by each property owner is assumed to be unchanged. Levels of output or, more specifically, gross annual returns to each property are also unaltered by the tax change. Thus the land values predicted by the model represent the value of each land parcel to its current owner assuming that he is unable to adjust the land/improvement of his property in the short run.

In the long run land value is determined by its opportunity cost based on the demands for land by all potential users. The changes in these demands caused by the change in the tax system may cause land values to differ from the short run estimates provided by our simple model. Thus the model may not accurately predict the land value changes which would be caused by a shift to site value taxation if the opportunity cost of individual land parcels changes drastically.

Our analysis assumes that the municipality's supply of land is perfectly inelastic. The return to land is the residual cashflow or accrual to real estate property after payment of normal returns to capital[1] and annual tax liabilities. The capitalized return to land is taken as its market value in our model.

The basic model discussed in the following section assumes that the entire property tax burden is borne by the immobile factor, land. Capital owners succeed in avoiding the property tax levied on them because of the possibility, in the long run, of relocating capital to avoid the tax. Because the tax on capital may not be completely shifted to landowners, the model is generalized somewhat in Section 4.4 to account for the case where only a portion of the improvements tax is shifted to landowners. The differing implications of the models are summarized in Sections 4.3 and 4.5.

4.2: A Simple Model

Using the simplification that the entire property tax burden is capitalized in land values, total land value can be expressed as a function of annual taxes and the level of improvements:

$$L = \frac{Y - rC - (t_\ell L + t_c C)}{r}$$

(1)
$$= \frac{Y - rC - t_c C}{r + t_\ell}$$

where L = total land value

Y = anticipated gross return to real estate (after operating expenses)

C = total value of capital improvements to land

r = discount rate

t_ℓ, t_c = tax rates on land and improvements respectively.

The total value of land is equal to the capitalized value of residual returns to property (land and improvements) after paying all property taxes, $t_\ell L + t_c C$, and a normal return to capital, rC.

To use (1) to predict the changes in land values when site value (or differential[2]) taxation is adopted we want to ensure that t_ℓ and t_c change in a way which leaves revenue, R, constant. So the following constraint is imposed:

$$R = t_\ell^o L^o + t_c^o C = t_\ell' L + t_c' C \text{ or}$$

$$(2) \qquad = t_\ell^o L + k^o t_\ell^o C = t' L + k' t_L' C;$$

where R and C are fixed in the short run and $t_c = kt_\ell$. The superscripts, $(\ )^o$ and $(\ )'$, indicate the variable before and after the change in the tax system. The precise nature of the new tax system is specified by choosing a value for the policy variable $k = t_c/t_\ell$ which indicates how high the tax on improvements will be set relative to the tax on land. For example, to tax improvements at one half the land tax rate set k = .5. For site value taxation k = 0. The absolute value of the new tax rates and new land values are found by solving (1) and (2) using actual values for t_ℓ^o, t_c^o, C, L^o and selecting k. In the case of multiple solutions the lowest positive tax rate on land is chosen. The gross return to real estate, Y in (1), is assumed fixed at its original level:

$$Y = (r + t_\ell^o)L^o + (r + kt_\ell^o)C \quad \text{[from (1)]}$$

as mentioned previously.

Both Mason Gaffney (1970) and Raymond Richman (1967) have used (1) and (2) to explain how aggregate land values will respond to the adoption of site value taxation. The approach can readily be adapted to the general case of a changeover to differential taxation of land and improvements and used to predict changes in the value of individual sites as well as aggregate land value. This simply involves substituting the appropriate tax rates into:

$$(5) \qquad \ell_i = \frac{y_i - rc_i - t_c c_i}{r + t_\ell}$$

to determine the value of the i^{th} site under alternative tax systems. The variables in (5) are identical to those used in (1) except they apply to the values for an individual site rather than the aggregates for the entire community. The land values calculated from (5) are relevant for calculating the tax burdens on particular sites under different tax schemes. This enables us to assess the impacts of proposed changes in the tax system on particular types of property.

4.3: Implications of the Simple Model

The structure of the aggregate land value equation (1) combined with the constant revenue constraint (2) yields what may at first seem to be a surprising result: the total land value in a municipality remains unchanged after the adoption of site value taxation.[3] The values of individual properties will vary, however, depending on their total value and their land/improvement ratios. This characteristic of the model has a valid economic interpretation:

> Untaxing buildings raises ground rent by an amount equaling the loss of building taxes, whence it may be recaptured by raising the tax rate [on land] and without lowering [aggregate] land values. (Gaffney, 1970, 207).

More specifically:

> The taxable surplus in any local jurisdiction can only be the excess value generated above the external opportunity cost of mobile labor and capital. This is identical to land rent. After-tax returns to mobile labor and capital seek a common level throughout the economy. Local land supply is inelastic; local labor and capital are elastic. Therefore, any tax nominally levied on buildings must reduce land rent. Conversely, lowering building taxes must increase land rent by an equal amount. Taxable surplus is not lost or destroyed by untaxing buildings; it simply pops up elsewhere...If the tax cost on buildings falls, land rent rises by the same amount, just as earnings on common stock would rise by the amount of any fall of interest on bonds. There is a Newton's Third Law in economics, a conservation of economic energy. This is nothing more than good book balancing: everything must be accounted for. (Gaffney, 1970, 188).

This result is the fundamental distinction between the model developed in this chapter and simple capitalization procedure which has been used previously to assess land value changes.[4] Thus the validity of our model would cast doubt on the conclusion of earlier models that land values would decline drastically because of the capitalization effect if the site value tax was implemented.

In the generalized version of our model, discussed in Section 4.4 and 4.5, it will be seen that changes in the tax system may cause changes in total land value. This possibility which the simple model ignores depends on assumptions concerning the incidence of the property tax.

One implication of the simple model is that it is possible to calculate the new tax rates on land and improvements (in the case of differential taxation) by referring only to existing assessment values. This obviates the need for calculating new land values for the purpose of checking whether the new tax rates required by a proposed change in the tax system are excessively high or at a politically feasible level. The new rates are simply:

$$t'_{\ell} = t^{o}R/(L + k'C) \text{ and } t'_{c} = k't'_{\ell}$$

where k is the selected policy variable indicating the degree of differentiation in the taxation of land and improvements as previously defined.[5]

4.4: A Generalized Land Value Model

The simple model outlined in the preceding sections of this chapter is based on a particular assumption regarding the final incidence of a tax on real estate property. Namely, the entire property tax burden is assumed to be borne by landowners. As we indicated in Section 4.1 this assumption is undoubtedly overly restrictive. For example, immobility of capital in a particular community may result in a situation where capital owners are unable to shift tax levied on them to landowners even in the long run. Furthermore, a portion of the tax may be shifted to the consumers of the products produced with land and capital.

Alternatively, as Mieszkowski (1972) has suggested, the "average" property tax may be a general tax which affects the after-tax returns of a substantial proportion of a nation's capital supply. Consequently this tax may be borne, to a greater extent, by capitalists. Only differences between a community's effective tax rate and the national average rate of tax on capital would be capitalized in local land values.

As Harberger (1962, 1964, 1966) and Mieszkowski (1967, 1969, 1972) have shown, many factors influence the final incidence of any tax. The elasticities of supply and demand for different products, the factor intensities of various production processes, and the elasticities of substitution between factor inputs are all important. As such data is rarely available, very few estimates of the final incidence of the property tax are available and there is little agreement between them.

L. B. Smith (1974, 481) estimates that "landlords are able to pass approximately 60 percent of an increase in property taxes on to the tenant". Musgrave (1974, 225) makes an "allowance for shifting - involving, say, one-third of the tax on nonhousing property" in some of his work on tax incidence. As Aaron (1974, 212) points out:

> Most such studies [of property tax incidence] assume that (1) homeowners bear property tax burdens directly in their capacity as occupants and are unable to shift the tax

> to anyone else; (2) owners of rental properties shift the tax substantially to renters who bear the tax in proportion to rents paid; and (3) owners of other taxed property pass on to final consumers a sizeable fraction (half, according to the Musgraves (1973), variations, depending on the type of property, according to Netzer (1966, 1973)) of non-residential property taxes. Presumably because of inadequate data, these studies do not distinguish between land and improvements in allocating burdens.

The uncertainty as to the final incidence of the property taxation casts some doubt on the validity of the land value equation (1) in our basic model.[6] By incorporating two tax incidence parameters, δ_ℓ and δ_c, which represent the proportions of the land and improvements taxes respectively which are borne by <u>landowners</u>, the basic model can be generalized somewhat. This makes it possible to consider the effects of the site value tax given various hypotheses about the values of δ_ℓ and δ_c. Sensitivity analysis can be used to test the significance of these assumptions about the parameter values until reliable estimates of their true values become available. Thus, the land value equation (1) is changed to:

$$(1') \qquad L = \frac{Y - rC - \delta_c t_c C}{r + \delta_\ell t_\ell}$$

Similarly (5) becomes:

$$(5') \qquad \ell_i = \frac{y_i - rc_i - \delta_c t_c c_i}{r + \delta_\ell t_\ell}$$

In this form, the land value equations enable our model to approximate the results of the following incidence assumptions:

For the land tax component:

(a) 100 percent shifting of the tax; $\delta_\ell = 0$

(b) partial capitalization combined with partial forward shifting (to final consumers) and/or partial backward shifting (to capital or labor); $0 < \delta_\ell < 1$

(c) 100 percent capitalization; as in the basic model; $\delta_\ell = 1$.

For the improvements tax component:

(a) 100 percent shifting to land as in the basic model; $\delta_c = 1$

(b) partial shifting to land; $0 < \delta_c < 1$

(c) no shifting to land. The tax is borne by capital owners, other productive factors and/or final consumers; $\delta_c = 0$.

The generalized model can readily handle Mieszkowski's (1972) differential shifting of the tax on capital improvements also. For this case $\delta_\ell = 1$ and δ_c is set equal to the percentage by which the tax rate on capital in a particular jurisdiction differs from the regional or national average.

Implicit in our discussion of possible values for δ_ℓ and δ_c is that, in the short run, only land values will be affected. That is, any long-run adjustments such as those which cause changes in the economy's deadweight inefficiency losses or its optimum capital stock can safely be ignored. The effect which the final incidence of the property tax has on land use is also disregarded.

The validity of considering the effect of only the portion of the property tax which rests with landowners in a short-run analysis is based on the belief that landowners and potential owners are generally aware of the possibilities of shifting the tax levied on them even if the shifting does not occur immediately. Thus any unshiftable tax will be capitalized rather quickly. This situation is particularly plausible for taxes levied on residential property. Home owners realize immediately that they will bear any changes in tax burdens themselves causing land values to adjust relatively quickly.

The ability of landowners and potential landowners to predict the proportion of the tax on land or capital which could conceivably be passed on also provides a rationalization for the invariability of δ_c and δ_ℓ between different land uses in our model. It is assumed that these parameters represent the amount of the property tax borne by landowners on average. Large deviations from this average would presumably cause some reallocation of land between various uses in the long run. Although this assumption is undoubtedly not completely realistic, it simplifies the computations of our model considerably.

In sum, the generalized model provides a simple means by which a priori hypotheses or empirical evidence about the final incidence of the property tax can be inputted into our short-run analysis. This should lead to better predictions about the changes in tax burdens and land values which will likely result from a specified change in the tax system.

4.5: Implications of the Generalized Model

The previous section outlined the results which are implied by the structure of the basic model after its alteration to include the tax incidence parameters δ_ℓ and δ_c.

The first difference of the generalized model is that the total land value of the community is no longer invariant to changes in tax policy as it was in the simple model. This can be seen by examining the conditions necessary for total land value to rise, to fall, or to remain unchanged. From (1'):

$$(6) \qquad L = \frac{Y - rC - T}{r}$$

where $T = \delta_\ell t_\ell L + \delta_c k t_\ell C$, the taxes whose final incidence is on land-owners. Obviously the change in total land value is:

$$(7) \qquad \Delta L = L' - L^o = \frac{-\Delta T}{r} = \frac{-(T' - T^o)}{r}$$

from (6) where Y, C and r are fixed in the short run.

$$(8) \qquad \Delta T = [\delta_\ell t_\ell' L' + \delta_c k' t_\ell' C] - [\delta_\ell t_\ell^o L^o + \delta_c k^o t_\ell^o C]$$

Any ΔT is the result of a change in the tax system (indicated by the specified value of k' compared to the original system where $k = k^o$) and the effect this change has on the required tax rates and land values. Recall from (2) the revenue, R, constraint:

$$R - k^o t_\ell^o C = t_\ell^o L^o$$

$$R - k' t_\ell' C = t_\ell' L'$$

Thus (8) becomes:

$$\Delta T = [\delta_\ell(R - k't'_\ell C) + \delta_c k't'_\ell C] - [\delta_\ell(R - k^o t^o_\ell C) + \delta_c k^o t^o_\ell C]$$

$$= (\delta_c - \delta_\ell)(k't'_\ell - k^o t^o_\ell)C$$

(9) $$= (\delta_c - \delta_\ell)(t'_c - t^o_c)C$$

From (9) we conclude that for any change in the tax system towards lighter taxation of capital improvements, i.e., $(t'_c < t^o_c)$, the direction of the change in taxes borne by landowners is given by the sign of $-(\delta_c - \delta_\ell)$. If landowners bear a greater portion of the tax on land than the tax on improvements (i.e., $\delta_\ell > \delta_c$) then a shift towards site value taxation will decrease total land value (from (7)).

If $\delta_\ell = \delta_c$ (as in the basic model of Section 4.2) land values remain unchanged regardless of the change in tax policy which is specified by k'.

4.6: A Computation Example

In this section hypothetical assessment data (which is based on 100 percent of market value, by assumption) is used to demonstrate the computational procedure for finding new land values and tax liabilities after a change in the tax system.

The initial assessment values appear in Table 1. The tax liabilities are based on a tax rate of 20 mills (i.e., 2 percent of assessed value) with land and improvements taxes at 100 and 75 percent of assessment value respectively. That is: t^o_ℓ = 20 mills; $t^o_c = k^o t^o_\ell$ = .75(20). The final tax incidence on landowners, T_i^o, is based on the prespecified tax incidence parameters δ_ℓ and δ_c. Although δ_ℓ and δ_c should ideally vary for different types of property we assume $\delta_\ell = \delta_c = 1$ for all property to simplify the example. Consequently the current tax levy, $\overline{T}_i$, always equals the final incidence, $\overline{T}_i = T_i$. Generally:

$$(10) \qquad \overline{T}_i = t_\ell \ell_i + kt_\ell c_i$$

$$T_i = \delta_\ell t_\ell \ell_i + \delta_c kt_\ell c_i$$

The current land and improvement values are used to impute a gross annual return, y_i, to each property using:

$$(5') \qquad \ell_i = \frac{y_i - rc_i - \delta_c kt_\ell c_i}{r + \delta_\ell t_\ell}$$

with existing data ℓ_i^o, c_i, $t_\ell^o = 20$, $k^o = .75$, and the discount rate $r = .08$ (by assumption). Thus:

$$y_i = (r + \delta_\ell t_\ell^o)\ell_i^o + (r + \delta_c k^o t_\ell^o)c_i$$

These values which are assumed to be unchanged by subsequent tax changes are given in column 6, Table 1.

The desired change in the tax system can now be specified by selecting a new $k = k'$, the desired ratio of the effective tax rate on improvements to the effective rate on land.

The new aggregate land value, L', and required tax rates, (t_ℓ' and $t_c' = k't_\ell'$, so that the revenue generated from taxation remains unchanged ($R = \Sigma_i \overline{T}_i^o$)), are easily found from:

(1') $$L' = \frac{Y - rC - \delta_c k' t'_\ell C}{r + \delta_\ell t'_\ell}$$

(2) $$R = t'_\ell L' + k' t'_\ell C$$

Solving (1') and (2) simultaneously yields:

a. if $\delta_\ell \neq \delta_c$ and $k' \neq 0$;

$$t'_\ell = \frac{(\delta_\ell R + rC - rk'C - Y) \pm \sqrt{DISC}}{2k'C(\delta_\ell - \delta_c)}$$

where $DISC = (\delta_\ell R + rC - rk'C - Y)^2 + 4rkCR(\delta_\ell - \delta_c)$; $t'_c = k' t'_\ell$

b. if $\delta_\ell = \delta_c$ or $k' = 0$ (or both)

$$t'_\ell = rR/(Y - rC + rk'C - \delta_\ell R)$$

With our data t'_ℓ = 41.89 mills; $t'_c = 0$. L' = \$185,002.9 which follows by substituting the new tax rates into (1') where Y, C, r, δ_ℓ and δ_c are assumed to be unchanged.

The new land values for individual properties, ℓ', are found by using k', t'_ℓ and t'_c in (5') above. These values are then used to calculate new tax liabilities from (10). Table 2 compares the land values and taxes before and after the adoption of site value taxation. The new final incidence on landowners is calculated using (10).

TABLE 1

HYPOTHETICAL DATA DESCRIBING EXISTING PROPERTY VALUES AND TAX LIABILITIES BEFORE THE CHANGEOVER TO THE SITE VALUE TAX

CURRENT LAND (ℓ_i) (1)	ASSESSMENT VALUE IMPROVEMENTS (c_i) (2)	c_i/ℓ_i (3)	CURRENT TAX LIABILITIES ($\bar{T}_i$) (4)	FINAL INCIDENCE (T_i) (5)	GROSS ANNUAL RETURN (y_i) (6)
18,000	8,000	.44	480	480	2,560
18,000	-	0.00	360	360	1,800
18,000	20,000	1.11	660	660	3,700
15,000	-	0.00	300	300	1,500
20,000	130,000	6.5	2,350	2,350	14,350
20,000	20,000	1.00	700	700	3,900
20,000	17,000	.85	655	655	3,615
16,000	17,000	1.06	575	575	3,215
15,000	3,000	.20	345	345	1,785
13,000	55,000	4.23	1,085	1,085	6,525
12,000	-	0.00	240	240	1,200
185,000	270,000	1.46	R=7,750	7,750	44,150

TABLE 2

A HYPOTHETICAL EXAMPLE OF THE EFFECTS OF A CHANGEOVER TO SITE VALUE TAX

WITH THE EXISTING PROPERTY TAX (k=.75)			WITH SITE VALUE TAXATION (k=0)	
LAND (1)	IMPROVEMENTS (2)	TAX LIABILITY (3)	LAND (4)	TAX LIABILITY (5)
18,000	8,000	480	15,751.9	659.8
18,000	-	360	14,767.4	618.6
18,000	20,000	660	17,228.6	721.7
15,000	-	300	12,306.2	515.5
20,000	130,000	2,350	32,406.3	1,357.5
20,000	20,000	700	18,869.5	790.4
20,000	17,000	655	18,500.3	775.0
16,000	17,000	575	15,218.6	637.5
15,000	3,000	345	12,675.4	531.0
13,000	55,000	1,085	17,433.8	730.3
12,000	-	240	9,844.9	412.4
185,000	270,000	7,750	185,002.9	7,749.7

4.7: Precautions

It must be emphasized that the generalized model developed in this chapter gives only an approximation of the magnitude of short run changes in taxes and land values when site value taxation is adopted. To determine the magnitude of these changes after all equilibrating adjustments have occurred would require the use of a long run, general equilibrium approach. At the empirical level, however, such an analysis would be extremely difficult to carry out because: (1) the theoretical foundation describing the precise way in which the multifarious economic variables interact is just being developed (Hargerger, 1962, 1964, 1966; Mieszkowski, 1967, 1969, 1972; McLure, 1974, 1975) and (2) there is a paucity of data for households and business activities which would enable reliable estimates to be made of the many elasticities which must be used in a general equilibrium model.

The following chapter details an attempt to use the generalized model with recent assessment data to estimate the effects of adopting site value taxation in a particular municipality in British Columbia, Canada -- New Westminster. The analysis, it must be realized, is not an "empirical" one, except to the extent that actual data was used to get precise detail about an existing situation where the property tax is used. Rather, the following analysis is a simulation based on the validity of the generalized model which has been developed in this chapter. Consequently the conclusions of the simulation are based on the presumption that the model is acceptable and can, therefore, in no way be used to test this proposition.

Although a discussion of the model's acceptability on theoretical grounds is the topic of Chapter 6, one point should be mentioned here concerning the nature of the changes in land values which the model predicts. The model assumes that the level of capital improvements on every property remains optimal both before and after the change in the tax system. Consequently, any two, equally valuable sites with equal improvement values will still have equal values after instituting of site value taxation.

To the extent that the new tax system causes a change in the optimal capital stock and the opportunity cost of different sites, the model may be inaccurate. It is not capable of predicting how such tax-induced changes will affect different properties. Thus the model predicts no such changes for properties which have equal land and improvement values initially when, in fact, they may not remain of equal value in the new tax environment.

FOOTNOTES

1 Labour is ignored because of the unavailability of appropriate data and the belief that labor is relatively less important as a determinant of land values.

2 That is different tax rates on land and improvements. This is not to be confused with the differential shifting of the property tax suggested by Mieszkowski (1972).

3 The same conclusion holds for the more general case of differential taxation. See Appendix A for a proof.

4 For example see Lehigh University (1958) where land values are adjusted on the basis of the following formula $\ell_i = y_i/(r + t_\ell)$. That is, only the tax levied on the land component of the property is capitalized in land values.

5 See Appendix A for proof.

6 A. Thomas King (1973, Chapter 6) contains empirical evidence against capitalization of the property tax. He also provides a summary of related studies on property tax capitalization. See also: Wicks, Little and Beck (1968), Stafford Smith (1970), Orr (1968), Oates (1969). No conclusive results on the issue of how much of the property tax is capitalized are yet available. Also Break (1974, 164-168) contains an excellent summary of the various views on tax incidence.

Appendix A*

A change to any form of differentiation taxation leaves total land value unchanged in the Basic Model.

Proof: As before we have the following equations:

(A1) The original land value: $L^o = \dfrac{Y - rC - t_c^o C}{r + t_\ell^o}$

(A2) The new land value: $L' = \dfrac{Y - rC - t_c' C}{r + t_\ell'}$

(A3) The specification of the degree of differential taxation:

$t_c = kt_\ell$

(A4) The constant revenue constraint: $L^o t_\ell^o + Ct_c^o = L' t_\ell' + Ct_c'$

Clearing the denominators and subtracting (2) from (1) yields:

(A5) $r(L^o - L') + L^o t_\ell^o - L' t_\ell' = -C(t_\ell^o - kt_\ell')$ implying that

$L^o = L'$. If (4) is to be satisfied then in (5) $r(L^o - L')$ must equal zero implying $L^o = L'$.

The new tax rate can now be expressed as a ratio of the original assessment values by rearranging (5) after recalling that $L^o = L'$:

(A6) $t_\ell' = \dfrac{t(L + C)}{(L + kC)}$ where $t = t_c^o = t_\ell^o$.

*This appendix is based on a discussion in Gaffney (1970).

Appendix B

The model developed in this chapter must be formulated with care to insure that the addition of the value of land and improvements equals the total value of the property, V_i. V_i is defined as

(B1) $$V_i = \ell_i + c_i$$

$$= \frac{y_i - x_i - \delta_c t_c c - \delta_\ell t_\ell \ell_i}{r} + c_i$$

x_i is the gross cashflow paid to capital. The other variables remain as defined in the chapter. V_i can also be viewed as the capitalized value of the net cashflow to the property (both the land and the improvements). Hence it must be true that:

(B2) $$V = \frac{y - \delta_c t_c c - \delta_\ell t_\ell \ell - bt_c c}{r}$$

where b is the fraction of the improvements tax borne by the capital owner. The numerator of (B2) equals the property's net cashflow after taxes. If (B1) and (B2) are to be consistent, therefore, c_i must equal the capitalized value of the <u>net</u> cashflow to capital:

(B3) $$c_i = \frac{x_i - bt_c c_i}{r}$$

Substituting (B3) into (B1) yeilds

(B4) $$V = \frac{y_i - \delta_c t_c c - \delta_\ell t_\ell \ell - bt_c c}{r}$$

which is just (B2).

The value for b used in the model must be determined exogenously. If $b + \delta_c = 1$ the entire improvements tax is being borne by land and capital owners. If $b + \delta_c < 1$ a portion of the tax is being shifted either backward to labor or, more likely, forward to final consumers of the commodities produced using the land and improvements.

The additional information on the incidence of the improvements tax provided by the parameter b enables greater generalization of the model by permitting the examination of the expected changes in the capital stock induced by the adoption of the site value tax. Assume that x_i remains fixed at $\bar{x}_i$ regardless of tax changes. That is, the gross returns to capital are independent of taxes. This would occur, for example, in the case of rent controls. (B3) can be used to impute a value $\bar{x}_i$ to each property using the current improvements tax rate, t_c^o and the current improvement value, c_i^o, from the assessment records after specifying b exogenously.

(B5) $$\bar{x}_i = c_i^o(r + bt_c^o)$$

If the improvements tax changes to t_c', which equals zero in the case of site value taxation, the value of improvements changes to

(B6) $$c_i' = \bar{x}_i/(r + bt_c').$$

Also assume that the supply of capital improvements is perfectly elastic at existing market prices, c_i^o, which are indicative of replacement costs. Thus any change in c_i (from c_i^o to c_i') as taxes change can be interpreted as an increase or decrease in the level of improvements on the particular site. Measuring the physical amount of capital in terms of its dollar value before the tax change, the percentage change in the optimal level of improvements is

$$\text{(B7)} \qquad \Delta c_i = \frac{c_i' - c_i^o}{c_i^o}$$

This provides a rough approximation of the capital stock adjustments which could be expected to follow a change in the property tax system.

Equation (B6) brings out the critical importance of determining the final incidence of the improvements tax. The magnitude of any tax-induced change in the level of improvements depends on the degree to which the tax burden distorts capital investment decisions. The level of imporvmenets under the existing tax system is only suboptimal to the extent that capital owners bear at least part of the improvements tax. If b = 0, for example, indicating that the entire tax is shifted, changing the improvements tax would cause no change in the optimal capital investment on each property. In this extreme case, there would be no potential gains in economic efficiency to be secured by a changeover to site value taxation.

CHAPTER 5: AN APPLICATION OF THE LAND VALUE MODEL

5.1: The Data

The application of the land value model (outlined in Sections 4.5 and 4.6) to estimate changes in tax liabilities and property values in a British Columbia municipality, involved a number of complications because of the nature of the available data. Three of these are noteworthy for they occur in most situations where the property tax is levied.

(1) Property taxes are often based on assessment values which are only a specified fraction of estimated market values.

(2) The actual as opposed to the statutory assessment ratio varies from property to property because of assessment inaccuracies and time lags between reassessments.

(3) The statutory assessment ratio may vary depending on the predominant use classification of the property rather than being uniform throughout the tax jurisdiction.

With regard to the first problem, the situation in British Columbia is unique. The province is in the process of instituting legislation requiring that all properties be assessed at 100 percent of their estimated market value. This will make the statutory assessment ratio equal to one.

Although the property tax is still being levied on the basis of the fractional assessment roles (called "frozen" roles) which have been used in the past, the B.C. Assessment Authority was compiling "actual value" roles for B.C. municipalities for comparative purposes when the data was being compiled for this study. Whereas virtually all of the frozen roles contain both problems (2) and (3) mentioned above, the actual value roles in some communities have gotten around these problems to a considerable extent depending on how the actual role was developed.

In bringing the previous assessment values on the frozen role into line with the existing market values which are to comprise the actual value role, different methods have been used in different municipalities. At one extreme the values on the frozen roles were merely factored up, i.e., the previous assessment figure is multiplied by the inverse of the appropriate statutory assessment ratio to get the estimated market value. Consequently, this procedure magnifies any assessment inaccuracies which may have existed in the frozen roles.

In other municipalities a much greater effort has been made to determine actual market values by reassessing areas in which "frozen" values were considered particularly inaccurate and by altering values on the basis of mapping and other assessment techniques. The estimated market values which resulted from this process, therefore, can be taken as particularly good indications of true market values.[1]

In consultation with the B.C. Assessment Authority the city of New Westminster, B.C. -- a municipality within the greater Vancouver area -- was chosen for an application of the model developed in this study because the actual value roles are considered to be particularly accurate reflections of true market values. Thus the inaccuracies described in (2) should be minimized. Furthermore, the problem of nonuniform assessment ratios (3) which is common in the frozen roles is eliminated by the actual roles which value all property at market value regardless of its use.

The only complication which prohibited complete reliance on the actual value roles is the fact that tax assessments are still based on the frozen roles. Consequently, errors in assessments and non-uniform effective rates of tax cause inequities in the tax burdens borne by different properties. This causes no immediate difficulties however. In fact it enables us to generate some information about the extent of inequities in the present system caused by differences in effective tax rates between taxpayers within a given jurisdiction.

The analysis that follows assumes that current market values (from the actual value role) reflect the final tax incidence after any hypothesized amount of shifting has occurred. Both the current tax liability, $\overline{T}_i$, and the final incidence, T_i, for property i are found by applying the statutory mill rate to the frozen roles on which the property tax is based:

(11) $$\overline{T}_i^o = t_\ell^o \ell_{ai} + k^o t_\ell^o c_{ai}$$

(12) $$T_i^o = \delta_\ell t_\ell^o \ell_{ai} + \delta_c k^o t_\ell^o c_{ai}$$

where ℓ_{ai} and c_{ai} are the net assured values for land and improvements which appear on the frozen roles. Net assessed value is defined here as the total assessed value less the amount of any legal exemptions. k^o is the ratio of the effective tax rate on improvements to the effective tax rate on land or, equivalently, the fraction of assessed improvement values which are currently subject to tax at the rate imposed on land. In New Westminster improvements are taxed at 60 percent of their assessed value. Thus, k = .60.

In the following analysis of the changeover to the site value tax it was assumed that all statutory exemptions would be abolished to make the system less discriminatory between different property uses. The primary exception was property which is currently 100 percent exempt from property taxation. Such property was assumed to retain its tax-free status under the site value tax system.

The tax burdens calculated in (12) can now be used in the land value equations to impute the gross returns, y_i, to the properties. By substituting the current values for all other variables into (1') and (5') in the form shown below, the y_i's and r are found. The computation procedure then becomes analagous to that outlined in Section 4.6.

(1') $$Y = rL^o + rC + \Sigma T_i^o \text{ from } L^o = \frac{Y - rC - \Sigma T_i^o}{r}$$

(5') $$y_i = r\ell_i^o + rc_i + T_i^o \text{ from } \ell_i^o = \frac{y_i - rc_i - T_i^o}{r}$$

where $R = \Sigma \overline{T}_i^o$, the total revenue which the model insures will remain unchanged under any alternative tax scheme as before.

The model developed previously can now be used to analyze the effect of two separate changes in tax policy:

(1) the change to uniform assessment of all properties while maintaining the original ratio of the improvements tax to the tax on land, k^o. The effects of eliminating nonuniform assessment ratios (between use classifications) in the frozen roles can be determined by basing assessments on market values (as given in the actual value role). This simply involves using the land value model to simulate the case of differential taxation at the currently specified rate, i.e., set $k = k^o$. The changes in land values, the tax rate, and tax liabilities which the model predicts arise solely because the inequities of the existing system are reduced by basing taxes on estimated market values regardless of frozen values or current use classes.

(2) the change to site value taxation (or a different degree of differential taxation) from the system of "equitable" taxation determined in (1) above, can now be carried out exactly as outlined in Chapter 4. It involves an analysis of the changes which result from changing k to a new value k' instead of k^o, its original value after the inequities of the present system have been removed.

The following simulation results summarize the combined effects of (1) and (2). That is, the present variation in effective tax rates is eliminated at the same time the site value tax is adopted. An appendix at the end of the chapter gives the effects of equalizing effective tax rates while retaining the existing system so that the effect of untaxing improvements in the first simulation can be isolated.

5.2: A Simulation of the Changeover to Site Value Taxation

The remainder of this chapter describes the results of a simulated changeover to the site value tax in the municipality of New Westminster, British Columbia. These results show how the values of different sites and their respective tax liabilities change in response to the new tax policy. The predicted effects are analyzed from two different perspectives. First, the properties are grouped according to use as specified in the assessment records. Two different classifications are used there. The first classification is a general one indicating the current legal status of the property for tax purposes. The second is a more detailed classification describing the actual use of the property. These classifications are referred to as AC17 codes and actual use codes respectively.

The changes in land values and taxes are also grouped according to geographic location. The assessment roles specify the subdistrict in which each property is located. These subdistricts have been established by the local assessors to delineate areas of the city which they consider relatively homogeneous. That is, properties within the same subdistrict are similar with respect to various characteristics considered important for assessment purposes.

In some cases the simulation results vary considerably depending on the assumption which is made about the incidence of the tax on capital improvements. Three (δ_ℓ, δ_c) incidence combinations are examined: (1.0, 0.0), (1.0, 0.5) and (1.0, 1.0). Because δ_c is defined as the proportion of the improvements tax paid by land owners, these alternatives represent progressively larger amounts of shifting of the improvements tax from capital owners to landowners. Although empirical evidence is scanty, experts suggest that landowners bear the entire land tax plus approximately one half of the improvements tax. Thus $(\delta_\ell, \delta_c) = (1.0, 0.5)$ is perhaps the most reasonable approximation. For comparative purposes the results using the other two incidence assumptions are also given in the tables that follow. This enables some determination to be made of the sensitivity of the conclusions to the incidence assumption which is chosen.

Using $\delta_c = 0.5$, the land value model predicts a fall in aggregate land value[2] from approximately \$187 million to \$153 million when site value taxation is adopted. This represents an average decline of \$4044 on each of the 8408 properties used in the simulation. If it is assumed that none of the improvements component of the property tax is shifted to landowners (i.e., $\delta_c = 0.0$), the average fall in site value is \$8090, twice as large as the case where $\delta_c = 0.5$. When δ_c is assumed to equal one total land value necessarily remains constant because of the structure of the model as explained in Section 4.3.

The changes in land values are broken down by AC17 codes in Table 1 and by actual use code in Table 3. These tables point out that changes in land values depend critically on the tax incidence assumption about δ_c which is made. The ranking of average changes in land value by different use categories, for example, depends on the value of δ_c which is chosen.

The Tables also show that it is generally impossible to predict the change in the value of a particular site merely by looking at its improvement/land ratio. In other words, the simple ratio rule employed in earlier studies on site value taxation (described in Section 1.5) yields different predictions than those derived from the model developed in this study. In our model, under certain incidence assumptions, properties with a below average improvement/land ratio, for example, might still increase in value. The ratio rule predicts a fall in all properties which have less than average improvement/land ratios.

In the absence of variability in the ratio of assessed to market values on different properties we would expect the predictions of the land value model to conform with those of the ratio rule when $\delta_\ell = \delta_c = 1.0$. There is enough variation in the actual (as opposed to statutory) assessment ratios on different properties, however, to make the ratio rule inaccurate even for the case when $\delta_\ell = \delta_c = 1.0$. This characteristic of the data on New Westminster is undoubtedly typical of most communities.

These results illustrate that it is questionable to base predictions solely on a site's current intensity of development when attempting to determine the expected gainers and losers of a changeover to the site value tax. The results also indicate the importance of carefully considering tax incidence if equitable changes in tax policy are to be adopted.

Examining Table 1 more closely, it can be seen that regardless of the value of δ_c which is assumed the land value model consistently predicts large losses in value for land classified as farm or utilities for tax purposes. Note that these properties have extremely low improvement/land ratios.

Multi-family dwellings and industrial users can expect lower than average declines in land values when $\delta_c = 0.5$ or 1.0 but would experience about average losses if it is assumed that landowners do not bear any of the tax on improvements (i.e. $\delta_c = 0.0$).

For residential properties the fall in land value is slightly above average when $\delta_c = 0.5$ or 1.0. For $\delta_c = 0.5$ the average loss in residential land values is less than the average loss on commercial or farm property as well as the loss borne by utilities, but is greater than the drop in value of land in industrial use. If $\delta_c = 1.0$, the loss of residential properties exceeds that of commercial properties.

Table 3 brings out the relationship between improvement/land ratios and the incidence of the improvements tax (δ_c) more clearly. Properties with small investments in improvements and low improvement/land ratios typically have greater than average land value losses when $\delta_c = 0.5$ or 1.0. For $\delta_c = 0.0$, however, the loss is often less than the city average. The following (actual use) categories, for example, illustrate this tendency: vacant land, one-family dwellings, duplex and triplex dwellings and outbuildings.

In contrast, properties which have greater value and higher improvement/land ratios generally experience lower than average declines

TABLE I

LAND VALUE CHANGES BY USE CATEGORY FOR TAX PURPOSES

AC17 CODES (no. of sites)	Average initial land value	Average value of improvements	Average c_i/ℓ_i ratio for each category	New land value (change from initial value) $\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
unclassified (40)	000	000	-	1,468 (1,468)	2,418 (2,418)	630 (630)
residential (6,973)	17,047*	16,106	.94	12,704 (-4.337)	14,807 (-2.238)	10,472 (-6.568)
multi-family[1] (406)	45,838	176,452	3.85	48,065 (2,228)	67,290 (21,455)	30,361 (-15,476)
commercial (591)	52,939	61,708	1.17	47,526 (-5,413)	58,817 (5,880)	36,361 (-16,578)
farm (18)	24,657	7,186	.29	16,853 (-7,804)	18,708 (-5,949)	14,659 (-9,997)
industrial (369)	47,127	79,290	1.69	43,489 (3,639)	56,404 (9,279)	31,149 (-15,978)
machinery and equipment[2] (7)	7,669	10,461	1.36	10,603 (2,935)	13,658 (5,990)	7,673 (4)
utilities (4)	59,215	18,693	.32	45,088 (-14,127)	51,181 (-8,034)	38,291 (-20,924)
total (8,408)	22,227	29,728	1.34	18,179 (-4,044)	22,226 (000)	14,133 (-8,090)

1 more than 3 units
2 commercial and industrial, farm, pollution abatement, etc.
* Figures may contain round-off errors.

TABLE 2

TAX CHANGES BY USE CATEGORY FOR TAX PURPOSES

AC17 CODE	CHANGE IN LEGAL TAX LIABILITY			CHANGE IN FINAL INCIDENCE AFTER SHIFTING		
	δ_c = .5	δ_c = 1.0	δ_c = 0.0	δ_c = .5	δ_c = 1.0	δ_c = 0.0
unclassified	-224	-193	-263	-117	-193	-50
residential	214	179	260	347	179	526
multi-family	-2,134	-1,716	-2,673	-178	-1,716	1,238
commercial	-505	-470	-551	443	-470	1,326
farm	569	476	688	624	-476	800
industrial	-901	-742	-1,106	291	-742	1,278
machinery and equipment	-513	-479	-557	-235	-479	000
utilities	836	643	1,085	1,130	643	1,674
Total	000	000	000	324	000	647

TABLE 3

LAND VALUE CHANGES BY ACTUAL USE CATEGORY

ACTUAL USE	No. of each type	Average initial land value	Average value of improvements	Average imp/land ratio for each category	New land values (change from initial value) $\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
vacant land	(515)	21,028	1,809	.09	15,692 (-5,336)	17,148 (-3,880)	13,873 (-7,155)
one-family dwelling	(6093)	17,459	15,795	.90	12,832 (-4,622)	14,883 (-2,575)	10,638 (-6,815)
duplex or triplex dwelling	(420)	17,375	18,593	.07	13,023 (-4,351)	15,263 (-2,112)	10,666 (-6,709)
row house	(6)	31,350	40,762	1.29	25,276 (-6,074)	30,938 (-412)	19,620 (-11,730)
conversion	(114)	22,677	21,838	.96	17,512 (-5,160)	20,458 (-2,214)	14,397 (-8,276)
apartment block	(553)	33,887	144,566	4.27	37,990 (4,104)	54,160 (20,275)	23,199 (-10,688)
outbuildings only	(21)	19,510	1,927	.10	14,173 (-5,337)	15,531 (-3,979)	12,494 (-7,015)
motel, auto court	(2)	51,645	33,600	.65	41,918 (-9,727)	49,620 (-2,025)	33,926 (-17,719)
hotel	(9)	121,671	269,711	2.21	126,227 (4,556)	173,105 (51,435)	82,703 (-38,968)
hall	(15)	43,596	127,769	2.93	45,147 (1,551)	62,934 (19,338)	28,741 (-14,855)
stores and service-commercial	(200)	62,020	72,037	1.16	57,018 (-5,001)	70,654 (8,635)	43,550 (-18,468)

TABLE 3 (cont'd.)

ACTUAL USE	No. of each type	Average initial land value	Average value of improvements	imp/land ratio for each category	New land values (change from initial value) $\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
store and living-quarters	(87)	24,642	32,475	1.31	22,026 (-2,616)	27,177 (2,535)	43,550 (-7,723)
office building	(49)	67,991	191,196	2.81	73,803 (5,812)	101,777 (33,786)	47,891 (-20,100)
bowling alley	(1)	36,250	98,980	2.73	37,655 (1,405)	51,964 (15,714)	24,405 (-11,845)
theatre building	(3)	93,423	135,000	1.45	88,067 (-5,355)	112,348 (18,925)	64,625 (-28,799)
gas and service station	(38)	57,518	29,819	.52	46,164 (-11,354)	53,594 (-3,923)	38,226 (-19,291)
commercial garage, workshop	(65)	40,215	44,065	1.10	36,868 (-3,347)	45,917 (5,702)	27,970 (-12,245)
cold storage	(2)	33,665	25,215	.74	27,643 (-6,022)	32,779 (-886)	22,326 (-11,339)
storage and warehousing-open	(1)	62,840	750	.01	51,772 (-11,068)	56,238 (-6,602)	46,047 (-16,793)
-closed	(24)	49,712	47,736	.96	43,735 (-5,977)	53,847 (4,137)	33,689 (-16,023)
marine facilities	(33)	26,518	43,278	1.63	24,252 (-2,266)	31,183 (4,665)	17,594 (-8,924)
other commercial	(108)	52,458	23,948	.46	41,533 (-10,925)	47,669 (-4,789)	34,843 (-17,615)
manufacturing	(35)	190,294	580,669	3.06	199,364 (9,070)	282,576 (92,281)	123,086 (-67,208)

TABLE 3 (cont'd.)

ACTUAL USE	No. of each type	Average initial land value	Average value of improvements	imp/land ratio for each category	New land values (change from initial value) $\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
other industrial	(14)	78,144	86,676	1.12	68,533 (-9,610)	85,095 (6,952)	52,205 (-25,938)
TOTAL	(8,408)	22,228	29,729	1.34	18,180 (-4,044)	22,227 (000)	14,134 (-8,090)

TABLE 4

TAX CHANGES BY ACTUAL USE CATEGORY

Actual Use Category	Number of Sites	Change in Legal Tax Liability δ_c=.5	δ_c=1.0	δ_c=0.0	Change in Final Incidence with Shifting δ_c=.5	δ_c=1.0	δ_c=0.0
vacant land	(515)	410	310	538	427	310	572
one-family dwelling	(6093)	245	206	296	370	206	545
duplex or triplex dwelling	(420)	201	169	243	348	169	537
row house	(6)	31	33	28	490	33	938
conversion	(114)	224	177	284	413	177	662
apartment block	(553)	-2,000	-1,622	-2,487	-328	-1,622	855
outbuildings only	(21)	406	318	520	427	318	561
motel, auto court	(2)	242	162	344	778	162	1,418
hotel	(9)	-5,034	-4,115	-6,222	-365	-4,115	3,117
hall	(15)	-1,926	-1,547	-2,415	-124	-1,547	1,188
stores & service-commercial	(200)	-737	-691	-797	400	-691	1,477
store & living-quarters	(87)	-215	-203	-231	209	-203	618
office building	(47)	-3,268	-2,703	-3,998	-465	-2,703	1,608
bowling alley	(1)	-1,547	-1,257	-1,922	-112	-1,257	948
theatre building	(3)	-1,743	-1,514	-2,038	428	-1,514	2,304
gas and service station	(38)	453	314	633	908	314	1,543
commercial garage, workshop	(65)	-497	-456	-551	268	-456	980
cold storage	(2)	121	71	185	482	71	907
storage & warehousing-open	(1)	873	528	1,320	885	528	1,343
-closed	(24)	-350	-331	-374	478	-331	1,282
marine facilities	(33)	-448	-373	-545	181	-373	714
other commercial	(108)	535	383	732	874	383	1,409
manufacturing	(35)	-9,284	-7,383	-11,740	-726	-7,383	5,377
other industrial	(14)	-620	-556	-703	769	-556	2,075
TOTAL	(8408)	000	000	000	324	000	647

in site value when higher values of δ_c are chosen, but these losses in value become much greater than average as δ_c approaches zero. Here, apartment blocks, hotels, halls, the bowling alley, manufacturing and office buildings are good examples. These properties tend to vary much more dramatically in value as δ_c is adjusted than relatively underdeveloped properties with low initial values. This is because the capitalized tax savings on improvements which tend to increase land values when site value taxation is adopted (i.e. the unburdening effect) are most significant in our model for properties which have high valued improvements. The effect is most powerful when the improvements tax burden being removed from landowners is the greatest. This would occur when $\delta_c = 1.0$.

As δ_c is reduced the tax on capital affects landowners less and less. They receive no direct benefit from the removal of the improvements tax if it is not shifted to them by capital owners. Thus the unburdening effect is negligible when $\delta_c = 0.0$. In this case the capitalization effect predominates causing land values to decline rather drastically relative to less valuable properties with lower improvement/land ratios. These less valuable properties with relatively insignificant tax on improvements under the existing tax system decline only slightly more in value when the site value tax is adopted if $\delta_c = 0.0$ rather than 0.5 or 1.0. In other words, the small amount of capital on these properties makes the unburdening effect relatively unimportant regardless of the incidence assumption which is used.

Tables 2 and 4 give the tax changes for different groups of property owners which would accompany a changeover to site value taxation. For some property uses the legal tax levy on the property and the final burden on landowners after shifting both increase or both decrease. In other cases, the legal liability may decrease while the final burden rises.

Assuming $\delta_c = 0.5$, the average annual tax liability for properties classified as utilities, farm and residential increases when the site value tax is instituted. When shifting of the existing improvements tax is accounted for, the increased tax burden is even greater than their increased levies would suggest. Residential land owners, for example, are liable for an additional $214 in taxes annually but face an increased property tax burden of $347 after the assumed shifting of the current property tax is accounted for. The capitalized value of their additional tax burden comprises the capital loss on land value of $4337 which they would presumably incur if they decided to sell their property. Farm land would face a tax increase of $549 with an increased final tax burden of $624. The latter amount is capitalized at 8 percent to get the average drop in land value of $7,804 which is shown on Table 1.

Multi-family dwellings stand to gain the most, in terms of changes in tax commitments. Their taxes would fall an average of approximately $2100 although after shifting is accounted for their net benefit is reduced to $178 annually. As a result, land values in this category could be expected to appreciate $2227 on average.

Industrial property would face an average tax levy reduction of \$901 but would bear an increased tax burden of \$291. This increase in taxes after shifting is considered arises because industrial property owners are presently able to shift a portion of the property tax. The site value tax, in constrast, would be unshiftable thereby leaving industry with a heavier tax burden. A less than average fall of \$3639 in industrial land value would result according to our land value model.

Table 4 is useful for pinpointing those subgroups of the large use classes in Table 3 which would gain or lose if site value taxation was adopted. Again assuming $\delta_c = 0.5$ we see that the most significant tax savings accrued to apartment blocks, hotels, halls, office buildings, bowling alleys and property used by manufacturers. These properties generally have a relatively high total value and a high improvement/ land ratio. In contrast substantial tax increases were incurred by vacant land, all residential dwellings except apartment blocks, motels, gas and service stations, most storage and warehousing facilities and miscellaneous commercial establishments. These developments tend to be land intensive compared to those that received tax reduction under site value taxation.

As can be seen from Table 4, properties in a number of uses received reductions in annual tax levies but after accounting for shifting their final property tax burden was actually increased. Others experienced much more significant increases in their property tax burdens than the amounts of their increased levies would suggest. This emphasizes the importance for policy purposes of determining not only the redistribution of legal liabilities caused by adoption of the site value tax but also the changes in its final incidence. It is possible, for example, that site value taxation may be politically infeasible if taxpayers object to higher taxes on land in particular uses even though, unknown to them, the relevant tax burdens after accounting for shifting of the existing capital improvements tax have actually been reduced. Thus it may be important for policy decisions to ascertain not only the legal liability of a tax but also its final incidence.

Changes in land values by geographic location are given in Tables 5 and 6. New Westminster is bordered by the municipalities of Richmond to the west, Burnaby to the north and Coquitlam to the east. The city of Vancouver lies to the northwest.

The primary commercial areas in New Westminster are located with subdistrict (S.D.) 2 and particularly S.D. 7 which contains the central business district (CBD). S.D. 2 and S.D. 7 also contain all of the sites zoned for multi-family dwellings except for: (1) three small areas in S.D. 3 which are zoned for two-family dwellings, low rise multi-family dwellings and high rise multi-family dwellings respectively and (2) a couple of small areas in S.D. 4 and S.D. 6 which are zoned for two-family dwellings.

Most of the north shore of the Fraser River as well as the north and east shores of Lulu Island is zoned for heavy industrial use. This area includes major portions of S.D. 5, 6 and 9. Subdistrict 7 has a mixture of light and heavy industry separating the CBD of New Westminster from the waterfront on the Fraser.

S.D. 1 and S.D. 3 as well as approximatly one-third of S.D. 9 are zoned for residential use. S.D. 8 includes some residential property

TABLE 5

LAND VALUE CHANGES BY SUBDISTRICT

SUBDISTRICT NUMBER	No. of this type	Average initial land value	Average value of improvements		New land values (change from initial value) $\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
unknown	6	10,160	10,315	1.01	8,168 (-1,992)	9,499 (-661)	6,750 (-3,410)
1	643	41,321	60,555	1.47	37,056 (-4,264)	46,676 (5,356)	27,683 (-13,640)
2	1,224	19,183	29,443	1.53	16,528 (-2,655)	20,702 (1,520)	12,442 (-6,742)
3	914	19,742	20,093	1.01	14,720 (-5,022)	17,187 (-2,555)	12,108 (-7,633)
5	1,105	23,811	34,077	1.43	19,270 (-4,541)	23,632 (-178)	14,922 (-8,892)
6	1,703	19,198	19,247	1.00	14,577 (-4,620)	17,201 (-1,996)	11,843 (-7,356)
7	790	18,579	14,852	.80	14,003 (-4,574)	16,508 (-2,070)	11,389 (-7,188)
8	495	14,713	12,476	.85	10,918 (-3,794)	12,644 (-2,068)	9,067 (-5,646)
41	916	26,009	38,526	1.49	21,677 (-4,331)	26,542 (534)	16,819 (-9,190)
42	612	22,826	53,819	2.39	21,055 (-1,771)	27,401 (4,575)	15,005 (-7,821)
TOTAL	8,408	22,230	29,730	1.34	18,183 (-4,047)	22,229 (000)	14,137 (-8,093)

TABLE 6

TAX CHANGES BY SUBDISTRICT

Subdistrict Number	No. of each type	Change in Legal Tax Liability			Change in Final Incidence after Shifting		
		$\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$	$\delta_c = .5$	$\delta_c = 1.0$	$\delta_c = 0.0$
unknown	6	77	53	107	159	53	273
1	643	-496	-428	-583	341	-428	1,091
2	1,224	-146	-122	-177	212	-122	539
3	914	244	204	295	402	204	611
5	1,105	11	14	6	363	14	711
6	1,703	190	160	229	370	160	588
7	790	196	166	234	366	166	575
8	495	200	165	244	304	165	452
41	916	-45	-43	-47	347	-43	735
42	612	-447	-366	-552	142	-366	626
TOTAL	8,408	000	000	000	324	000	647

which borders the CBD in S.D. 7; the remainder of S.D. 8 is comprised of public and institutional land including Queen's Park, the asylum grounds and the B.C. Penitentiary. Because the latter are tax exempt they have been completely excluded from the data set before any calculations were made.

With the above information about the geographic location and primary land uses for each subdistrict it is easier to interpret the changes in land values given in Table 5. Of the subdistricts where most land is in residential use (S.D. 1, 3 and 8 as well as part of S.D. 9) S.D. 8 experienced the most moderate decline in land value. The residential property in this subdistrict is all advantageously located adjacent to New Westminster's CBD. Thus its <u>relative</u> value would be expected to increase as the land value model predicts. Land values in S.D. 3 fall more than those in S.D. 1. This, too, seems reasonable in light of the fact that the property in S.D. 1 is closer than those in S.D. 3 to the C.B.D. of Vancouver, the Lower Mainland's principal employment center. Both S.D. 1 and S.D. 3 are approximately the same distance from the less important CBD of New Westminster.

Most of the S.D. 5 and 6 is comprised of Lulu Island, a relatively underdeveloped area zoned for residential use with heavy industry along the waterfront. This property, which has poorer access to the major employment centers in Vancouver and New Westminster than the other subdistricts in the northwest part of the city, falls most drastically in value when site value taxation is adopted.

Finally, S.D. 7 which contains the CBD of New Westminster experienced an unexpected average decline in land value of $4574 relative to the city's average decline of $4047 when a changeover to site value tax was simulated. This decline in land values within the CBD is difficult to explain. Within the context of our model, however, these losses in value must have been the result of an increased land tax burden on these properties which was not completely offset by the benefits resulting from the unburdening effect.

Table 6 verifies the above average increases in taxes on properties located within S.D. 7. Unfortunately, this table shows little systematic change in annual tax levies when the site value tax is adopted. Perhaps a more detailed knowledge of the capital intensities of various land uses within each subdistrict would enable us to detect the underlying causes of the tax changes occurring in various geographic areas.

5.3: Summary of Simulation Results

The land value model developed in this study shows a high degree of sensitivity of land values and taxes to changes in the assumption about the incidence of the improvements tax. This sensitivity is greatest for high valued properties with high improvement/land ratios.

Based on the intermediate assumption that one half of the tax on improvements under the existing property tax system is passed on to landowners, the model predicts drastic tax increases which are capitalized into losses in land values for properties classified as farms and utilities for tax purposes. Vacant land also declines in value as a result of its increased tax liability under the site value tax system. Substantial tax increases imply large declines in land value for the owners of motels, gas and service stations, storage and warehousing facilities and sundry commercial establishments.

All residential properties with the exception of apartment blocks experience above average burdens resulting from increased annual levies. These increases are most pronounced for single-family dwellings and became less significant for higher density accomodation such as duplexes and triplexes.

Apartment blocks, hotels, halls and manufacturing establishments face considerably lower taxes under the site value tax scheme. Consequently, their land values increase. These results, however, are considerably more sensitive to changes in the tax incidence assumption than the results concerning the properties mentioned in the previous paragraph.

As is the case for multi-family dwellings, lower than average declines in land value industrial property result from the tax change. Unlike the multi-family dwellings, however, the industrial tax burden when acknowledging shifting of the improvements components of the current property tax is slightly increased from its previous level after the site value tax is instituted.

Commercial property experiences a reduced legal liability for taxes but, like industrial property, has an increased total burden after shifting of the improvements tax under the existing property tax system has been accounted for.

The changes in land values and tax liabilities by geographic location predicted by the land value model are more difficult to interpret than the results according to property use. There does, however, appear to be some tendency for land values to increase in the subdistricts which are more accessible to the central business districts of Vancouver to the northwest as well as the local CBD of New Westminster itself. No clearly discernable pattern of changes in legal tax liability by geographic location was detected. This is undoubtedly due in part to the heterogeneity of properties within a given subdistrict with respect to both property use and capital intensities of development.

FOOTNOTES

1 The general exception is agricultural land which is not valued at its market value but rather it is valued on the basis of its income generating potential in its existing use.

2 Totally exempt land was excluded from these figures.

APPENDIX

The Effects of Equalizing Effective Property Tax Rates

This appendix briefly summarizes the effects of amending New Westminster's property tax system so that all property owners are taxed at the same rate. Although a single mill rate is currently applied to all properties, effective rates of taxation vary considerably because of differences in the assessment ratios applicable to property in different uses. Various statutory exemptions also cause discrepancies.

By simulating the equalization of effective tax rates for all property owners (excluding 100 percent exempt property, as before), the effects of discriminatory tax treatment on land values and tax liabilities under the existing property tax system can be examined. The results of this simulation can be compared with the site value tax simulation to get some idea of what proportion of the latter's effect is attributable to the reduction of inequities in the present tax system rather than the adoption of the site value tax per se. The site value tax simulation described in this chapter insures that effective tax rates are equalized at the same time that improvements are untaxed. Thus its effects include those discussed here.

Assuming that landowners presently bear one half of the improvements tax as a result of shifting (i.e. $\delta_c = 0.5$), total land value could be expected to fall from \$187 million to \$179 million. This represents an average decline in land value of \$946 on each property. If the site value tax system was instituted total land value would have fallen to $153 million or $4044 per property as noted earlier in the chapter. In both simulations the changes in land value equal the capitalized value of the changes in final tax burdens incurred by landowners.

By comparing Tables 7-9 with Tables 1-6 it can be seen that the effects of reducing the variability of effective property tax rates are generally smaller but in the same direction as the effects of adopting the site value tax. Tables 7 and 8 show again the sensitivity of the results to the (improvements tax) incidence assumption particularly for properties with high improvement/land ratios. Multi-family dwellings as well as industrial and commercial properties typically have high improvement/land ratios. If $\delta_c = 0.5$ or 1.0, these sites appreciate in value when tax rates are equalized. If $\delta_c = 0.0$, however, approximately average losses in land value are suffered. These sites had fallen in value in the simulation of site value taxation when $\delta_c = 0.5$ or 0.0 but had risen in value if it was assumed that all of the capital tax can be shifted under the present system (i.e. $\delta_c = 1.0$).

Properties with low improvement/land ratios such as farms, utilities and residential properties would experience above average declines in land value regardless of the incidence of the improvements tax.

Table 8 which gives the breakdown of land value changes by the actual use classification is similar to Table 3, the corresponding table from the site value tax simulation. Some commercial establishments which would bear an increased tax burden under the site value tax, however, would benefit if tax rates were equalized under the existing system, assuming that $\delta_c = 0.5$ or 1.0. Notable in this regard are theatres, gas and service stations, commercial garages, workshops, storage, warehousing and marine facilities. This seems to indicate that these properties incur heavier than average tax burdens because of the unequal tax rates in the present system.

Table 9 indicates the changes in land values and taxes by geographic location. Greater uniformity of tax rates would place a greater tax burden on properties in S.D. 7 which contains the central business district. The tax burden in S.D. 2 which has a substantial number of commercial properties would remain virtually unaffected by such a change.

Of the residential areas, S.D. 8, which also contains a lot of public and institutional land, and S.D. 3 appear to benefit from the discrepancies in tax rates which prevail under the existing system. S.D. 1, however, experiences a significant decline in taxes (an average of \$165 per property) when tax rates are equalized indicating that the area is currently being taxed at rates above the city average.

Heavy industry occupies major portions of S.D. 5 and 6. These properties seem to enjoy a tax advantage because of variability in the effective tax rates prevailing under the present system. Property owners in these subdistricts would face an increased tax burden of approximately \$116 and \$125 respectively if tax rates were uniform throughout the city. This would cause an average decline in land values of \$1454 in S.D. 5 and \$1779 in S.D. 6.

TABLE 7

LAND VALUE AND TAX CHANGES BY AC17 CODES
AFTER THE ADOPTION OF UNIFORM RATES OF PROPERTY TAXATION

AC17 CODES	NEW LAND VALUE (change in land value) $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN LEGAL TAX LIABILITY $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN FINAL TAX INCIDENCE WITH SHIFTING $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$
unclassified	1,904 (1,904)	2,909 (2,909)	912 (912)	-259	-233	-286	-152	-233	-73
residential	15,233 (-1,812)	15,369 (-1,676)	15,166 (-1,879)	147	134	159	145	134	150
multi-family	48,687 (2,851)	54,146 (8,309)	43,961 (-1,877)	-712	-665	-754	-228	-665	150
commercial	56,868 (3,930)	61,395 (8,458)	52,649 (-289)	-738	-677	-802	-314	-677	23
farm	21,303 (-3,354)	21,420 (-3,237)	21,226 (-3,431)	273	259	286	268	259	274
industrial	50,269 (3,144)	55,818 (8,693)	45,103 (-2,025)	-782	-695	-871	-251	-695	162
machinery and equipment	12,944 (5,275)	14,845 (7,177)	11,109 (3,441)	-613	-574	-654	-422	-574	-275
utilities	57,034 (-2,181)	58,746 (-469)	55,443 (-3,772)	36	38	31	174	30	302
TOTAL	21,280 (-946)	22,226 (000)	20,466 (-1,760)	000	000	000	76	000	141

TABLE 8

LAND VALUE AND TAX CHANGES BY ACTUAL USE CODE AFTER THE ADOPTION OF UNIFORM RATES OF PROPERTY TAXATION

ACTUAL USE CODE	NEW LAND VALUE (change in land value) $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN LEGAL TAX LIABILITY $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN FINAL TAX INCIDENCE WITH SHIFTING $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$
vacant land	20,213 (-814)	20,359 (-668)	20,087 (-941)	63	53	73	65	53	75
one-family dwelling	15,423 (-2,034)	15,508 (-1,949)	15,406 (-2,052)	170	156	184	163	156	164
duplex or trip-lex dwelling	15,453 (-1,922)	15,540 (-1,835)	15,440 (-1,931)	162	147	177	154	147	154
row house	29,630 (-1,720)	31,032 (-318)	28,409 (-2,941)	23	25	20	138	25	235
conversion	21,024 (-1,648)	21,298 (-1,374)	20,846 (-1,827)	125	110	140	132	110	146
apartment block	38,089 (4,203)	43,193 (9,308)	33,590 (-297)	-801	-745	-855	-336	-745	24
outbuildings only	18,234 (-1,276)	18,396 (-1,114)	18,091 (-1,419)	97	89	105	102	89	113
motel, auto court	51,770 (125)	54,601 (2,956)	49,123 (-2,522)	-266	-236	-299	-10	-236	202
hotel	142,852 (21,181)	167,297 (45,626)	119,750 (-1,921)	-4,114	-3,650	-4,590	-1,695	-3,650	154
hall	48,670 (5,074)	56,305 (12,709)	41,616 (-1,980)	-1,142	-1,017	-1,268	-406	-1,017	158

TABLE 8 (cont'd.)

ACTUAL USE CODE	NEW LAND VALUE (change in land value) $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN LEGAL TAX LIABILITY $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	CHANGE IN FINAL TAX INCIDENCE WITH SHIFTING $\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$
stores and commercial service	68,381 (6,362)	74,069 (12,049)	63,060 (1,040)	-1,045	-964	-1,130	-509	-964	-83
store and living quarters	26,055 (1,414)	27,765 (3,124)	24,498 (-144)	-266	-250	-284	-113	-250	11
office building	80,931 (12,940)	93,402 (25,411)	69,344 (1,353)	-2,243	-2,033	-2,456	-1,035	-2,033	-108
bowling alley	41,182 (4,932)	47,481 (11,231)	35,338 (-912)	-1,004	-898	-1,110	-395	-898	73
theatre building	103,783 (10,359)	114,667 (21,244)	93,573 (150)	-1,874	-1,700	-2,054	-829	-1,700	-12
gas and service station	57,570 (52)	59,958 (2,441)	55,350 (-2,168)	-211	-195	-229	-4	-195	173
commercial garage, workshop	44,410 (4,195)	48,554 (8,339)	40,499 (284)	-733	-667	-802	-336	-667	-23
cold storage	33,903 (238)	35,611 (1,946)	32,328 (-1,338)	-170	-156	-186	-19	-156	107
storage & warehousing-open	67,093 (4,253)	67,560 (4,720)	66,674 (3,834)	-346	-378	-318	-340	-378	-307
-closed	53,032 (3,320)	57,541 (7,829)	48,780 (-932)	-695	-626	-768	-266	-626	75
marine facilities	28,107 (1,589)	30,944 (4,426)	25,476 (-1,042)	-396	-354	-438	-127	-354	83
other commercial	52,018 (-440)	53,721 (1,263)	50,451 (-2,007)	-104	-101	-109	35	-101	161

TABLE 8 (cont'd.)

ACTUAL USE CODE	NEW LAND VALUE (change in land value)			CHANGE IN LEGAL TAX LIABILITY			CHANGE IN FINAL TAX INCIDENCE WITH SHIFTING		
	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$
manufacturing	213,651 (23,357)	251,749 (61,454)	178,223 (-12,071)	-5,582	-4,916	-6,256	-1,869	-4,916	966
other industrial	82,184 (4,040)	89,220 (11,077)	75,591 (-2,553)	-989	-886	-1,097	-323	-886	204
TOTAL	21,281 (-946)	22,227 (000)	20,467 (-1,760)	000	000	000	76	000	141

TABLE 9

LAND VALUE AND TAX CHANGES BY SUBDISTRICT
AFTER ADOPTION OF UNIFORM RATES OF PROPERTY TAXATION

SUBDISTRICT NUMBER	NEW LAND VALUES (change in land value)			CHANGE IN LEGAL TAX LIABILITY			CHANGE IN FINAL TAX INCIDENCE WITH SHIFTING		
	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$	$\delta_c = 0.5$	$\delta_c = 1.0$	$\delta_c = 0.0$
unknown	9,796 (-364)	9,862 (-298)	9,774 (-386)	32	24	41	29	24	31
1	43,378 (2,058)	46,960 (5,641)	40,082 (-1,239)	-496	-451	-543	-165	-451	99
2	19,158 (-24)	20,435 (1,253)	18,013 (-1,169)	-111	-100	-121	2	-100	94
3	17,538 (-2,204)	17,627 (-2,115)	17,533 (-2,209)	186	169	204	176	169	177
5	22,357 (-1,454)	23,257 (-554)	21,603 (-2,207)	48	44	52	116	44	177
6	17,417 (-1,779)	17,772 (-1,424)	17,147 (-2,050)	123	114	133	142	114	164
7	17,014 (-1,564)	17,607 (-971)	16,492 (-2,086)	79	78	79	125	78	167
8	13,196 (-1,516)	13,319 (-1,394)	13,128 (-1,585)	122	112	132	121	112	127
41	25,134 (-874)	26,082 (74)	24,352 (-1,656)	00	-6	6	70	-6	133
42	23,144 (318)	24,790 (1,964)	21,727 (-1,099)	-165	-157	-173	-25	-157	88
TOTAL	21,284 (-946)	22,230 (000)	20,469 (-1,760)	000	000	000	76	000	141

CHAPTER 6: APPRAISAL OF THE LAND VALUE MODEL

6.1: Its Advantages

This study, like the initial impact studies, is primarily concerned with estimating the burden on different property owners of instituting site value taxation. The approach used, however, is unique in several respects. First, it takes into account the interrelationships between tax burdens and land values. In other words, land values are assumed to vary as the taxes which fall on the landowners are changed. This is important because:

(a) the possibility of capital gains or losses on individual properties when annual tax burdens are changed must be considered when assessing the equity of adopting a site value tax.

(b) changes in land values affect the aggregate value of the tax base and consequently the revenue raising capacity of the tax.

(c) it recognizes the necessity of determining the required site value tax rate from within the land value model if we are to insure that the revenue yield will remain unchanged after equilibrating adjustments.

The second difference in the approach of this study is that land values are made to depend on the final incidence of the property tax on landowners. The model can easily handle atlernative incidence assumptions concerning the proportion of the taxes on land and improvements which finally comes to rest on landlords so that the importance of tax incidence as a determinant of land values can be examined. This generality is advantageous because, although the incidence of the property tax is undoubtedly one determinant of land values, there is still uncertainty among public funance experts as to where the final burden of the property tax lies.

A third advantage of the model is its generality with respect to the types of tax changes which can be considered. It is capable of analyzing not only the case of site value taxation but also varying degrees of differential taxation of land and improvements. This is useful for two reasons. First, it becomes possible to deal with the transition to the site value tax in cases where the relative importance of improvements in the tax base is to be reduced gradually over time. Second, the confounding effects of equalizing assessments can be separated from the effects of site value taxation per se. That is, the redistributional impact of equalizing the actual assessment ratios on different properties in different uses while maintaining the statutory degree of differential taxation can be isolated. This makes it possible for the changes which are due strictly to the adoption of site value taxation, after eliminating existing discriminatory tax policies, to be ascertained.

In sum, the land value model developed in this thesis provides considerably more information on the expected impacts of a changeover to the site value tax than the previous, initial impact studies on the subject. This is a result of the model's explicit recognition of the interdependence of land values and property taxes. The method used, however, does retain a number of shortcomings of these earlier studies. Most significant among these is the short run, comparative static nature of the analysis. This is a consequence of the necessarily restrictive assumptions which were imposed on the gross returns and capital stock associated with each property. As a result, the model serves, at best, as a rough approximation to a real world situation where the multitude of interactions and interdependencies are always variable and imprecise.

6.2: Its Shortcomings

It has been emphasized that the land value model developed therein is capable of giving only a rough approximation of the changes in land values and tax liabilities which would result if the property tax was replaced by a site value tax. The imprecision of the model is caused by its inability to capture all the anticipated effects of such a change. Only the capitalization effect, i.e. the capitalization of the unshiftable portion of the property tax or the site value tax which is borne by landowners, is fully accounted for. The credit rationing and holding cost effects are completely ignored.

Furthermore, only part of the unburdening effect is captured by the model. By setting $\delta_c > 0$ we are assuming that landowners are forced to pay at least a portion of the property tax levied on improvements. The removal of this tax burden from land with the adoption of site value taxation is properly included by the model as a benefit to landowners.

Thus the value of land rises as a result of the untaxing of buildings. This partially reflects what has been referred to earlier as the unburdening effect.

Ideally land prices should reflect the opportunity cost of the most profitable development alternatives available to potential landowners given the existing economic environment. This environment includes the incentives and disincentives created by various taxes as well as other economic, social and political factors. If the land market is a reasonably efficient one, a strong relationship will exist between the profitability of capital investments which require land and the market price of land.

The inability of the land value model to account for any change in the opportunity cost of land after the change in the tax system causes its adjustment for the unburdening effect to be inaccurate. The unburdening effect predicted by the model is based on the actual amount of capital currently employed on the property rather than the optimum level. Even if all properties were optimally developed under the existing tax system, opportunities for further capital investment are likely to arise once the economic inefficiencies caused by the nonneutrality of the property tax are eliminated. Such opportunities would presumably depend on many factors, not just the present capital intensity of development on each site. The land value model, however, places the same value on all similarly developed properties which currently have equal value after the site value tax is instituted. For example, two vacant, equally valuable lots would both fall substantially in value - even if one happened to be located on the outskirts of the city and the other, advantageously located near the city centre.

Even if two lots have the same opportunity cost under the existing property tax system, it is likely that an advantageously located one will have increased development potential relative to a similar lot on the outskirts when the tax on improvements is removed. The model developed in this study is unable to explain the increased premium which would be paid for the first site after the tax change. This is because the model bases the unburdening effect on the untaxing of existing improvements rather than the level of improvements which would result when the land was optimally developed under the site value tax. This shortcoming of the land value model, which is its most serious drawback, is difficult to overcome without a complete knowledge of: (1) the demands by various users for land and improvements, (2) the degree of substitutability of land in different locations by these users and (3) the degree of substitutability between land and capital in various uses.

Ideally, the unburdening effect should be based on the tax savings assuming an optimal level of improvements rather than the actual level as was done here. Some proxy for optimal improvement levels after the changeover to the site value tax would have to be used if a simple, but reasonably satisfactory estimation of the unburdening effect is to be obtained. A manageable approach, for example, might be to use some appropriately weighted average of the improvement/land ratios on neighbouring sites to determine the optimal ratio for a particular site under site value taxation. This approach would have the advantage of altering the existing land value gradient to reflect the development potential of each property as indicated by the improvements which have already been made to similar sites in the same area of the city. Of course, many other proxies for the optimal levels of capital after the tax system is changed could be devised. The above suggestion is just one such proxy.

It is important to realize that the inaccuracy of the unburdening effect predicted by the land value model results not because land prices do not reflect the opportunity costs of optimum development but rather because the tax reform would cause a change in these opportunity costs. It is these changes which our model neglects. This study is based on the presumption that the "100 percent of market value" assessments for land provided by the Assessment Authority are a reasonably accurate representation of its true opportunity cost under the existing property tax system. (All administrative problems dealing with accurate, equitable assessment procedures are disregarded).

If the actual value role is an accurate reflection of market values one of two interpretations is implicit in the use of the land value equation:

$$\ell_i = \frac{y_i - rc_i - \delta_c t_c c_i}{r + \delta_\ell t_\ell} \tag{5}$$

First, it could be assumed that the existing capital stock on each property, c_i, is the optimal long run level of capital improvement given the existing property tax system. The gross return, y_i, which is calculated in our analysis can then be said to represent the maximum gross yield obtainable from the land using the optimal amount of capital, c_i.

An alternative assumption is: in cases when the existing level of improvements is nonoptimal, the market nevertheless values all land according to its opportunity cost. Thus its value still reflects its revenue generating potential if the optimal level of investment in improvements was attained. The calculated y_i value for the property must now be considered the value which makes the term $(y_i - rc_i)$ the expected gross return to land with the <u>optimum</u> capital stock but before taxes. That is, any discrepancy between the actual c_i and the optimum c_i is assumed to be adjusted for in the calculated y_i value. Thus, in essence, a maximum potential gross cashflow, $(y_i - rc_i)$, is imputed to each site regardless of its current level of improvements when this second interpretation is used.

It now becomes clearer why the model only partially includes the unburdening effect. When the site value tax is instituted the optimum intensity of development on land is expected to change; the amount of land which should be devoted to various uses will also change as a result of the new tax. In other words, the optimal capital stock on different properties can be expected to change rather than remain fixed as the calculation procedure required. The elimination of dead-weight losses which were caused by the property tax should increase the opportunity cost of many land parcels and hence their gross cash-flow. By holding $(y_i - rc_i)$ constant the changes in land values which shifts in the optimum amount of capital would imply are ignored.

In effect, the model is assuming, contrary to expectation based on economic theory, that the value of capital on each property remains optimal (or no more or less suboptimal) after the change in the tax system. This implies that levels of output and the factor intensities of all activities using land and capital are fixed. This is, in effect, assuming a world of fixed coefficients. It is, therefore, self-evident that the model is short run in nature.

In reality, changes in the optimal capital investment on various parcels of land after site value taxation is instituted are caused by tax induced adjustments in the labor and final product markets as well as the capital market itself. These former adjustments include the reactions of laborers and consumers to property tax burdens which are shifted to them rather than borne by landowners. Varying elasticities of technical substitution and final demand for different goods and services determine the magnitude of these effects.

In cases where landowners bear the entire property tax (i.e. $\delta_c = \delta_\ell = 1.0$) the changes in the optimum stock of capital and aggregate output will be negligible. This is because capital owners and consumers as groups face no net property tax burden which would induce them to alter their economic behavior if the landowners absorb the entire tax. It is the change in the final incidence of the tax on these various groups (caused by $\delta_c \neq \delta_\ell$) which is the basis of the unburdening effect on aggregate land value. The direction of the unburdening effect on individual properties is more uncertain. It depends not only on tax incidence but also on its optimum capital/land ratio relative to the optimum ratio for the municipality as a whole.

The fact that the unburdening effect depends crucially on final tax incidence as well as optimum capital/land ratios for each property has generally been neglected in the literature on the site value tax. Any change in tax incidence, because of the nonuniformity of capital/land ratios, can be expected to alter the behavior of households and business firms. Factor intensities will be adjusted to achieve a profit-maximizing output after payment of tax liabilities; various activities will be expanded or contracted so that mobile factors of production maintain normal rates of return.

Assuming that the existing property tax is not borne entirely by landowners the adjustments following the adoption of the site value tax are expected to increase the profitability of opportunities for the development of land. The increased profitability of these opportunities is a consequence of eliminating the economic inefficiency caused by any portion of the property tax which falls on productive factors or final consumers. Assuming δ_c and δ_ℓ are not both equal to one, the magnitude of the unburdening effect will depend on how much the opportunity cost of land increases as a result of the new optimum capital/land ratios which prevail after site value taxation is adopted. In general, the opportunity cost and hence the price of land can be expected to rise, at least somewhat, because of the unburdening effect. The magnitude of the changes depends not only on tax incidence but also on technical production relationships and the locational advantage of various properties. Empirical information in these areas is extremely hard to come by.

It should now be apparent that the shortcomings of our land valuation model arise because of its short run, partial equilibrium nature. Only the proportion of the property tax burden which was finally borne by landowners was considered as a determinant of land value. In reality all of the incidence effects of the tax are important in determining land value. If the tax falls, at least partly, on final consumers or productive factors other than land, certain adjustment in the supply and demand of various inputs and outputs can be anticipated. An analysis of these more far-reaching effects requires a general equilibrium approach.

The construction of a general equilibrium model for estimating empirically the effects of a shift to site value taxation involves many problems. The lack of data on the production relationships for different industries and on the nature of final product demands makes this task particularly formidable. A second problem is the lack of a firm theoretical foundation defining the exact manner in which the myriad of relevant economic variables interact.

The theory and empirical research on general equilibrium tax effects are best developed in the work on the corporation income tax and the effects of tariffs on international trade and national welfare. Recently, a general theory of tax incidence has begun to evolve. Some aspects of this theory which have applicability to the problem of determining the effects of heavier taxation of land and reduced levies on improvements are summarized in the remainder of this chapter.

6.3: Some Suggestions for a General Equilibrium Analysis of the Site Value Tax

In this section specific characteristics of the property and site value taxes which must be recognized in a general equilibrium analysis of tax effects are discussed. This information is necessary when attempting to expand simple models of tax effects into more comprehensive ones in an effort to obtain better predictions of the economic adjustments which a change in the property tax system would induce.

Estimating the effects of replacing the property tax with a site value tax involves the study of two distinct but simultaneous processes of adjustment. The first involves the effects of removing the tax on improvements; the second, the effects of increasing the tax on land. These two effects would not be expected to exactly offset each other even if the same revenue was raised under either system. A changeover from property taxation to site value taxation will probably affect tax incidence[1] as well as the degree of tax-induced misallocation of resources in the economy. A knowledge of these effects is important for any policy recommendation concerning the property tax system.

The differences in the effects of the property tax and the site value tax arise because of the differences between land and capital (discussed in Section 1.4). Whereas capital is usually considered at least partially mobile between various uses and locations, land is completely immobile geographically. The supply of the two factors of production also differs. The total land supply is inalterably fixed, although there may be some variability in the supply of <u>urban</u> land in cases where surrounding agricultural land can be converted to urban use. In contrast, the supply of capital in any given municipality may be quite variable. Any differences in the rates of return to mobile capital in different localities or uses will cause a tendency for capital to relocate in areas which offer higher after-tax returns until the differentials in returns are eliminated. This makes the capital supply curve for a particular municipality elastic with respect to the rate of return. Elasticity of a country's aggregate supply of capital depends on the interest elasticity of saving in the economy.

The differing supply conditions of land and capital are extremely important for determining the impacts of taxes levied on them. If supply cannot adjust to changes in economic conditions, a tax on that supply is unshiftable and must therefore be borne by its owners. If the supply is variable the potential exists to shift forward and/or backwards at least a portion of the tax depending on the demand and supply elasticities in the relevant markets.

The total demand for land as well as for capital depends on the demands of both firms and households. Thus the demand for these two commodities ultimately depends on:

(1) the nature of the production functions in different industries which utilize land and capital as well as labor as inputs,

(2) the utility function of consumers or their final demands for land and capital as consumer products (rather than inputs).

Consequently, the effects of taxes on land and improvements will depend on the responsiveness of firms and households to changes in the relative (net of tax) prices of land and capital. Because spending units (1) differ in their ability or desire to substitute land for capital and (2) have different initial improvement/land mixes (i.e., "factor intensities" for firms), taxes alter their economic decisions in different ways. These responses must be estimated to determine: (1) how the output levels of various firms will change and (2) how the capital intensity with which land is used in various sectors adjusts if the relative tax burdens on land and capital were altered by the adoption of the site value tax.

It should be noted with regard to the first point above that changes in input prices affect the supply prices of different industries in different ways. The concomitant changes in their levels of output will depend on the elasticity of demand for the final products in question. The effect of a tax change on the demands for these products may be relatively small in most cases compared to the effect on the demand for land and capital for residential use. Hence it may simplify the analysis of the site value tax impacts to ignore changes in final demands for commodities produced with varying amounts of land and capital at least initially. In other words, the changes in the aggregate output levels of different products would be ignored. Instead the emphasis would be on: (1) the adjustments in production processes which result from the unequal elasticities of substitution for land and capital as well as the different factor intensities in various industries, and (2) the willingness of different residential property owners to adjust their desired improvement/land ratio.

Another important feature of the property tax, emphasized by Peter Mieszkowski (1972), is that the tax, because it is levied in virtually all municipalities, acts as a "general" or global tax on all capital. (A general tax is one which is levied on all capital in the economy regardless of use). Under a strict set of assumptions which include perfect factor mobility and, more important, fixed aggregate factor supplies, such a tax will necessarily be borne by capital owners. This tax burden is unavoidable regardless of the use to which the capital is put. With the total capital supply fixed, there would be no shifting of the tax burden. Hence no distortion in resource allocation would occur.

The property tax, however, is not uniform between municipalities. Hence, the universality of the tax will not prevent suboptimal resource allocation. Capital will tend to move freely between tax jurisdictions until after-tax returns are equalized at the margin throughout the country. The resulting allocation will undoubtedly be suboptimal when compared to the no-tax situation which is assumed to be Pareto optimal.

To account for both of these effects Mieszkowski breaks the improvements tax[2] into two components: a general (capital) tax and a partial (capital) tax. A partial tax is one which is levied on capital (or any other factor) only in a particular use or geographic area.

The average property tax rate within the country can be considered as a general tax on all capital because of the universality of the property tax.[3] The deviations from this average rate in different municipalities are then partial taxes or subsidies on capital located within those jurisdictions. Under Mieszkowski's assumptions capitalists will bear the general tax but not necessarily the partial taxes. The latter taxes alter the relative prices of various products because they affect the cost of capital to different communities. Thus they create "excise effects" which influence the allocation of resources throughout the country. If the resulting allocation is less efficient than in the absence of the property taxes welfare losses have resulted.

To summarize, general taxes are considered neutral from an economic efficiency standpoint in Mieszkowski's analysis. They affect only the distribution of income between capitalists and noncapitalists. Partial taxes (and subsidies) are nonneutral, the exact magnitude of their effects depending on the price elasticities of demand in consumer markets and the technical production relationships of different industries. Depending on these factors the partial taxes could be at least partially shifted. Their effect is, therefore, not only on the allocation of economic resources but also on the distribution of after-tax income in the private sector.

The importance of the excise effects caused by the partial taxes on capital in different jurisdictions also depends on the scope of the analysis being undertaken. The possibility of adopting the site value tax universally or just within a single community while all others retain the present property tax system can be considered. The magnitude of the excise effects depends on which approach is taken.

If the site value tax is adopted nationwide, all existing partial taxes on capital would be eliminated. This would cause an improvement in the allocation of capital throughout the economy. Taxes would no longer interfere with the equalization of marginal rates or return on capital. Hence capital would be used where it is most productive.

If, on the other hand, the adoption of site value taxation within a single community is considered, the eliminated tax on capital amounts to a large subsidy on capital located within that municipality. To take advantage of the lower tax rates, an influx of capital into the municipality adopting site value taxation would be expected. This capital inflow also tends to increase the demand for land thereby pushing up land values. This is the unburdening effect discussed in Chapter 3.

A final consideration when comparing tax rates in different municipalities is that the quantity and quality of the public services provided may also vary considerably. High tax rates which are accompanied by higher public expenditure benefits are much less likely to cause excise effects than tax differentials with no offsetting benefits. When making interregional tax comparisons it is imperative to study both the expenditure and revenue aspects of the local budgets. These complications are avoided when considering possible tax changes within a single community because it is reasonable to assume that government expenditures will remain unchanged regardless of the method used to finance them. Thus the unimportance of considering the expenditure side of the municipal budget is an advantage of comparing alternative tax schemes for raising the required revenue in a single community while the tax systems of other areas are assumed to remain unchanged.

Thus there are a number of factors which might be considered in future analyses of the site value tax. While the present work has incorporated some features which have generally not been considered in previous estimates of the effects of a change to site value taxation, the inclusion of further factors could be expected to lead to still more useful results.

FOOTNOTES

1 Tax incidence could remain unchanged in the extreme case where landowners bear the entire burden of the property tax or the site value tax.

2 By improvements tax or capital tax is meant the portion of the property tax which falls on improvements as opposed to land which will be referred to as the land tax.

3 Actually for this to be completely correct, all capital in the country should be subject to a tax equal to this average rate. If capital not engaged in real estate is subject to lower rates of taxation these should really be considered in calculating the average rate of tax on capital. In other words, excise effects can cause reallocation of capital away from the real estate sector if the sector as a whoe has rates of taxation above those in the real estate sector. In essence, all non-real estate capital is assumed to bear a tax equal to the average property tax.

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