PROPERTY TAX REFORM: AN ANALYSIS OF A PROPOSAL FOR MILWAUKEE

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THIRD CONCURRENT CONFERENCE SESSION

PROPERTY TAXATION

MONDAY, OCTOBER 14, 1974, 10:30 A.M.

KEITH W. TEAGUE, *presiding.*

CHAIRMAN TEAGUE: Conference delegates and guests, the hour has arrived, and it is now time to begin our session on Property Taxation.

My name is Keith W. Teague, I am the General Manager of Property Taxes for the Union Pacific Corporation, and I extend a special welcome to you for this Third Concurrent Conference Session of the Sixty-Seventh Annual Conference on Taxation. I feel that it is a privilege and an honor to be here today to participate in this property tax session. We will hear four gentlemen, all real experts and competent in the property tax field. The subjects to be covered are all very timely and will be of special interest to all.

The property tax, as you are aware, is one of this Country's major tax sources. Some like it, some do not. Many feel the property tax structure should be improved or changed considerably as has been indicated by recent legislative efforts.

You may have noted that the Commerce Clearing House *State Tax Review*, dated July 23, 1974, reported that property taxes collected by state and local governments during the 12 months ending with March, 1974, totaled a whopping $48.2 billion or an increase of 8.3 percent over the previous fiscal year. The subject matter of Property Taxes is important to us and will continue to be.

Our first speaker is Dr. Arthur P. Becker.

Dr. Becker is Professor of Economics at The University of Wisconsin — Milwaukee. He is Chairman of the Committee on Taxation, Resources and Economic Development and Vice Chairman of the Redevelopment Authority of the City of Milwaukee. He has prepared many papers on property taxation matters, too numerous to enumerate at this time. Dr. Becker also has had several books and articles published on property taxation. He has recently been involved in a computerized study of the probable impact on property taxpayers in Milwaukee if improvements were exempted from the real estate property tax.

Dr. Becker will present a paper entitled "Property Tax Reform: An Analysis of a Proposal for Milwaukee."

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PROPERTY TAX REFORM:
AN ANALYSIS OF A PROPOSAL FOR MILWAUKEE [1]

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I. GENERAL CONSIDERATIONS IN DESIGNING A STUDY ON THE DISTRIBUTIVE IMPACT OF REAL PROPERTY TAX REFORM

If the real property tax is ever going to provide the beneficial economic and environmental effects, the equity and the revenues that it is capable of producing, both administrative and substantive reform of the tax is necessary. A great deal of attention is given to measures for administrative reform. However, relatively little attention is given to measures of substantive reform, especially those that may be fundamental in nature. Substantive reform requires action to reverse the erosion of the tax base [2] and to emphasize the taxation of land more heavily than improvements. The latter reform is usually known as "land value taxation."

The merits of the latter reform has been presented and debated at length in tax literature.[3] The promise of significant help in solving a wide spectrum of urban problems has aroused considerable interest in land value taxation. However, many concerned citizens are uncertain of exactly how such a tax reform would affect them initially. They might agree that the proposal to shift the burden of the real property tax more to land and away from improvements is desirable in the long run for reasons of equity, economics, environment, and local finance. However, they may be worried about overcoming a possible initial "shock" of a sudden large increase in tax liabilities. Therefore, in order to find out the extent and magnitude of the adjustments that will

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[1] The research forming part of the basis for this publication was conducted pursuant to a contract with the Department of Housing and Urban Development. The substance of such research is dedicated to the public. The author is solely responsible for the accuracy of statements or interpretations contained herein.

[2] Arthur P. Becker, (Chairman of the Property Taxation Committee), *The Erosion of the Ad Valorem Real Estate Tax Base, Tax Policy*, Volume XL, No. 1, National Tax Association — Tax Institute of America, 1973.

[3] For a summary of reasons given on both sides of the land value tax issue see: Becker, Arthur P.; Gottlieb, Manuel; Harriss, C. Lowell, and Schaaf, A. H.; *Land Value Taxation: Pro and Con; Tax Policy;* Tax Institute of America, Princeton, Volume XXXVII, Nos. 9-12, Sept.-Dec., 1970.

be required it is desirable to analyze carefully the impact of such a reform.

An empirical analysis of all parcels of property in the jurisdiction under study is desirable insofar as it can avoid unnecessary assumptions, and provide greater accuracy in disaggregated analysis. Computer technology makes this kind of case study possible.

Purposes

The broad purpose of any tax impact study is to determine the initial money burden on individual taxpayers and various groups of taxpayers. Substantive tax reform is highly controversial and invites inaccurate and misleading statements about both short and long range effects of the reform. While the economist, and government is generally more concerned with the long range incidence and effects of taxes and tax changes, the taxpayer himself is primarily concerned with the immediate impact of the tax or a change in it. For that reason it is necessary and essential that a tax impact study be made of any significant and substantive tax reform. Taxpayers have a right to accurate knowledge of what tax reform will mean for them. Such knowledge will be their best weapon in improving a burdensome tax and best defense against those who would dismantle a good tax.

The completion of an adequate tax impact analysis will provide facts that can be used to replace speculative notions and become the basis for secondary or derivative purposes, some of immediate practical value and others that can help us understand and perhaps predict further ramifications of the tax reform. Thus, the long range economic effects of a real property tax reform can be better understood if its distributive impact is based on fact rather than speculation. Factual knowledge of the impact will make it possible to determine with a greater degree of reliability the probable long range effects of a tax reform measure because it can supply realistic premises or assumptions upon which accurate deductive reasoning must be based. In analyzing the effects of a possible conversion of the real property tax into a land value tax we must first determine what the initial results (impact) of the change would be and the likely reasons for them. Once equipped with this information the sequential stages of further change can be deduced as the forces induced by the conversion work themselves out.

In terms of immediate practical value, a tax impact analysis of reforming the real property tax into a land value tax will provide one, although one would hope not the only, basis for taxpayers and other concerned citizens to take a position on the proposed tax reform. Lack of knowledge leads to the rejection of ideas "out of hand." Fear of the unknown leads to its avoidance. History is replete with the rejection of the unknown, albeit the truth, which was later to be-

come widespread knowledge and then accepted. Accordingly, a tax reform has little chance of acceptance in a democracy unless it overcomes opposition based on ignorance and fear.

An impact analysis of real property tax reform will highlight many of the problems that would have to be faced before or after the reform were adopted. For example, poor assessment is most often evident in the undervaluation of land. Any real property tax reform with the objective of shifting the burden of the tax to land exclusively or merely in greater measure than what is prevalent today, would seem to call for improved land assessment. Perhaps one reason for the difficulties in raising assessment standards lies in the vested interests and special privileges arising out of the mediocrity of the status quo.

An impact analysis of various proposals for reforming the real property tax into a land value tax will reveal clearly the likely, although not inevitable, political lineup for and against the proposal. It will reveal the locations and land use functions of proponents and opponents and the stakes involved. Thus, the debate can be joined in more precise terms with a better chance for shedding light than darkness. For example, vested interests will be uncovered and be subject to discounting if they are deemed contrary to the public interest.

A distributive impact study should not be regarded as a study of the equity of reforming the real property tax into a land value tax. The equity of the tax reform lies in its long run effects. While beneficial results can be expected to flow as soon as the reform is instituted, the magnitude of the benefits, including equity, can grow only with the passage of time which as the benefits continue to accumulate.

General Methodology

A case study approach to any proposal for reforming the real property tax in a substantive and fundamental manner begins with a determination of the immediate effect of the tax reform measure on the tax bills of real property taxpayers. Accordingly, the study attempts to discover whether the tax liabilities of property owners will change significantly, in which direction and by what magnitude. Individual tax changes can be aggregated or disaggregated in a variety of ways to provide panoramic as well as microscopic views of the impact instituted by the reform.

An impact study itself generally consists of a quantitative analysis involving the production of a frequency distribution and a variety of statistical data for each variable (class or group). The following are some of the statistics that can be generated on the basis of each frequency distribution:

1. the arithmetic mean,
2. an estimate of the median,

3. an estimate of the mode,
4. the maximum value, minimum value and range,
5. the variance,
6. the standard deviation,
7. the coefficient of variation (in percent),
8. the range as a percent of the mean.

The classes for which frequency distributions and statistical analysis of changes in tax liabilities can be made to include:

1. classes or real property in terms of use, such as residential, commercial, manufacturing, and agricultural;
2. values of real property in terms of use;
3. classes of real property in terms of their ratios of improvement value to land value;
4. a representative sampling of individual parcels of real property, or all individual parcels;
5. geographical areas from the largest to the smallest that may be useful, such as:
    a. internal political subdivisions, i.e., boroughs, wards, etc.,
    b. assessment districts,
    c. sections,
    d. quarter sections,
    e. identifiable neighborhoods, such as the central business district,
    f. census tracts,
    g. blocks,
    h. quarter blocks.
6. family income levels;

The above list does not presume to be exhaustive, but at least suggests the possible scope of an analytical impact study of property tax reform. Needless to say, a study of this magnitude would require considerable effort and expense and it is therefore not surprising that most studies are limited to discovering answers to only those questions that are deemed most urgent or easiest to answer. As a rule this would include only a limited analysis of 1 to 5 above.

Land Value Tax Models

Among the more important practical advantages of an impact study is that it can help interested persons decide upon the kind and extent of tax reform they are willing to support. For example, the real property tax may be re-formed into a land value tax along many lines.

Each design or model may be applicable to all levels of government levying the real property tax or to any one or several levels of government while excluding the others. At the same time, the model itself may produce an equal amount or more or less revenues than the uniform real property tax that it would replace. Lastly, the model may exempt improvements completely or only partially.[4] A land value tax model with any combination of the above features can be constructed. The features must be modeled carefully with consideration for economic goals, equity, constitutional or statutory legal restrictions, political feasibility, and determination for serious reform.

We are now ready to examine the kinds of property tax reform measures that would shift a greater burden to land in varying degrees. Only the general characteristics of these models will be outlined, together with some observations pertaining to economics, logic, equity, legality, and political feasibility. The models which we shall examine will be primarily those showing how land value taxation can be made more effective by modifying the present general property tax, and assuming that the local government will receive the same total amount of property tax revenues after the modification as it did before the modification.[5] Under the foregoing assumptions, there are eight possible models differing from one another according to the extent that personal property and/or improvements are relieved of the property tax. They can be outlined as 1a, 1b, 2, 3a, 3b, and 3c:

1. No change in personal property tax rates, and

    a. differential rates on improvements vs. land or

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[4] The term "partial exemption of improvements" as used here may mean either that the assessment ratio of improvements is set at a level lower than the assessment ratio of land (the approach used in Hawaii) or that the tax rate applicable to improvements is lower than that to land (the approach in Pittsburgh). The rate applicable to improvement can be set at any level less than 100% of the rate on land. One frequently made suggestion is that the tax rate on improvements be just half as high as that on land, as is the case in the Pittsburgh Municipal tax. Another suggestion would fix the tax rate on improvements at only one percent of the rate on land, and retain improvements as part of the real property base in order to meet state constitutional and statutory requirements and thereby preserve the basis for tax and debt limits as well as various grant programs. Such a land value tax with the tax rate on improvements fixed at one percent of the tax rate on land was studied quite thoroughly by Mayor Mitchell's Committee on Taxation of the City of New York, (1916) and more recently, and briefly, by the Special Committee on Tax Policies, reported in *Tax Policies and Urban Renewal in New York City,* (May 1960), Citizens Housing and Planning Council of New York, Inc.

[5] The application of land value taxation by modifying the property tax has great advantage in that it correlates the reduction of taxes on improvements with a simultaneous increase in taxes on land. The impact and economic effect will be more clearly visible if taxes on improvements are reduced (rather than some other tax) while taxes on land values are increased.

    b. the exemption of improvements

2. A graded general property tax in which personal property and improvements on land are taxed at the same rate.
3. The exemption of personal property, and
    a. differential rates on improvements vs. land by increasing rates on land to make up for lost personal property tax revenues, or
    b. differential rates on improvements vs. land, by increasing rates on land to make up for lost personal property tax revenues and also to permit lowering the tax rate on improvements by 50%
    c. the exemption of improvements
4. The exemption of personal property with the lost revenue made up with non-property taxes, and
    a. differential rates on improvements vs. land, or
    b. the exemption of improvements.

Both models 1a and 1b retain the personal property tax without modification; i.e., the tax rate on this kind of property would be the same as if all property were taxed uniformly. Model 1a, however, would reallocate the real property burden of the general property tax so that the tax rate on improvements would be reduced while that on land [6] would be increased. The result would be a three part graded tax with the lowest rate applying to improvements, a higher rate applying to personal property, and the highest tax rate to land.

All eight models can be illustrated by assuming that of the total assessed property values in a local tax unit, 25% are land values, 50% are improvements on land, and 25% consist of personal property. It is also assumed that a 2% uniform rate would suffice to meet local revenues. In accordance with the design of model 1a, we may further assume that the tax rate on improvements is reduced 1 percentage point from 2% to 1%. Inasmuch as land values are only one-half that of improvements, the rate on land must be increased 2 percentage points to 4%. See Table I.

Model 1b would eliminate the tax on improvements and place this burden entirely on land. Again referring to our illustration and the common assumption of all six models *before* the tax change, we would see that the elimination of the 2% tax rate on improvements would necessitate an increase of 4% in the tax rate on land. The result would be a two part graded tax with the rate of 6% on land and 2% on personal property (See Table I).

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[6] In this section dealing with land value tax models, any reference to applying tax rates to personal property, improvements on land, and land should be understood to mean the taxation of the *assessed values* of these categories of property.

Model 2 is designated as a two part graded general property tax in which the same tax rate would apply to personal property and improvements on land, although this rate would be lower than that applying to land. We can illustrate this model also by using the same general assumptions *before* change as found in Table I. If the tax rate on personal property and improvements on land were to be reduced by one percentage point from 2% to 1%, the change would require a rise in the tax rate on land by 3 percentage points to 5%. (See Table I).

TABLE I. — Tax Rates of Various Land Value Tax Models

	Land	Improvements on Land	Personal Property
Comparative ratios of total assessed values	1(25%)	2(50%)	1(25%)
Rates (assumed) before change	2.00%	2.00%	2.00%
Rates after change:			
Model 1a	4.00%	1.00%	2.00% [7]
Model 1b	6.00%	0.00%	2.00% [7]
Model 2	5.00%	1.00%	1.00%
Model 3a	4.00%	2.00%	0.00%
Model 3b	6.00%	1.00%	0.00%
Model 3c	8.00%	0.00%	0.00%
Model 4a	4.00%	1.00%	0.00%
Model 4b	6.00%	0.00%	0.00%

[7] No change in the tax rate for personal property compared with what the rate was under the uniform rate plan existing previously.

Model 3a, 3b, and 3c assume the exemption of personal property, but differ in how the personal property tax burden is allocated between improvements and land. Model 3a would establish a graded tax with lower rates for improvements than for land. The entire previous burden on personal property would be placed on land. According to our illustration in Table I, the rate on improvements could remain at 2% while the rate on land would have to be increased to 4%. Model 3b would also reduce the tax rate on improvements 50 percent, or by one percentage point, to a tax rate of 1% and the tax rate on land would have to be increased 2 additional percentage points to a rate of 6%. Model 3c would exempt improvements as well as personal property and place the full burden of the general property tax on land. With the assessed value of improvements and personal property being three times the assessed value of land, it would be necessary to increase the tax rate on land three times its level before the tax change, or an increase of 2% to 8% in our illustration. (See Table I).

The above six models may be compared in a variety of ways. First, we can array the models according to those which tax land values most heavily down to those which tax land values the least. Using this criterion we can list the models in the following general order:

(1)	(2)	(3)	(4)
3c	1b and 3b	2	1a or 3a

There are other criterion, however, by which these models can be judged. If, for instance, it is judged desirable to reduce the tax against man-made goods, the choice between improvements on land or personal property is easily made. The tax on personal property is subject to far more valid criticism than is the tax on improvements on land.[8] We can then array the model in the order of those which replace the personal property tax the most to those leaving the personal property tax burden unchanged. Accordingly:

(1)	(2)	(3)
3a, 3b, 3c	2	1a, 1b

If we were content to follow the above two criteria alone, we would note that model 3c which ranked first in both arrays would be given priority over model 3b which ranked first in this array and second in the other.

However, the criteria of political feasibility must be brought into the picture. For purposes of discussion we might assume that a change in the tax structure is more likely to be legislated if a majority of the taxpayers are supporting the change. Their support in turn will depend upon their estimates of how the tax change will affect their tax bill. Following this line of reasoning we can say that if the ratio of the property taxpayers' assessed value of improvements and personal property compared with the assessed value of his land is greater than the average ratio for this tax district, his property tax bill will fall with the change. Conversely, if the ratio of the assessed value of his improvements and personal property compared with the assessed value of his land is less than the average ratio for his tax district, his property tax bill will rise with the change in the tax. If by some chance the ratio of the assessed value of his improvements and personal property compared with the assessed value of his land is identical with the average ratio for his district, his tax bill will be the same after the tax change. Knowing this, we can determine the extent of popular sup-

[8] See my comparative evaluation of the components in the general property tax in Becker, Arthur P., "Property Tax Problems Confronting State and Local Governments in 1967," *State and Local Tax Problems*, Johnson, Harry L., editor, The University of Tennessee Press(Knoxville) 1969, pp. 43-46.

port and opposition to any tax model. If the majority of property taxpayers have a ratio of $\frac{\text{improvements + personal property}}{\text{land}}$ which is greater than average in the tax district these persons will likely support the tax measure. There is no easy way to guess at this information. It must be calculated for every parcel of property. However, an approximation of the effect may be determined by examining data pertaining to classes of property or geographic sections of the tax district and forming judgments with respect to these aggregates.

The continued importance of personal property in the general property tax stands as a major obstacle to the political feasibility of a land value tax. Where the assessed value of personal property is a large proportion, say 15% or more of the general property tax, the reduction or elimination of the personal property from the tax base would increase the burden of the real property tax considerably. A graded real estate tax then will bring a lower tax bill only if the property owner's improvements are substantially above average. A majority of the property owners may not have their land improved to that level. The problem arises because taxable personal property is held by a relatively small percentage of all property owners, primarily industrial and commercial. The reduction or elimination of the personal property tax will reduce the tax of a few and increase that of many, a prospect that cannot attract popular support.

With this in mind, a case can be made for models 1a and 1b in terms of political feasibility. Both leave the personal property tax unchanged because they recognize the political difficulty of having real property assume part or all of the burden of the personal property tax. On the other hand, it is economically and ethically indefensible to reduce the burden on improvements generally and not on personal property. Both kinds of property are man-made and the incentive to produce them can be impaired with equal ease. In fact, if it is true that a smaller proportion of improvements is influenced by the marginal efficiency of investment than is the case with personal property, models 1a and 1b would be exactly the reserve approach of what is needed to maximize investment.

The greatest drawback of models 1a and 1b lie in the fact that they give preferential treatment to improvements compared with personal property. It is generally conceded that the tax on personal property is unfair, capricious, harmful to incentive and administratively difficult or impossible (except for relatively few categories of personal property such as motor vehicles, equipment and fixtures.) In view of these facts, it seems illogical to preserve and favor the weakest component in the property tax structure. Moreover, in model 1b there might be a tendency to increase the tax rate on personal property so that the rate on land would not rise so high.

Model 2 has several virtues compared with models 1a and 1b. It recognizes that personal property and improvements on land have the common generic quality of being made by man. As such, there are logic and economic sense, as well as equitable considerations not to favor improvements over personal property in tax relief. Moreover, inasmuch as the personal property tax may be the least defensible portion of the general property tax it is desirable to reduce its rate. Model 2 would also seem easier to administer and understand. The primary drawback to model 2 is that it may not provide sufficient tax relief for the majority of property owners to arouse their support.

This brings us to a Model 4 which may be called the "Strategic Preparation" Model. The primary characteristic of this model is the exemption of personal property from the general property tax and replacing the lost revenue with a non-property tax, before or simultaneously with reforming the real property tax. The real property tax reform accomplished in Models 4a and 4b would parallel that in Models 1a and 1b, respectively. Several states already exempt personal property from the general property tax and have made up for the lost revenue with other taxes.[9] This situation conveys a great advantage because any form of land value tax in those states would ordinarily reduce property taxes for a majority of persons. Most property owners have a higher ratio of improvement value-to-land value than what is average for their tax district.[10] Later when sufficient community and political support permits, it will be possible to exempt improvements completely.

One practical and immediate goal then of real property tax reform in the United States as it is visible in the 1970's would be that of exempting personal property first of all, and then reduce the tax rate on improvements compared with the rate on land. The trend in property taxation down this road has already begun.[11]

All of the above models of property tax reform would affect equally

[9] Delaware, Hawaii, New York, and Pennsylvania. See U.S. Bureau of the Census, Census of Governments, 1967, Vol. 2, *Taxable Property Values*, U.S. Government Printing Office, Washington, D.C., 1968, p. 4.

[10] See *Land Value Taxation Around the World*, (1955), Robert Schalkenbach Foundation, Inc., New York, New York. Percy R. Williams, "Pittsburgh's Pioneering in Scientific Taxation, II, "*The American Journal of Economics and Sociology*, (April, 1962), p. 221. Special Committee on Tax Policies, *Tax Policies and Urban Renewal in New York City*, (May, 1960), Citizen's Housing and Planning Council of New York, Inc., p. 17.

[11] Most states either exempt or apply special property taxes to intangible property. Four states exempt tangible personal property while several other states apply a lower rate of tax than on real estate. In one state, Pennsylvania, a graded real estate tax exists in Pittsburgh and Scranton, and third-class cities have the authority to reduce the tax rate on improvements even further than what is allowed for the two mentioned cities of the Second-Class.

each level of government which uses the property tax. Constitutional or statutory constraints, such as the uniformity rule, may deny all of these taxing units the local option to institute tax reform even if they are eager to do so. The denial of local option to any municipality, school district, special districts, and counties the right to tax land more heavily and to tax improvements and personalty less heavily, if it wishes to do so, seems to be an arbitrary restraint and denial of democratic rule, whether in the name of "uniformity," ease of administration, or otherwise.

On the other hand, if individual local governments were free to adopt property tax reform when they were "ready, willing, and able," without the cooperation of other vertical jurisdictions, we would witness a model of reform similar to Model 2 above. For example, if the City of Milwaukee alone were to exempt improvements from taxation and make up the lost revenue by taxing land more heavily, we would have a model very similar to Model 1a when one adds in the uniform property tax rates of the Milwaukee School Board, Milwaukee County, the Metropolitan Sewerage District, and Milwaukee Area Technical College. If the City exempted personalty as well as improvements, the combined property tax rates of all local governments would follow Model 2.

Adoption of tax reform by local option would seem highly desirable provided that it does not open "Pandora's box." The latter envisions the complexities, confusion, and harm that can arise if property tax reform followed functional rather than natural lines. Legislation in a number of states requires or authorizes classification of property according to function or use and prescribes a differential tax treatment among these classes. The essential weakness of this approach is that it violates the uniformity rule as applied to land. By taxing land differently, according to use, the latter becomes a fundamental factor which would distort the market price of land. Thus, two parcels of land in different uses, though side by side and otherwise similar in every respect, will sell for different prices. This situation would jeopardize seriously the significance of the price of land and make it deviate even further from its "true" market price than it does today by virtue of zoning, codes, and a multitude of other factors.

If the market price of land within a local government is not to be distorted by taxation based on use, any local option for property tax reform must provide for the uniform taxation by the local government *within* each of the natural or physical classes of property, i.e., land, improvements, and personalty although rates *between* the classes may differ. Moreover, since property tax reform will produce benefits in proportion to increasing the tax on land and decreasing it on improvements and personalty, it would seem that local option should be restricted to reforms in that direction.

In light of the danger cited, it would be the better part of wisdom that states do not completely cast aside the uniformity rule and authorize local governments to opt in favor of any type of property tax reform including unrestricted types of classified property and differential tax treatment that would reduce the taxation of land. Rather, it would be far preferable if the classification of property and its differential tax treatment were restricted to the three basic classes of land, improvements, and personalty and that these restrictions were written into state constitutions and/or enabling legislations.

If, indeed, local option for property tax reform were authorized by state constitutions and/or enabling statutes, it would pay for many local governments to take advantage of their opportunity for reform as soon as possible, such as central cities of metropolitan areas and school districts that are faced with critical financial pressures. The latter may produce the political climate and power for tax reform in these cities or school districts. It would seem unjustifiable for an overlapping government unit such as the county, to prevent tax reform in that municipality or school district where the political tide would permit its adoption. Tax reform should not be arbitrarily interfered with in those local governments having greatest need for reform and where a favorable political climate is most likely to develop.

Several Possible Models Applicable to Milwaukee

In order to give a realistic perspective to an impact study of real property tax reform, it will be worthwhile to review various possible models for reform that are based on local political jurisdictions. For example, three basic models for reform can be persued in Milwaukee. All models assume no change in revenue yield from the reform:

1. The most far-reaching model assumes that the model is adopted by all six governments to which real property owners in the City of Milwaukee pay real property taxes. Besides the City, they include the Milwaukee School District, the County of Milwaukee, the Metropolitan Sewerage District of Milwaukee, the Milwaukee Area Technical College, and the State of Wisconsin's state reforestation tax. While this model is the most idealistic in terms of assuming tax reform harmony among overlapping governments, it can best serve the purpose of demonstrating the impact of the reform if carried out fully with governmental cooperation. The extent of tax reform follows Model 1b above not only in order to avoid the personal property trap, but also to avoid local revenue losses related to the State's payment of 60% of the tax on industrial and commercial stocks (the State's payment of 60% of the tax on livestock being unimportant in Milwaukee). If the personal property tax were ex-

empted, it would hardly seem likely that the taxing jurisdictions would qualify for the State payment of 60%. Of course, it is possible to limit the exemption on stocks to the 40% which is not reimbursed by the state. Including this sort of complication in the study model was deemed undesirable since it would confuse rather than illuminate the impact effects of reforming the real property tax.

2. An alternate model assumes that the tax reform is only adopted by the City of Milwaukee and the Milwaukee School District whose boundaries are identical with those of the City. This model may be more realistic politically than the primary model of the study. It would seem to be easier to develop leadership for tax reform and mobilize political support in a given municipality and district having common physical boundaries, than in a multiple of governments and districts having different officials, legislators, and constituencies.

3. The "minimum" model would have the tax reform adopted only by the City of Milwaukee. From the political point of view this model of property tax reform should present the fewest obstacles and complications since only one local government is involved.

One effect of limiting tax reform to the Milwaukee municipal real property tax is to create a graded real property tax since improvements would still be taxed by the Milwaukee School Board, the County, Metropolitan Sewerage District, the Milwaukee Area Technical College, and the State. However, the difference between the tax rate on improvements compared with the tax rate on land would be modest.

The Calculus of Tax Reform

Undoubtedly the most important kind of calculation that is necessary in a property tax reform proposal is the determination of the percentage change in tax burden for the various classes of real estate and various geographic areas of the municipality as well as for individual taxpayers.

Whether or not a given property owner's taxes will rise or fall with tax reform will depend on how the ratio of his real estate value to land value compares with the ratio of aggregate real estate values to land values in the reforming jurisdiction. The percentage change in tax burden can be stated as follows:

$$\Delta^i Y_i = \cfrac{\cfrac{\Sigma^n L_i + \Sigma^n B_i}{\Sigma^n L_i} - \cfrac{L_i + B_i}{L_i}}{\cfrac{L_i + B_i}{L_i}}$$

The symbols in the equation represent the following:

$\Delta^i Y_t$ = change in tax burden as a fraction of present real property tax

L_1 = the assessed value of an individual parcel of land

B_1 = the assessed value of improvements on an individual parcel of land

n = the total number of taxable parcels of property

Thus if a city's aggregate ratio of real estate values to land value is 3.5 and an individual property owner's ratio of real estate to land value is 4.0 his change in tax burden with tax reform will be:

$$\Delta^i Y_t = \frac{3.5 - 4.0}{3.5}$$
$$= -\frac{.5}{3.5}$$
$$= -\frac{1}{7}$$

The property owner in this illustration will find his taxes fall by 1/7 or 14.29 percent. Similarly we can determine the percentage change in taxes for each class of property if we substitute total land and building values in each class for land and building values of individual parcels of property.

The selection of one or more study models, and the calculation of the changes these models would bring in the tax burdens to owners of real property in a given locality and year are necessary steps in any serious quantitative analysis of the impact of real property tax reform.

Data Preparations and Procedures for Use of the Computer

Another preliminary is the need to determine just how elaborate the study will be. Factors bearing on this decision include the availability of data, quantity and quality of data, the kind of research facilities and manpower available, the time available to complete the study, and financial support. An impact study for a city of the size of Milwaukee is one of considerable magnitude. The volume of data that must be treated and analyzed requires the assistance of a computer to save time and manpower.

The study should proceed through the following steps although some may be taken out of sequence:

1. Gathering of data;
2. Determining the quality of the data;

3. Making adjustments where necessary to bring data up to a minimum standard;
4. Establishing one or more programs of analysis, adapted to community characteristics;
5. Adapting the data and program to the available computer;
6. Running tests and modifying and debugging the program;
7. Final analysis.

The gathering of voluminous data can be tedious and expensive. It is an ideal situation if such data is banked on computer tapes and available. Fortunately, the City of Milwaukee stores on tapes basic real property information including the assessment of land and buildings. Information on parcels of real property are banked on 10 reels of tape, each holding 2400 feet of tape with a density of 1600BPI. In the Milwaukee study all of the necessary information on over 150,000 parcels of real property was reduced to one reel of tape for convenience and economy. This reel was known as the complete "file" from which sub-files were created such as for vacant land and improved land.

The quality of data refers to its proper classification, accurate recording, and compatibility such as the existence of uniform assessment ratios between classes of real property according to use and geographic areas. The data must be examined by sampling to detect possible deficiencies. Necessary adjustments must be made if any are found that would lead to distorting results.

Computer programs for data analysis must be prepared. One such program has been in the making in Milwaukee for several years. Robert Brueck and others of Management Research International, Inc., were involved in the production of early versions. These were published by the Robert Schalkenbach Foundation, Inc. A certain amount of adaptation to characteristics of the real property tax data for Milwaukee has been necessary. One adjustment in particular, concerned the size of classes and range of values.

The data and program must be adapted to the available computer, of course. Since a Milwaukee study will involve voluminous detail, a Univac 1110, or similar computer, must be utilized. The adaptation itself must be followed by further testing and other program adjustments. After all of the above, computer assisted analysis can proceed.

Limitations of an Impact Study of Real Property Tax Reform

A case study of the impact of real property tax reform is limited in terms of its predictive ability. In fact, the time horizon of the immediate effect on tax liabilities of property owners is analogous to the "market period" of economists. For just as the market supply consists of goods already produced, an impact study deals with existing

land assessments under the real property tax. Nevertheless, as stated at the beginning of this chapter, while knowledge gained by this type of study pertains to the immediate effect of real property reform, it will form a sounder basis for any deductive reasoning as to future effects than would mere speculation.

It would be an interesting exercise to develop a model that attempts to predict the magnitude of long run effects of real property reform in a given community. Such a model would have to make certain assumptions as to the nature and extent of increased investment in improvements arising out of a shift in tax burdens accompanying the reform in addition to the degree of shift in tax burden from improvements to land and the extent of governmental jurisdictions involved. Various factors would have to be examined for their contributing influences, such as building and land use laws and customs, elasticity of supplies of building materials, capital and labor, the strength of the community's economic base and population trends. Making assumptions about dynamic variables is tricky, but they may hold for several years.

Whether or not a predictive model is applied along with the impact model of this study it would be highly desirable if real property tax reform is adopted in a community to make a trend analysis of land and improvement values according to land use and location in order to trace the long run effects of the tax reform. Hopefully, other variables of significance can be detected and factored out.

In the event that real property reform is achieved in a community, it is highly desirable that a reassessment of property be conducted as soon as possible after the transition. With real property reform, the future expectations of many property owners will change and be reflected in a shift in the market value of land. A reassessment will record these changes in expectations. A lapse of one year may be desirable for project developers to recognize their improved investment opportunities and make their demand for land effective. On the other hand, too long a delay in reassessment would permit too many other variables to enter the picture and be reflected in the new assessment value.

II. A Case Study of a Real Property Tax Reform Proposal for Milwaukee

A case study was made to analyze the distributive impact of converting the real property tax in the City of Milwaukee to a land value tax. The model that was studied has the following specifications and assumptions:

1. The complete removal of improvements from the tax base only in the City of Milwaukee. Therefore, the analysis will hold

only for those property taxing units whose jurisdiction is limited to the City. This means that it is only valid for either the City of Milwaukee or the School Board of the City of Milwaukee, or both. This model was selected because it would seem somewhat easier politically to achieve if attempted in only one local jurisdiction. The City's tax rate is one-third of the combined property tax rates of all local jurisdictions to which owners of City property pay taxes. Thus, if the modeled reform were adopted, the tax rate on improvements would decline by only one-third. It would hardly pay to advocate a real property tax reform plan of a lesser magnitude.

2. Whatever property tax revenues are lost by exempting improvements will be restored by increasing the tax levy on the assessed value of taxable land.

3. No change in taxation of personal property is included in the model. This is realistic inasmuch as the State of Wisconsin has removed a great deal of personal property from the propery tax base, such as inventories, stocks of various kinds of goods and livestock, and machinery and equipment.

4. No change in the exemption of presently exempted real property. While a good case can be made for broadening the tax base of a land value tax, this is a separate question, and if brought into the study here the results of changes in tax liabilities might be confused, in the sense that part of the change would be attributable to the change-over to the land value tax and another part to the broadening of the land value base.

The first objective of the study involved the determination of the change, i.e. percent increase or decrease, in tax liability for each parcel of taxable real property if the real property tax were converted to a land value tax. The second objective was to group the parcels according to:

1. Land use, such as residential, commercial, manufacturing, and vacant land;

2. Assessed value for each type of land use as well as in the aggregate;

3. Geographic areas of the City including
   a. quarter sections,
   b. the "core,"
   c. the central business district (CBD),
   d. wards.

The third objective was to produce central tendencies, i.e. the arithmetic mean, median, and mode, and frequency distributions of the

changes in tax liabilities for the parcels of real property in each group.

In 1972 the total number of parcels of taxable real property in the City of Milwaukee was 151,249. (See Table II). The vast majority of these, i.e. 137,212, or 90.7% of the total was classified as residential. Commercial parcels numbered 12,127 or 8.0%. Only 1,910, or 1.3%, of the total taxable parcels of property were classified as manufacturing.

It was a surprise to find that only 3.8% of all taxable parcels in the City were vacant. Vacant land was in shortest supply (3.1%) among residential property. Vacant commercial land was moderate (8.6%) while the number of vacant parcels for manufacturing use was considerable (29.4%) compared with all manufacturing property although not much in absolute numbers (434). A more meaningful analysis of the allocation of land use would be in terms of area rather than parcels, however, this information was not available for study.

The case study was carried out with the assessed values of real property in the City of Milwaukee which, according to the Office of the Tax Commissioner, averaged about 55 percent of full market value in 1972. An overall perspective was needed of the assessed value of improvements as well as improved and vacant land for residential, commercial, and manufacturing classes of land use. (See Table III). This data is required to calculate the average changes in tax liability for real property in various classes of land use. It is interesting to note that the assessed value of all land is 28.291 percent of the assessed value of all real property, and that land accounted for only 12.303 percent of improved manufacturing real property and 29.136 percent of improved residential real property. Another item of interest is that the assessed value of all residential real property comprised 54.07 percent of the assessed value of all taxable real property.

Findings of the Study Based on Broad Classes of Land Use

Our aggregate findings show that a conversion of its real property tax by the City of Milwaukee into a land value tax will decrease the tax on improved real property on the average by 4.1 percent and increase taxes on vacant land by 253.47 percent. The increase for vacant land derives from the ratio of the value of improvements to the value of all land, i.e., 2.5347 to 1. In order to raise the same amount of revenue as before, the City would have to increase the tax rate on land by 2.5347 times.

While taxes on all improved land would fall on the average by 4.1 percent, the change in tax liability for the three classes of real property (according to land use) would vary greatly. Residential property would experience a moderate average increase of 7.0 percent in taxes and commercial property taxes would rise by an average of 10.3 percent. Taxes on manufacturing property would enjoy a substantial average decrease of 55.6 percent.

TABLE II. — Number of Parcels of Taxable Real Property in the City of Milwaukee in 1972 *

	Parcels of Vacant Land	Vacant Parcels as a Percent of all Parcels	Parcels of Improved Land	Improved Parcels as a Percent of all Parcels	All Land Parcels	Parcels in each Class of Use as a Percent of all Parcels
Residential	4,303	3.1	132,909	96.9	137,212	90.7
Commercial	1,048	8.6	11,079	91.4	12,127	8.0
Manufacturing	434	29.4	1,476	70.6	1,910	1.3
Total	5,785	3.8	145,464	96.2	151,249	100.0

* Source: Office of the Tax Commissioner, City of Milwaukee.

TABLE III. — Assessed Values of Taxable Real Property in the City of Milwaukee in 1972 *

Class of Land Use	1. Value of Vacant Land ΣL_v	2. Value of Improved Land ΣL_i	3. Value of Improvements ΣI	4. Value of all Land $\Sigma L_v + \Sigma L_i$	5. Value of all Land and Improvements $\Sigma L_v + \Sigma L_i + \Sigma I$	6. Value by Class of Use of All Land and Improvements as a Percent of Value of the Total of All Land and Improvement
Residential	$12,537,570 (1.095%)	$333,568,476 (29.136%)	$ 798,836,960 (69.777%)	$346,099,776 (30.231%)	$1,144,847,472 (100.0%)	54.07
Commercial	13,859,570 (2.249%)	188,030,310 (30.511%)	414,384,080 (67.241%)	201,889,880 (32.760%)	616,269,936 (100.0%)	29.11
Manufacturing	7,233,510 (2.029%)	43,862,990 (12.303%)	305,420,732 (85.668%)	51,096,500 (14.332%)	356,517,072 (100.0%)	16.84
Total	$33,630,650 (1.588%)	$565,392,944 (26.703%)	$1,518,325,120 (71.710%)	$599,011,864 (28.291%)	$2,117,326,384 (100.0%)	100.00

* Source: Office of the Tax Commissioner, City of Milwaukee.

TABLE IV. — Average (Mean) Change in Tax Liability of
Improved Real Property, by Land Use

Class of Land Use	1. Ratio of Value of Improved Real Property to Improved Land $\frac{\Sigma L_i + EI}{\Sigma L_i}$	2. Change in Tax Liability of Improved Real Property [1]
Residential [2]	3.394821505	.070
Commercial	3.203815331	.103
Manufacturing	7.963062299	−.556
Total	3.685433442	−.041

[1] This is the deviation of the ratios in Column 1 from the ratio of all taxable real property to all land value, i.e., 3.534716274, expressed as a fraction of the ratios in Column 1. Thus,

$$\frac{\dfrac{\Sigma L_v + \Sigma L_i + \Sigma I}{\Sigma L_v + \Sigma L_i} - \dfrac{\Sigma L_i + \Sigma I}{\Sigma I_i}}{\dfrac{\Sigma L_i + \Sigma I}{\Sigma L_i}}$$

The increase in the tax liability of all vacant land would be by 2.534716274 since this is the ratio of the value of total improvements to the value of total improved and vacant land.

[2] According to state law "residential" property for assessment purposes includes only those multifamily structures containing less than eight dwelling units and without any mercantile use.

Changes in average tax liability for each of the three classes of property provides basic information about the tax reform plan, but a more disaggregated analysis is also needed. We would like to know how many properties would experience various amounts of decreases or increases in their tax liabilities. This can be accomplished by producing frequency distributions of the properties over a range from less than −70 percent to 70 percent and greater, with an interval of 10 percentage points in each class.

Our findings for all land uses of improved real property based on 1972 assessments show that 41.5 percent of all properties (See Table V) would have their taxes fall. An additional 41.3 percent of the properties would experience an increase of no more than 30 percent. Since the City of Milwaukee tax is only one-third of the combined local property tax the reform can be accomplished with less than a 10 percent increase for this group of 41.3 percent of properties along with a decrease in taxes for 41.5 percent of properties.

TABLES V to VIII (*inclusive*). — A Simulated Real Property Tax Reform for the City of Milwaukee: A Frequency Distribution of Changes in Tax Liability According to Land Use (1972 Assessments)

Percent of Change	V. All Land Uses			VI. Residential Real Property		
	Number of Properties in Each Class	Percent of Total Properties In Each Class	Cumulative	Number of Properties in Each Class	Percent of Total Properties In Each Class	Cumulative
less than −70	125	.1	.1	8	.0	.0
−70 and less than −60	252	.2	.3	57	.0	.0
−60 and less than −50	863	.6	.9	368	.3	.3
−50 and less than −40	2,216	1.5	2.4	1,528	1.1	1.5
−40 and less than −30	5,335	3.7	6.0	4,466	3.4	4.8
−30 and less than −20	10,949	7.5	13.6	9,890	7.4	12.3
−20 and less than −10	17,585	12.1	25.7	16,529	12.4	24.7
−10 and less than 0	23,114	15.9	41.5	22,199	16.7	41.4
0 and less than 10	24,373	16.8	58.3	23,479	17.7	59.1
10 and less than 20	20,879	14.4	72.7	20,136	15.2	74.2
20 and less than 30	14,756	10.1	82.8	14,083	10.6	84.8
30 and less than 40	8,594	5.9	88.7	8.027	6.0	90.9
40 and less than 50	5,073	3.5	92.2	4,554	3.4	94.3
50 and less than 60	3,104	2.1	94.3	2,687	2.0	96.3
60 and less than 70	1,954	1.3	95.7	1,567	1.2	97.5
70 and greater	6,295	4.3	100.0	3,331	2.5	100.0
TOTAL	145,464	100.0		132,909	100.0	100.0

TABLES V to VIII (Continued).

Percent of Change	VII. Commercial Real Property			VIII. Manufacturing Real Property		
	Number of Properties in Each Class	Percent of Total Properties In Each Class	Cumulative	Number of Properties in Each Class	Percent of Total Properties In Each Class	Cumulative
less than −70	34	.3	.3	83	5.6	5.6
−70 and less than −60	123	1.1	1.4	72	4.9	10.5
−60 and less than −50	381	3.4	4.9	114	7.7	18.2
−50 and less than −40	549	5.0	9.8	139	9.4	27.6
−40 and less than −30	761	6.9	16.7	108	7.3	35.0
−30 and less than −20	933	8.4	25.1	126	8.5	43.5
−20 and less than −10	949	8.6	33.7	107	7.2	50.7
−10 and less than 0	833	7.5	41.2	82	5.6	56.3
0 and less than 10	835	7.5	48.7	59	4.0	60.3
10 and less than 20	683	6.2	54.9	60	4.1	64.4
20 and less than 30	624	5.6	60.5	49	3.3	67.7
30 and less than 40	527	4.8	65.3	40	2.7	70.4
40 and less than 50	478	4.3	69.6	41	2.8	73.2
50 and less than 60	386	3.5	73.1	31	2.1	75.3
60 and less than 70	364	3.3	76.4	23	1.6	76.8
70 and greater	2,619	23.6	100.0	342	23.2	100.0
TOTAL	11,079	100.0	100.0	1,476	100.0	100.0

The frequency distribution of tax changes for improved residential real property (See Table VI) follows a similar pattern with 41.4 percent of the properties enjoying decreases in their taxes and 43.4 percent receiving increases of no more than 30 percent (i.e., less than 10 percent of combined real property taxes of all local governments which tax City of Milwaukee property). The size of these groups are important inasmuch as they represent the potential source of political support for the tax reform plan under study.

It was a surprising coincident to find that the taxes of 41.2 percent of improved parcels of commercial property (See Table VII) would decrease. However, only 19.3 percent of all improved commercial parcels would have their taxes increase by less than 30 percent, which when added to those enjoying a decrease, gives us 60.5 of the properties which we regard as a potential base for political support for the reform plan. The largest percentage of beneficiaries of real property tax reform are found in manufacturing where 56.3 percent (See Table VIII) of the properties would become more profitable, a substantial number of them considerably so. An additional 11.4 percent would find their tax bills go up no more than 30 percent, our rule-of-thumb upper limit in gauging the potential base of political support for the reform.

Findings of the Study Based on the Value of Real Property

Any serious debate over real property tax reform will in time turn to the distributive impact on properties according to their assessed value (as an indication of full market value). This information was obtained by producing central tendencies (arithmetic mean, median, and mode) and frequency distributions of the properties over a range from less than $6,000 of assessed value to $15,000 and greater with intervals of $3,000 in each class.

The findings on central tendencies according to value of assessments is presented in Tables IX to XII (inclusive). Perhaps the median is the most significant of these central tendencies. The relationship shows that the lower the assessment class, the greater the percentage increase in taxes and the higher the assessment class, the greater the percentage decrease in taxes. This is clearly the pattern for improved residential property.

The medians of all assessment classes of commercial property show increases in tax rates although the median does vary inversely with assessment class. The central tendencies produced for manufacturing property is not significant inasmuch as most of the parcels fell in the highest assessment class. In order to generate significant central tendencies for manufacturing property the range of assessment values should be extended upwards and the intervals broadened. However,

TABLES IX to XII (*inclusive*). — A Simulated Real Property Tax Reform for the City of Milwaukee: Central Tendencies for Changes in Tax Liability According to Amounts of Assessment (1972)

IX. All Land Uses

Assessment Class	Number of Parcels	Percentage Change In Tax Liability		
		Arithmetic Mean	Median*	Mode*
Less than $ 6,000	33,601	17.54	10.27	2.41
$ 6,000 and less than $ 9,000	50,678	13.24	12.31	14.36
$ 9,000 and less than $12,000	37,221	3.42	1.63	1.63
$12,000 and less than $15,000	10,266	-5.75	-11.70	-14.23
$15,000 and greater	13,697	7.33	-16.10	-25.00
TOTAL	145,463			

X. Residential Real Property

Assessment Class	Number of Parcels	Percentage Change In Tax Liability		
		Arithmetic Mean	Median*	Mode*
Less than $ 6,000	32,431	15.80	9.72	2.31
$ 6,000 and less than $ 9,000	49,094	12.42	12.23	14.42
$ 9,000 and less than $12,000	35,889	2.45	1.51	1.65
$12,000 and less than $15,000	9,355	-9.20	-12.44	-14.18
$15,000 and greater	6,140	-14.71	-22.74	-25.10
TOTAL	132,909			

XI. Commercial Real Property

Assessment Class	Number of Parcels	Percentage Change In Tax Liability		
		Arithmetic Mean	Median*	Mode*
Less than $ 6,000	1,104	59.17	34.34	15.52
$ 6,000 and less than $ 9,000	1,529	36.03	16.88	5.60
$ 9,000 and less than $12,000	1,278	26.21	8.67	-6.15
$12,000 and less than $15,000	853	26.77	9.25	2.32
$15,000 and greater	6,315	29.23	6.55	-23.87
TOTAL	11,079			

XII. Manufacturing Real Property

Assessment Class	Number of Parcels	Percentage Change In Tax Liability		
		Arithmetic Mean	Median*	Mode*
Less than $ 6,000	66	176.92	202.73	0
$ 6,000 and less than $ 9,000	55	111.89	125.00	0
$ 9,000 and less than $12,000	54	107.82	130.00	0
$12,000 and less than $15,000	58	73.56	47.50	-24.29
$15,000 and greater	1,242	4.89	-20.17	-45.82
TOTAL	1,475			

* Estimated from Grouped Data.

if different ranges and class intervals are used in grouping parcels of property for each kind of land use, an accurate basis for the comparative analysis of findings according to land use would be sacrificed.

The frequency distribution of all improved properties of various assessed values shows that 28.6 percent of properties with an assessed value of $6,000 to $9,000 would have lower taxes (See Table XIII). All other assessment classes would have had larger percentages of properties with tax decreases, with the largest percentage of parcels with lower taxes (75.8 percent) in the $12,000 to $15,000 assessment class.

The frequency distribution of residential property the taxes of which would decrease ranges from 28.5 percent of the properties assessed from $6,000 to $9,000 to 85.9 percent of properties assessed at $15,000 and greater. If we add the percentage of these properties with decreased taxes to the percentage of properties with taxes increasing no more than 30 percent we find that the sums would range from 72.4 percent for property assessed at $6,000 or less to a maximum of 96.2 percent for properties in the $12,000 to $15,000 class. These percentages form a large base for potential political support for the tax reform.

Our study showed that 46.0 percent of improved commercial property assessed at $15,000 and greater would have lower taxes (See Table XV). In this same class 15.6 percent of the properties would have their taxes rise by less than 30 percent. Both groups add up to 61.6 percent for this all important class because it contains 6,315 parcels out of the total of 11,079 commercial parcels of property. Approximately the same percentage of properties are found in the $6,000 to $9,000 class (60.6 percent), the $9,000 to $12,000 class (65.2 percent), and the $12,000 to 15,000 class (63.2 percent).

As stated above, the range and interval of assessment classes for manufacturing property are too small to allow meaningful comparisons inasmuch as 1,242 parcels are in the $15,000 and greater class out of a total of 1,475 parcels. However our findings for this class are particularly significant precisely because most of the parcels are assessed at $15,000 and greater. In this assessment class 64.5 percent of the properties would enjoy tax reductions (See Table XVI).

Findings of the Study According to Geographic Areas
Within the City of Milwaukee

Prior to the writing of this report, only first run results had been achieved in the mapping of the City of Milwaukee that shows the magnitude of tax increases or decreases by quarter sections and wards resulting from tax reform. These first run results need further refining and interpretation. However, some of the methodology and findings can be reported here in a general way.

TABLES XIII to XVI (*inclusive*).—A Simulated Real Property Tax Reform for the City of Milwaukee: Frequency Distribution of Changes in Tax Liability According to Amount of Assessments (1972)

	XIII. All Land Uses Percent of Total Parcels (Cumulative)					XIV. Residential Real Property Percent of Total Parcels (Cumulative)				
Percent of Change	$6,000 or less	$6,000 to $9,000	$9,000 to $12,000	$12,000 to $15,000	$15,000 and greater	$6,000 or less	$6,000 to $9,000	$9,000 to $12,000	$12,000 to $15,000	$15,000 and greater
less than −70	.0	.0	.0	.0	.8	.0	.0	.0	.0	.0
−70 and less than −60	.1	.0	.1	.2	2.2	.0	.0	.0	.1	.2
−60 and less than −50	.4	.3	.2	.6	6.0	.4	.2	.2	.4	1.7
−50 and less than −40	1.9	1.0	.7	2.1	13.5	1.9	.9	.5	1.6	9.2
−40 and less than −30	4.7	2.9	2.2	8.9	26.7	5.7	2.7	1.9	8.6	28.8
−30 and less than −20	12.7	6.9	7.7	28.9	44.8	12.8	6.6	7.3	29.5	58.0
−20 and less than −10	22.9	15.4	22.3	54.3	58.1	23.1	15.1	22.1	56.6	77.1
−10 and less than 0	36.0	28.6	45.9	75.8	65.6	36.5	28.5	46.1	79.3	85.9
0 and less than 10	49.7	45.5	71.2	86.0	71.0	50.4	45.6	72.0	89.6	91.0
10 and less than 20	61.8	65.0	87.2	90.6	74.9	62.6	65.4	88.2	94.1	93.8
20 and less than 30	71.4	81.1	94.4	93.1	77.8	72.4	81.8	95.5	96.2	94.9
30 and less than 40	79.6	90.0	96.7	94.9	79.9	80.6	90.7	97.8	97.5	95.5
40 and less than 50	85.5	94.6	97.7	95.9	82.0	86.5	95.4	98.6	98.1	95.9
50 and less than 60	89.8	96.9	98.2	96.5	83.8	90.8	97.6	99.0	98.4	96.4
60 and less than 70	92.6	98.1	98.6	96.9	85.6	93.6	98.7	99.2	98.6	96.8
70 and greater	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLES XIII to XVI (Continued).

XV. Commercial Properties
Percent of Total Parcels (Cumulative)

Percent of Change	$6,000 or less	$6,000 to $9,000	$9,000 to $12,000	$12,000 to $15,000	$15,000 and greater
less than −70	.4	.1	.1	.2	.4
−70 and less than −60	.6	.4	.7	.8	2.0
−60 and less than −50	.9	1.5	2.3	3.3	7.1
−50 and less than −40	2.3	3.9	5.0	7.5	13.9
−40 and less than −30	6.1	10.2	10.4	13.0	21.9
−30 and less than −20	11.0	17.3	18.9	22.9	31.0
−20 and less than −10	17.7	25.6	29.7	31.9	39.5
−10 and less than 0	24.4	33.9	40.8	40.6	46.0
0 and less than 10	31.3	44.0	51.4	50.8	52.1
10 and less than 20	39.8	52.7	59.7	55.9	56.9
20 and less than 30	47.0	60.6	65.2	63.2	61.6
30 and less than 40	53.9	67.4	71.2	69.3	65.0
40 and less than 50	59.8	73.4	75.3	74.4	68.6
50 and less than 60	63.9	77.1	78.9	78.2	71.8
60 and less than 70	67.3	80.7	82.6	81.1	75.0
70 and greater	100.0	100.0	100.0	100.0	100.0

XVI. Manufacturing Real Property
Percent of Total Parcels (Cumulative)

Percent of Change	$6,000 or less	$6,000 to $9,000	$9,000 to $12,000	$12,000 to $15,000	$15,000 and greater
less than −70	.0	.0	.0	.0	6.7
−70 and less than −60	.0	.0	.0	.0	12.5
−60 and less than −50	.0	1.8	.0	.0	21.6
−50 and less than −40	.0	1.8	1.9	3.4	32.5
−40 and less than −30	1.5	1.8	5.6	5.2	40.9
−30 and less than −20	1.5	5.5	13.0	13.8	50.2
−20 and less than −10	1.5	10.9	14.8	17.2	58.3
−10 and less than 0	1.5	12.7	14.8	24.1	64.5
0 and less than 10	1.5	18.2	20.4	27.6	68.6
10 and less than 20	3.0	25.5	22.2	31.0	72.8
20 and less than 30	6.1	27.3	25.9	37.9	76.0
30 and less than 40	6.1	30.9	31.5	44.8	78.3
40 and less than 50	9.1	34.5	33.3	51.7	81.1
50 and less than 60	9.1	40.0	35.2	60.3	82.9
60 and less than 70	10.6	40.0	40.7	62.1	84.3
70 and greater	100.0	100.0	100.0	100.0	100.0

Four large (4' × 6') wall maps were prepared by computer which show the direction and magnitude of the arithmetic mean of the tax changes of residential, commercial, manufacturing, and all parcels of property in each of the approximately 500 quarter sections in the City of Milwaukee. Four smaller (1½' × 2') maps were computer draws to show the arithmetic mean changes for residential, commercial, manufacturing, and all parcels of property. The technique of mapping by computer was found to be excessively expensive and not particularly suited to the needs of the study.

Three transparent overlays were prepared as tools to aid in the location and interpretation of the maps. One of the transparencies outlines the quarter sections and are numbered so that they may be identified for position and detailed quantitative analysis. Another transparency contains drawings of major streets in the City of Milwaukee and an outline of the central business district and "inner core" immediately to the north of and adjacent to the central business district. The third transparency outlines the ward boundaries.

Since each parcel of property is coded according to its location by quarter section, the computer can provide efficiently and accurately the arithmetic mean of the changes in tax liability for property in the four classes of land use for each quarter section. However, since parcels of property are not coded by ward, and since ward boundaries divide many quarter sections, it is possible only to make an estimate of the arithmetic mean of changes in tax liabilities by wards.

The value of property in quarter sections straddling ward boundaries was allocated to the appropriate ward on the basis of a visual estimate of the relative area of the quarter section falling in each ward. Therefore, estimates for changes in tax liability for wards should be received with reservation until their accuracy can be verified.

A calculation of the distributional impact of real property tax reform on quarter sections throughout the city showed that taxes would decrease on the average (arithmetic mean) for all types of property (by land use) in the older portions of the city north of the Menomonee River valley. In the remainder of the city the distributional impact of tax reform by quarter section was quite inconsistent, with quarter sections where average taxes would increase often being immediately adjacent to others where average taxes would decrease.

Average taxes would also decrease for residential property in the older central portion of the city, including the "core" which contains the highest percentage of low income families. It appears then, that property tax reform would provide property tax relief where it is most needed. In most of the other quarter sections of the city residential property taxes would increase slightly or moderately although they are generally interspersed with quarter sections where average taxes would

decrease. Lastly, taxes on residential property in the central business district would increase substantially. This impact is expected inasmuch as the value of land in the CBD is high while the value of residential improvements is relatively low.

Taxes would increase on the average for commercial property in 182 quarter sections and decrease for 125 quarter sections. Some of the latter are clustered, although most are dispersed among quarter sections where taxes would decrease. Taxes on commercial property located on the eastside, in the CBD, and along expressways would enjoy the largest tax decrease. This follows from the fact that the ratio of the value of their improvements to the value of their land is higher than the average throughout the city.

Taxes would decrease on the average for manufacturing property in 109 quarter sections and increase on the average in only 40 quarter sections. The highly industrialized Menomonee River valley contains a number of quarter sections some of which would enjoy very substantial increases in average taxes while others would experience substantial decreases.

As stated above, our study of the impact of tax reform by wards was least reliable because real property is not identifiable by ward, which necessitated a careful but not scientific allocation of property in quarter sections divided by ward boundaries. Moreover, inasmuch as the impact of tax reform on wards is to gain insight into the political feasibility of the reform plan, one can also make a good case for utilizing the median rather than the arithmetic mean as a measure of average change in tax liability. Despite these unresolved difficulties in the study, by the time of the writing of this report for presentation at the 1974 Conference of the NTA-TIA, preliminary findings show that taxes averaged for all land uses would increase in nine wards and decrease in seven of the sixteen wards in the City of Milwaukee.

CONCLUSIONS

After having spent considerable time on the design and application of a study of the distributive impact of real property tax reform, several conclusions have become apparent. The first is that such a study can be improved considerably if real property were coded in greater detail as to land use and also by census tract and ward. Because residential property is so narrowly defined for assessment purposes by Wisconsin law, the findings of the impact study are not valid with respect to residential and commercial property. Property containing any number of multi-family dwelling units is classified as "commercial" if any part of the structure is used for mercantile purposes. Also, all multi-family structures with eight or more dwelling units is classified as "commercial" even if no part of the structure is used for mercantile

purposes. Thus, our findings were heavily biased against all of this actual residential property which in all likelihood would have experienced a considerable tax reduction with tax reform.

In order to avoid this sort of bias it is necessary that the value of all real estate used exclusively for residential purposes regardless of the number of dwelling units be classified as residential. Furthermore, if a commercial structure is partially residential, the assessor should assign a residential factor to the property which would allocate the appropriate value of the property between the residential and commercial uses.

Census coding of properties would make it possible to relate the rich body of census data collected and published by census tract, such as average income, average rent paid, and population characteristics. This type of data can be well used to determine the burden of tax liability changes in terms of family income, rent paid, or per family or per person, all of which might provide more insight into the milleau into which the impact of tax reform would fall. Coding real properties by ward can make our ward analysis of the impact of tax reform fully reliable, and make it unnecessary to resort to mere estimates.

The second conclusion is that this sort of impact study of real property tax reform can be refined in some of the techniques and methods that are utilized. For example, it may be desirable to generate frequency distributions by quarter sections, census tracts, and wards. However, the expense of computer time in so extending the study is considerable when dealing with over 150,000 parcels of real property. If property were identifiable by wards, an in-depth study could be carried out primarily on a ward basis at a reduced cost, and yet it may be entirely adequate.

Furthermore, it was quickly realized that the study of the aggregated tax changes of many parcels and large areas can be misleading. For example, many parcels of property in the central business district are vacant or used for surface automobile parking. Thus, it would be misleading to declare that the average change in taxes in a given block would be an increase of 101.5 percent after tax reform when the vacant half of the block would have its tax rise by 253 percent while the highly improved other half of the block would enjoy a tax reduction of 50 percent. For that reason the CBD might well be studied on a quarter-block basis. Furthermore, a complete impact study should include illustrations of the tax impact on representative parcels of real property according to land use, assessed value, as well as location within the city.

We cannot conclude this report without stating explicitly that the findings of any distributive impact study depends entirely upon the characteristics of local real property assessments. The findings will reflect the ratio of assessed improvement values to assessed land values

according to land use, amount of assessment, and location. Any reassessment that reflects changing land use and land values in various parts of a city will cause changes in the distributive impact of tax reform. Thus, because the City of Milwaukee has established a 100 percent assessment policy for 1974 and has incorporated land use and geographic shifts in real property values into its full value assessments, the findings of a new impact study based upon the reassessment would surely be different than what was found in this study.

However, regardless of the findings, the distributive impact of real property tax reform cannot be equated with the equity or fairness of the proposal. The equity of tax reform is revealed over a period of time as the faster pace of investment in new and rehabilitated residential, commercial, and manufacturing improvements, and the heightened economic activity which will accompany such investment, present their fruits to the people of that city wise enough to adopt such a real property tax reform.

APPENDIX

The Mathematics of Determining Land Value Tax Rates and Liability with Real Property Tax Reform

The Uniform Real Property Tax. The basic real property tax equation shows the relationship between the revenue that the tax yields, the tax rate and the components of the tax base. The relationship is expressed as follows:

$$Y_t = R_u{}^n\Sigma(L_i + B_i) \qquad [1]$$

The symbols in the equation represent the following factors:

Y_t = total revenue yield from all taxable real property

R_u = the uniform tax rate for land and improvements under the present real property tax

L_i = the assessed value of an individual parcel of land

B_i = the assessed value of improvements on an individual parcel of land

n = the total number of taxable parcels of property

Equation [1] aggregates the total assessed value of each parcel of property $(L_i + B_i)$. We can rearrange the equation as:

$$Y_t = R_u({}^n\Sigma L_i) + R_u({}^n\Sigma B_i), \quad \text{or}$$
$$= R_u({}^n\Sigma L_i + {}^n\Sigma B_i) \qquad [2]$$

in which the assessed land value of all parcels of taxable real property are aggregated $({}^n\Sigma L_i)$ separately from the assessed improvement value of all parcels of taxable real property $({}^n\Sigma B_i)$. This form of the property tax equation is essential to illustrate property tax reform.

How Land Value Tax Rates are Derived

If real property tax reform simply takes the form of exempting improve-ments, the resulting land value tax can be expressed by equation,

$$Y_1 = R_1({}^n\Sigma L_i) \qquad [3]$$

in which Y_1 represents the total revenue yield from all taxable land, and R_1 represents the tax rate on land that is needed to yield Y_1.

If the land value tax must yield the same total revenue as the uniform real property tax, the necessary tax rate on land values can be derived easily. Thus, if it is assumed that

$$Y_1 = Y_t \qquad [4]$$

then the right hand side of equation [3] is equal to the right hand side of equation [2], or

$$R_1({}^n\Sigma L_i) = R_u({}^n\Sigma L_i + {}^n\Sigma B_i)$$

which can be rearranged to:

$$R_1 = R_u\frac{({}^n\Sigma L_i + {}^n\Sigma B_i)}{{}^n\Sigma L_i} \qquad [5]$$

Equation [5] states that the land value tax rate would be equal to the product of the present real property tax times the ratio which the value of all taxable real property bears to all taxable land values alone. The land value tax rate would be a sharp increase over the property tax rate. If land is assessed below full market value, the assessed value of land can be in-creased to offset in part and minimize the increase in the tax rate.

Equation [5] enables us to calculate the land value tax rates necessary to absorb revenue lost by full or partial exemption of improvements. The following data for 1970 in Milwaukee bear on these calculations:

R_u (combined property tax rate) = 8.118%

${}^n\Sigma L_i$ (total assessed land value) = \$582,489,050

${}^n\Sigma B_i$ (total assessed improvement value) = \$1,455,309,990

Recalling Equation [5] for the determination of the tax rate on land values:

$$R_1 = R_u\frac{({}^n\Sigma L_i + {}^n\Sigma B_i)}{{}^n\Sigma L_i} \qquad [5]$$

Substituting the above values for the appropriate terms, we get:

$R_1 = 8.118 \times 3.498$

   = 28.396764%

Thus, in our primary study model the tax rate based on the assessed value of land would have to rise very sharply if all improvements were exempted. However, if property were assessed at full market value rather than at the 55 percent of it, the uniform property tax rate would have been 4.413 per-cent compared with 8.118 percent and a necessary tax rate of 15.446674

percent on land values if improvements were completely exempt instead of 28.4 percent.

In the alternate study model, in which the City of Milwaukee and its school district alone would exempt improvements from taxation, their property tax rate of 5.764 percent would have to be increased to 20.164 percent on assessed value of land. In addition, the other four levels of government which accounted for 29 percent of the combined tax rate would continue their property taxes at a uniform rate of 2.354 percent (8.118% − 5.764%). Thus, the combined tax rate on the assessed value of land becomes 22.518 percent (20.164% + 2.354%), while the non-city tax rate on the assessed value of improvements is only 2.354 percent. This would produce a graded real property tax with the tax rate on improvements approximately 10 percent of the tax rate on land.

This disparity of rates exaggerates the allocation of the tax *burden* between improvements and land. A tax rate of 2.354 percent on $1,455,310,000 of improvements will yield $34,248,097 in revenues and a tax rate of 22.5 percent on $582,500,000 of land values will yield $131,062,500 for a combined real property tax of $165,310,600. Thus the tax burden on improvements will be 26 percent of the tax burden land. Or stated as a percentage of the total real property tax burden, land would bear about 79.3 percent and improvements would bear about 20.7 percent.

If the tax rates are calculated on the basis of 100 percent assessments, the standard adapted by the City of Milwaukee for 1974 taxes, the 4.413 combined property tax rate consists of a 3.153 percent rate for city and school purposes and 1.260 percent for non-city purposes. The tax rate on land values for city and school purposes would then be 11.036 percent, and for all governments 12.296 percent (11.036% + 1.260%). The non-city tax rate on improvements would be only 1.260 percent.

How to Determine Individual Land Value Tax Liability

Once the land value tax rate has been derived from revenue requirements and the land value base, it is possible to determine the land value tax liability on a given site and compare it with the present real property tax on that site. If we allow the symbol Y_t to represent the real property tax on an individual parcel of land, we can determine the real property tax liability on it in equation [6].

$$Y_t = R_u(L_i + B_i) \qquad [6]$$

Allowing Y_1 to represent the land value tax on an individual parcel of land, we can determine the land value tax in equation [7]:

$$Y_1 = R_1 L_i \qquad [7]$$

A person living in a local community that is contemplating the possibility of converting to a land value tax will want to compare his liability under the proposed land value tax in terms of his most recent real property tax rate. We can do this by substituting the equivalent of R_1 in equation [7] as found in equation [5]. We will then get:

$$Y_1 = \frac{R_u(^n{}_zL_i + {}^n{}_zB_i)L_i}{^n{}_zL_i} \qquad [8]$$

which can be reduced to:

$$Y_1 = R_u L_i \left(I + \frac{{}^n\Sigma B_i}{{}^n\Sigma L_i} \right)$$ [9]

Equation [8] tells us that a change over from the uniform real property tax to a land value tax will create a tax liability for an individual property owner equal to the product of his present tax on land, as a part of the real property tax ($R_u L_1$), and the ratio of the aggregate value of all taxable property to the aggregate value of taxable land in the community.

We can now compare the property owner's proposed land value tax with his present real property liability. We can show this by subtracting equation [6] from equation [9]:

$$Y_1 - Y_t = R_u L_i \left(1 + \frac{{}^n\Sigma B_i}{{}^n\Sigma L_i} \right) - R_u (L_i + B_i)$$ [10]

which can be rewritten as:

$$Y_1 - Y_i = R_u L_i + R_u L_i \left(\frac{{}^n\Sigma B_i}{{}^n\Sigma L_i} \right) - R_u L_i - R_u B_i$$ [11]

and reduced to

$$Y_1 - Y_i = R_u L_i \left(\frac{{}^n\Sigma B_i}{{}^n\Sigma L_i} \right) - R_u B_i$$ [12]

which shows us the net dollar change in tax liability due to the increase in tax on land and the elimination of the tax on improvements ($-R_u B_1$).

Let us now assume that a given parcel of real property has a ratio of improvement value to land value that is equal to the ratio that prevails in the community for the total value of improvements compared with total land value. This assumption can be expressed as:

$$\frac{B_i}{L_i} = \frac{{}^n\Sigma B_i}{{}^n\Sigma L_i}$$ [13]

We can then substitute $\left(\dfrac{B_i}{L_i} \right)$ for $\left(\dfrac{{}^n\Sigma B_i}{{}^n\Sigma L_i} \right)$ in equation [12] and get:

$$Y_1 - Y_t = R_u L_i \left(\frac{B_i}{L_i} \right) - R_u B_i$$ [14]

which can be reduced to:

$$Y_1 - Y_t = 0$$ [15]

or rearranged so that:

$$Y_1 = Y_t$$ [16]

Equation [16] shows us that changing to a land value tax does not change tax liabilities at all for those parcels of real estate that have an improvement/land value ratio that is identical with the ratio of the aggregate value of improvements to the aggregate value of land in the community.

By making the appropriate assumptions, it can be shown that the land value tax will result in a greater liability than a real property tax if that property's ratio of improvements to land value is less than the ratio of aggregate improvement to land values. Thus, if

$$\frac{B_i}{L_i} < \frac{{}^n\Sigma B_i}{{}^n\Sigma L_i}, \quad \text{then} \tag{17}$$

$$Y_1 > Y_t. \tag{18}$$

Conversely, a land value tax will produce a lower tax liability than a real property tax if the property's ratio of improvement to land value is greater than the ratio of aggregate improvement to land value. Thus, if

$$\frac{B_i}{L_i} > \frac{{}^n\Sigma B_i}{{}^n\Sigma L_i}, \quad \text{then} \tag{19}$$

$$Y_1 < Y_t. \tag{20}$$

CHAIRMAN TEAGUE: Thank you Dr. Becker for the fine presentation.

Our next speaker is John O. Behrens. John Behrens is Public Finance Specialist for the Governments Division of the U.S. Bureau of the Census. He directs research and is responsible for the technical content for the property values survey of each quinquennial Census of Governments. This includes the only nationally based study of assessment-sales price ratios undertaken in the United States, most recently for the 1972 Census of Governments.

Before joining the Bureau, John served as field representative for Public Administration Service of Chicago. His assignments included almost five years in Africa as Tax Advisor for Liberia and Sierra Leone and also several years as consultant for state and local governments in the United States.

Earlier he was Assistant Executive Director of the International Association of Assessing Officers, following several years as a Tax Assessor for the City of Milwaukee.

He represented the United States in the first seminar on cadastre in Ethiopia, and he also has served as Consultant to the Advisory Commission on Intergovernmental Relations and the American Society of Planning Officials.

His writings have appeared in the *National Tax Journal* and else-

where. In addition to an M.B.A. from the University of Wisconsin, his academic background includes graduate study in economics at American University.

John will now present to this group the subject "Property Tax Inequities and Other Differences in a New Scene."

PROPERTY TAX INEQUITIES AND OTHER DIFFERENCES IN A NEW SCENE

JOHN O. BEHRENS *
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Open a dictionary and you find "inequities" defined as "aspects of unfairness." Economists distinguish "horizontal" and "vertical" types: respectively, unequal treatment of things essentially the same, and a pattern of unequal treatment among things differing individually in some systematic sequence.

Lawyers contrast "inequity" with its opposite, "equity," a habit of fairness that led to a distinctive court system. Thus the technical spin-offs in economics and law are consistent with Webster's definition. This consistency is salutary amid the diversity of the property tax. Here is a levy, or collection of levies, about which it is at once easy and risky to generalize.

Almost any statement will fit somewhere, and very likely no statement will fit everywhere. As Dick Netzer [1] has observed, one of its needs is "place-oriented" research. It requires nationwide rather than national attention. In all of its varieties it is close to the people, in all their varieties. Like them it has made progress, and more is likely when some now paying too little of the property tax pay more, and vice versa. Which brings us back to inequities. Which in turn can lead us several ways, but let's begin with the much maligned assessors.

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* Views expressed are those of the author and not necessarily those of the U.S. Bureau of the Census.

[1] "The Incidence of the Property Tax Revisited" by Dick Netzer, *National Tax Journal*, December 1973, pp. 527 ff. A similar insight about an institution closely tied to the property tax, the real estate market, comes from Saul Shiefman in "Construction is Many Markets — Not One," *Real Estate Review*, Fall 1973, Vol. 3, No. 3, pp. 25-31. Shiefman says the "real estate market is local — and sometimes even narrower." Moreover, "there is no necessary correlation between the national construction trend and the trend in any local market."