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PROPERTY TAX ASSESSMENT INEQUITIES IN HAMILTON

THE DISTRIBUTION OF PROPERTY TAX  
ASSESSMENT INEQUITIES IN HAMILTON

by

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## ABSTRACT

Multivariate statistical analysis of the ratios of single family dwelling assessed value to current market value or sale price, has been used to evaluate the administration of the property tax assessment function in Hamilton, Ontario. The Hamilton assessment administration has been found to exhibit an unacceptable level of non-uniformity in the assessment of single family dwellings. It is shown that tax burdens will vary substantially within and between price classes of single family dwellings; thus, both horizontal and vertical inequities are attributed to the administration of the assessment function.

The spatial distribution of property tax assessment inequities in Hamilton is presented. It has been shown that certain districts of the city are overassessed relative to others. The spatial pattern is distinct; the area proximate to the industrial waterfront and the central business district have assessment-sales ratios above the mean ratio determined for the city as a whole, while the peripheral or fringe areas of the city are generally characterized by lower assessment-sales ratios.

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## CHAPTER 1

### INTRODUCTION AND PROBLEM STATEMENT

The property tax is the principle source of revenue in Ontario used to defray the cost of local public expenditures. It has been criticized since its inception for violating social, economic and public finance principles and contributing to urban problems. Much of the adverse effects of the property tax can be attributed to its inherent characteristics; however, many believe a significant proportion must be allocated to the administration of the assessment function.

The concept of market value is generally held as the ideal base for property tax valuation; however, assessments are usually not made according to market value but on a set of factors thought to reflect market value. The tendency to underassess real property and the concomitant non-uniformity of assessments is believed to contribute to the inequitable distribution of property tax burdens.

An assessment system where the ratio of assessed value(AV) to market value(MV) for all properties equals the mean or median assessment-sales ratio(AV/MV) exhibits no administrative inequities. Thus, consistently uniform underassessment is not the fundamental problem of inequitable assessments. However, the perfect assessment system does not exist. Research on assessment-sales ratios has revealed a great variability in assessments within and between price classes of property. It is this

non-uniformity which creates property tax inequities.

Improvement in the mode of assessment will alleviate non-inherent inequalities in the property tax. This may be achieved by using information from assessment-sales ratios and multivariate statistical mass-appraisal techniques. If all property is assessed stochastically then presumably there will be less non-uniformity.

### Scope and Objectives of This Paper

The objective of this study is to evaluate the administration of the property tax assessment system in the city of Hamilton, Ontario. If the administration of the tax is shown to contribute to inequitable tax burdens then support will be given to the reform proposals outlined in the recent *Report of the Commission of the Reform of Property Taxation in Ontario* (hereafter referred to as the Blair Report).<sup>1</sup>

The examination of assessment-sales ratios for single residential properties in Hamilton forms the basis of this study.<sup>2</sup> The information supplied from these ratios will be used to evaluate the administration of the tax according to three hypotheses:

1. The assessment-sales ratios of single residential properties in Hamilton exhibit significant variation.
2. Assessment-sales ratios will increase or decrease in a uniform fashion with respect to market values.
3. Assessment-sales ratios will vary significantly over space.

The first hypothesis states that the AV/MV ratio for any particular property will be significantly different than the city mean or median AV/MV ratio. Thus, the distribution of tax burdens will be inequitable

since some properties will be assessed at a significantly higher percentage of market value than others.

The second hypothesis states that the AV/MV ratio will be significantly different as market value increases. It is anticipated that as the market value of a property increases (as determined by sales prices), the AV/MV ratio will decrease. This implies that higher-value properties are underassessed relative to lower-value properties.

The third hypothesis states that certain areas of the city are expected to be characterized by AV/MV ratios which are significantly different from the city mean or median ratio. It is anticipated that the areas with generally lower property values will be overassessed relative to the areas with higher property values.

#### Organization of the Paper

Chapter 2 will provide a review of the history of the property tax in Ontario. Chapter 3 presents a general overview of the principles of the property tax. The literature of assessment-sales ratios and mass-appraisal techniques is reviewed in Chapter 4. Chapter 5 presents the characteristics of the data source and the sample design. Chapter 6 develops the general framework for analysis which is presented in Chapter 7. An illustration of differential tax burdens is provided in Chapter 8. Chapter 9 summarizes the data analysis, discusses policy implications and suggests areas for future research.

## CHAPTER 2

### HISTORY OF THE PROPERTY TAX IN ONTARIO

#### Origins and Early Development

The initiation of local self-government in upper Canada had been delayed by the British Colonial Office which was opposed to allowing what was believed to lead towards rebellion, reminiscent of the American Revolution in 1776. This experience led to suspicions of local government autonomy; however, pressures for local government mounted and in 1788, 4 districts were created for the purpose of administering justice.

Provision of public facilities such as roads had been a function of the Upper Canada Legislature. The prime revenue source was the collection of excise and other indirect taxes. It became clear that some form of local revenue collection was required. As Vineberg (1912) states, there was a "deficiency in revenue brought about by careless expenditure as well as by the smallness of its share of the customs duties."<sup>1</sup> Thus, in 1793, the Legislature recognized that each district's public needs should be financed, "in proportion to the Wealth and Number of the Inhabitants."<sup>2</sup>

The Assessment Act of 1793, established a pattern of local assessment based on all real and personal property.<sup>3</sup> The level of taxation allowed was kept quite low, presumably due to reluctance on the part of the British to grant full fiscal autonomy. The tax base consisted of



the assessment by "elected" assessors of all real and personal property belonging to every household. The value of each household's assessment was then placed into one of nine arbitrary groupings and taxed proportionately as shown in Table 2.1. In 1794, the tax brackets were extended to increase the base. Proportional taxation continued at 5 shillings per increment of 100£ assessment over 500£. In addition, owners of property assessed at less than 50£ were no longer exempt from taxation.

There was a general aversion to paying higher taxes since the levys and expenditures of local taxes were often in the hands of those outside the local townships. In addition, non-resident owners of "wild land" were exempt from assessment even though their land was increasing in value as a result of the growth and labor of the local population. It was argued that the disposition of crown lands and clergy reserves could provide the required additional revenues. The consequence of these complaints was that the amount of additional or future taxation had to be strictly defined. In 1796, the officials were compelled to estimate total expenditures for the year and levy only enough to cover this expenditure. The "visibility" of the tax base and expenditures was clearly important.

Assessment practices came under strong criticism at the outset. Aitchison (1953) acridly speculates on the assessors qualifications:

"The purpose of the classification of ratepayers may have been to relieve the often illiterate assessors from the necessity of computing awkward fractions." (Aitchison, 1953; p.237)

The potential for inequitable assessments due to "ignorance" or "partiality" was substantial. It was evident that some people with similar wealth were

Table 2.1

Property Tax Liability - 1793

<u>Group</u>	<u>Assessed value of property (£)*</u>	<u>Maximum annual tax (s/d)*</u>
1	under 50	exempt
2	50-100	2/6
3	100-150	5
4	150-200	7/6
5	200-250	10
6	250-300	12/6
7	300-350	15
8	350-400	17/6
9	over 500	20

\* £ = British pounds sterling

+ s/d = Shillings/pence

Source: Aitchison, J.; *The Development of Local Government in Upper Canada*. Ph.D. Thesis, University of Toronto, Department of Political Economy, 1953.

paying more taxes than their neighbors. Competitive underassessments between townships were often encouraged by the local Justices of the Peace themselves, as the proceeds of the levys were often used outside the local area. The townships were not free to control taxation until 1849.

In 1798, new legislation was proposed to ensure that assessments would equitably ascertain property wealth. This proposal failed to become law until it had been significantly revised in 1803, losing many of its important features. The Assessment Act of 1803 consisted of a very rigid mode of assessment whereby specified items of real and personal property were arbitrarily fixed with statutory assessed values.<sup>4</sup> This measure effectively eradicated the previous categorizations of property owners and it reduced the likelihood of poor valuation judgement by the assessors. Their post-1803 role is described by McEvoy (1889):

"The assessor's duty consisted merely in drawing up a list of each man's property ... contented himself with asking them ... in what kind of a house he lived ... how much arable and meadow land, how many cattle, horses, sheep, pigs each possessed. The assessor made no attempt at valuing the various possessions, his designation being therefore a misnomer ..."<sup>5</sup>

Unfortunately, the bill restricted the tax base in such a way that inequities were unavoidable. Households with a greater proportion of their property in tax exempted items obviously had a lighter tax burden. Cultivated land faced an assessment of 1£ per acre regardless of quality or location. "Wild lands", previously untaxed became subject to a nominal assessment which was independent of actual value. This means of statutory valuation for assessment remained unchanged in principle until 1850.

### Pressures For Reform

The Assessment Act of 1803 was made perpetual in 1825. However, in 1833, a bill was proposed which would divide cultivated land into 3 grades and assess each at a different rate. The same procedure was planned for wild lands, although on a reduced rate schedule. Aitchison (1953), believes that the defeat of the bill could be attributed to the fact that the proposed minimum new rates were greater than the previous uniform maximum rates.

Pressure for assessment of land "according to real instead of fictitious value" persisted.<sup>6</sup> The Assessment Bill of 1843, proposed that the assessment function be restored to municipal assessors who were to assess all real and personal property at actual value.<sup>7</sup> It was not implemented at that time because personal income was included as personal property and this was considered an invasion of privacy (Smith Report, 1967).

The pressures for reform did not desist and sweeping changes began in 1849. The Baldwin Act of 1849 restructured local government in Upper Canada; this predecessor of the Municipal Act has persisted virtually unchanged in Ontario until the recent formation of regional municipalities. The most significant change brought about by the Baldwin Act was that the provision for levying of property taxes was ceded to local municipalities.

The Common Schools Act of 1850, proclaimed that the municipalities had the responsibility and authority to levy property taxes for school support. This marked the real beginning of government supported schooling which over time has become the single largest public expenditure at the

local level.

The logical extension of these two Acts was the Assessment Act of 1850. Its objective was the provision of a system of more equal and just assessment for municipal purposes in the newly created municipalities of the province. Real and personal property was to be assessed at full value. Assessors were authorized to elicit information from property holders and they were obliged to notify them of the assessment made. The assessment of personal property "was defined so as to include only the more tangible classes of personalty."<sup>8</sup> Personal earned income over 50£ was to be considered personal property as well.

#### The Failure of the Personal Property Tax

In the Assessment Act of 1866, income (both from labor and investment) became subject to taxation as personal property.<sup>9</sup> This taxation according to Vineberg (1912), placed merchants at a disadvantage to those in other provinces. There were instances he claims, of large firms migrating to Montreal or Winnipeg where there was no comparable tax. Thus, the tax on personal property proved to be a disincentive to the growth of distributing centers.

Further criticism of the tax on personal property ensued. The Ontario Commission on Municipal Institutions of 1888, reported that:

"... the valuation of personal property varies so much as almost to prove prima facie that this cannot be an equitable basis of taxation."  
(Vineberg, 1912; p.39)

Evasion of personal property taxes became acute as well. This only

increased the inequity to those who could not or would not evade it. Thus, in 1900, the Ontario Assessment Commission concluded that taxation of personal property should be eliminated. This recommendation was accepted and made law in the Assessment Act of 1904.

### Farm Land Assessments

Assessment of farm land during the last half of the 19th Century underwent significant changes as well. In 1866, guidelines for assessing farm land at that value "at which sales of it can be freely made" were established (Vineberg, 1912; p.91). After 1883, the principle of taxation according to benefits received became popular and this helped reduce the farmers tax burdens. Special assessments for local improvements were usually made according to the frontage of the property, but gradually, awareness of the fact that others in the municipality benefitted by localized improvements resulted in a more equal apportioning of the cost. In 1892, farms exceeding 5 acres in size which received substantially less benefit from certain publicly provided services than other properties were declared exempt from supporting the services. This tax relief is still in the statutes; the municipal council is annually required to pass a by-law by March 1 to grant full or partial exemption from taxation for such expenditures as waterworks and sewers (Finnis, 1970; p.110). Further tax relief to the farmer came in the form of exemption from the business tax instituted in 1904.

### Twentieth Century Developments

The Assessment Act of 1904, has remained as the basic foundation

of present day assessments on residential and farm properties. Several issues have been raised since then and some changes in the legislation have been made, although these have not radically changed the premises of the 1904 document.

### The Single Tax

The Act of 1904, provided for the separation of the valuation of land and buildings. It was believed that this separation would help assessors achieve more equitable assessments and allow a better comparison of land values.<sup>10</sup> In the early part of the century there was a push to extend the concept of separating building value from land value. The proponents of the "single Tax", following the doctrine of Henry George (1879), suggested that the tax base should exclude capitalized improvements altogether. British Columbia had been exercising a system of exemption of improvements from taxation as early as 1891. The Prairie Provinces had initiated similar assessment schemes in the early part of the 20th Century. These measures were a response to the rapid development and concomitant land speculation of the Canadian West. It was generally conceded that the single tax, whose burden falls upon land irrespective of improvements, would tend to force speculators to either build on or sell their holdings. Further speculative activity would thus be discouraged.

In 1909, a select Committee of the Ontario Legislature was appointed to examine the possibility of conversion to a system whereby improvements were to be taxed at a lower rate than land. No changes in legislation were recommended. In 1912, a second committee examined the charge that buildings were assessed inequitably with respect to land. They found no

excessive assessments occurring in practice and hence no changes in the tax base were made. Perhaps the main reason behind the decision not to follow the western provinces' use of differential taxation was the relative lack of speculative activity in Ontario at that time. After World War I, a general move away from site-value taxation began across Canada. Continued interest in the concept of a land tax has yet to cause the Ontario government to enact reform. In fact, the Assessment Act of 1969, provided for the termination of separate valuation of land and buildings.

#### The Burden of the Property Tax and Tax Relief

The burden placed on the property tax as means of financing local expenditures increased prior to and during World War II. In 1936, the municipal income tax was lost to the provincial government and in 1942, the right to locally tax corporate income was also rescinded. As stated in the Smith Report (1967):

"the real property tax was left to fill a place in the Ontario taxation system that was bound to strain its capacity to contribute to an equitable tax and revenue system." (Smith Report, 1967; p.47)

Relief to the local ratepayer since World War II has come primarily from provincial grants. The size of these subsidies to the municipalities has grown substantially since the war, from \$50 million in 1946, to nearly \$600 million in 1965 and over \$1.5 billion in 1976 (Blair Report, 1977). Further relief has come via payments in lieu of taxes on exempted provincial and federal properties; however, the Smith Report concluded that the Province's payment in lieu of taxes did not cover the decreased local



revenue due to exempt properties, which are estimated to be 25% of the value of the taxable assessment (Smith Report, 1967; p.54).

The burden of residential and farm taxpayers was lightened substantially by the introduction of the split mill rate in 1957, whereby commercial and industrial properties are taxed at a higher mill rate than residential properties.

### The Smith Report (1967)

In 1967, the Ontario Committee on Taxation, referred to as the Smith Report, presented a comprehensive examination of the local revenue system in the province. It made numerous criticisms of the administration of the property tax in Ontario, aimed at such problems as ambiguous definition of the tax base and the divergence of assessment practices from the legal statutes. Recommendations were proposed to make the property tax more efficient and equitable. A few of the recommendations most relevant to this study are as follows:

- 11:16 (a) All real property, whether taxable or not, be assessed each year at 100 per cent of actual value.

At the time of the report, different property types were assessed at different rates of actual value as can be seen in Table 2.2. The rationale for this differential is presumably based on some concept of ability to pay.

- 11:16 (b) Residential properties, recreational properties and wasteland be subject to property tax on a taxable assessment of 70 per cent of assessed value.

The Committee's survey on assessment ratios for various municipalities revealed a "gross underassessment" of property throughout the province.

Table 2.2

Examples of Business Assessment Rates

<u>Type of business</u>	<u>Business assessment rate*</u>
Car parks	25%
Retail stores	30%
Professional and Retail Chains	50%
Industries	60%
Financial	75%
Wholesale	75%
Distilleries	140%

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\* Assessment as a percentage of market value

Source: *The Blair Report* (1977; p.54), Table 6.

Furthermore, the assessment ratios varied substantially within and between municipalities. The Committee proposed a statutory percentage of market value to ensure uniformity across the province.

13:3 The Assessment Branch of the Department of Municipal Affairs develop and promote the adoption of a plan of annual reassessment in each municipal assessment jurisdiction.

Reassessment had generally been conducted on an infrequent basis; this contributed to non-uniformity in assessments.

The Smith Report delegated much of the responsibility for property tax inequities to assessment practices.

"... a growing conviction that extreme inequalities in property assessment, with resulting inequities in taxation have been hidden from view by the prevalence of gross under-assessment."  
(Smith Report, 1967; p.205)

This underassessment has been a long-standing practice in Ontario, dating back originally to 1793. Contemporary underassessment has its origins in the World War II era. During the war, municipal expenditures underwent a period of austerity and the depressed assessments of the 1930's provided a sufficient tax base. After the war, the Department of Municipal Affairs recognized that updating assessments would cause a substantial burden to homeowners thus it encouraged assessment at 1940 values. In 1950, the Department issues the first *Assessment Manual* which used 1940 as the base year for valuation purposes. The 1940 base year was unofficially accepted until at least 1964, when the *Assessors Handbook of Cost Factors* was published by the province (although to a large extent this revised manual still used the original base year). The use of these manuals precludes

market value assessment. The significance of underassessment will be treated in Chapter 3.

### The Assessment Act of 1969

In 1969, an assessment act was introduced which adopted a few of the Smith Report's recommendations. It was the first major change in assessment legislation since 1904. The most notable change was the transferring of the responsibility for the assessment function from the municipalities to the provincial government. All assessment personnel became civil servants as of January 1, 1970.

The tax base was to be the current market value of all taxable properties. Market value was defined as; "... the amount that the land might be expected to realize if sold in the open market by a willing seller to a willing buyer." (The Blair Report, 1977; p.16). In addition, 32 regions were formed in which area commissioners were responsible for:

"... ensuring that every property within their region is assessed at market value by 1975, that the assessments are maintained at market value and that assessment methods and standards are uniformly and equitably applied." (Finnis, 1970; p.16)

### The Blair Report (1977)

The Report of the Commission on the Reform of Property Taxation in Ontario (the Blair Report), was initiated to examine the property tax system in Ontario and suggest reforms. The Commission conducted public meetings across the province, accepted briefs and studied other reports on property assessment and taxation. They recognized the fact that the

reassessment of all real property at 1975 market values had not yet been instituted throughout the province. It was their opinion that this aspect of the assessment function was crucial in determining equity in the application of the tax.

They concluded that much of the present day inequities in the tax were due to the system prior to 1970.

"... the distortions inherent in past local discrepancies are still with us today, in addition to such continued practices as assessing different classes of property at different levels of value ... apartments are assessed at higher values than are single residential dwellings." (Blair Report, 1977; p.17)

The Commission proposed a comprehensive set of reforms dealing with assessment rates, exemptions, provincial government grants, tax relief and plans for implementation. Some of these proposals are listed below.

I:P1 That all real property be assessed at market value.

The Commission believed that full current market value assessment was the only means to ensure that a well understood, equitable basis of taxation exists. It follows that the property tax base should be more explicitly defined:

I:P2 That real property liable to assessment include land and any building or other structure on it including only such machinery and equipment as is part of such a building or structure and is used or required primarily for the functional operation of the building or structure.

I:P3 That the present practice of levying different mill rates on residential and commercial properties be discontinued, and instead a uniform mill rate be employed.

The purpose of this proposal is to reduce the administrative problems inherent in the present system. To remain consistent with the provincial

government's policy that residential properties face a lesser tax burden it has suggested:

III:1R1 That residential property ... be subject to a taxable assessment at 50 per cent of its market value.

To ensure that assessments remain equitable they further suggested:

III:1R2 That the appropriateness of the residential market value percentage be reviewed by means of monitoring the real estate market, and if necessary this percentage be revised each two years.

Certain types of property, though taxed at full market value, would be awarded provincial grants to cover all (for example private schools and churches), or part (farmlands) of the taxes payable.

With respect to the implementation of the tax, the Commission stated that the property tax system based on 1975 market values should be ready for application by 1978. They maintain that the real property tax can be made an efficient and equitable tax if their reform proposals are acted upon. As of late 1977 these reforms have yet to be implemented. Reasons for this failure to act will be discussed at length subsequently.

### Conclusion to the Chapter

This chapter provides background information regarding the development of the property tax system in Ontario. Examination of these historical developments provides a valid perspective of the present day system, which is a remnant of the 18th and 19th Centuries. The preferential treatment awarded farmers today for example, is clearly based on a 19th Century vantage of equity. Furthermore, the evolution of the tax system may provide insight as to why the present system is regarded as inequitable, yet the reform process is so very slow.

The two major reports of the past decade, the Smith Report (1967) and the Blair Report (1977) have been capsulized in this chapter. Their contribution to the general literature will be examined in Chapter 3, which presents an overview of the principles of the property tax.

## CHAPTER 3

### THE PROPERTY TAX

#### Introduction

The property tax is a levy imposed by local governments on owners, occupiers or users of property in order to defray the cost of publicly-provided goods and services. This form of taxation has its origins as far back as 3000 B.C. (Finnis, 1972). Before the advent of democratic governments land was considered the property of the monarchy. Those who "tilled" the land were subject to a payment of taxes as a form of rent. This was usually based on some fraction of the produce harvested.

By the 14th Century, the assessment and collection of property taxes in Britain became the domain of local government. At this time *ad valorem* taxation was established, replacing the traditional fixed percentages of produce.

The base of the tax at one time included all elements of property. This included such tangible assets as land and livestock and intangible assets such as stocks and bonds. The inability to accurately and fairly record all personal property ultimately led to its exclusion from the tax base. Real property, the present base of the property tax, refers to land and any building or other structure on it.

The tax base for local revenue purposes depends upon the valuation of all real property within a municipality's jurisdiction. Once the tax base has been determined and assessments made for each parcel of real



property, the municipality will then be able to levy property taxes. The tax liability for each owner of property is a function of: total revenue needs of the municipality (TR), total assessed value of all property in the municipality (TAV), assessed value of the property concerned ( $AV_i$ ) and the millage rate (m). This procedure can be expressed in the following two simple equations:

$$\frac{(TR)}{(TAV)} (1000) = m \quad (3.1)$$

$$(AV_i)(m) = \text{Tax liability} \quad (3.2)$$

In 3.1 the municipality has determined the level of expenditures forecast for the following year. Presumably the required revenue will equal this amount. With the total taxable assessment known the municipality "strikes" the millage or mill rate. The tax due from any parcel of property is derived by multiplying the assessed value of that property by the mill rate. For example, let the total tax base of a municipality be \$100 million. The municipal council has determined that its revenue requirements from the tax for the coming year are \$5 million. Thus, the mill rate for the year is:

$$\frac{(\$5 \text{ million})}{(\$100 \text{ million})} (1000) = 50 \text{ mills} \quad (3.3)$$

An individual with property assessed at \$10,000 will be liable to a tax of \$10,000 (.05) = \$500. It is important to realize that a doubling of

the municipal tax base (for example by reassessment) will result in a halving of the millage rate to achieve the same revenue. Thus, increasing property assessments in itself will not result in increased taxation (Blair Report, 1977; p.1).

### Evaluation of the Property Tax

The property tax, as a method of raising revenue has been subject to much unfavorable criticism.

"... the general property tax as actually administered today is beyond all doubt one of the worst taxes known in the civilized world." (Seligman, 1921; p.62)

"... if any tax could have been eliminated by adverse criticism, the general property tax should have been eliminated long ago." (Jensen, 1931; p.478)

Contemporary critics of the property tax include; Morton (1955), Netzer (1966), Harriss (1968), Becker (1970), Gaffney (1973), Shannon (1973) and Nader (1975).

This dislike of the property tax is not restricted to academics. Shannon (1973), refers to United States public opinion surveys which reveal the property tax to be considered the least fair and most disliked of all taxes.<sup>1</sup>

An evaluation of the tax can be made using a framework established by Adam Smith and refined by Musgrave (1959), Johnson (1967) and Finnis (1972). This framework can be used to evaluate a tax according to a set of basic principles. These principles are outlined below; each will be reviewed in some detail.

In order for a tax to be politically acceptable it should:

1. Be adequate to raise sufficient revenues.
2. Be consistent with economic objectives.
3. Exhibit ease of administration and compliance and be highly "visible" with respect to collection and expenditures.
4. Exhibit the characteristics of social justice.

### 1. Revenue adequacy

Property tax revenues in Ontario approached nearly \$3 million in 1976.<sup>2</sup> In most municipalities throughout the province it accounts for the largest proportion of locally raised revenue. Unfortunately, these levys have proven to be insufficient. According to Finnis (1972, p.4), Canadian local governments per capita tax revenues have increased about 600 per cent from 1939 to 1970; however, per capita expenditure rose nearly 1,000 per cent during the same period. This is because the rising demand for services both to property and people has accelerated at a more rapid rate than the property tax base.

The problem may be one of fiscal imbalance (Harriss, 1968; Ecker-Racz, 1970; Netzer, 1974; Nader, 1975). Rising incomes have created this increased demand for services, yet income is only liable to federal and provincial taxes (Nader, 1975; p.286). This fiscal imbalance deters the municipalities from initiating programs which could help alleviate urban problems. They are reluctant to increase their present budget as this would necessitate raising the already excessively high millage rates.

Despite the general inadequacy of the property tax to finance burgeoning local government expenditures, the property tax is not likely to be abandoned since there is no strong candidate to replace it (Smith

Report, 1967; p.14). The \$3 billion raised by local property taxes in Ontario is not a sum easily replaced (Blair Report, 1977; p.8). This conclusion has been reached in the United States as well, where the property tax's longevity has been referred to as "fiscal realism." (Shannon, 1973; p.27).

Suggestions to alleviate the problem have been directed towards reducing the local governments reliance on the property tax (Netzer, 1973; Silver, 1973). This can be achieved by changing the fiscal imbalance through shifting some of the expenditure responsibilities to higher levels of government, or increasing the municipalities revenue-raising capacity by imposing local income or sales taxes (Netzer, 1973; Ecker-Racz, 1970; Silver, 1973). One view frequently expressed is that the cost of "people-related" services should not be met by a tax on real property (Blair Report, 1977; p.3). Services like education, welfare and recreation should be financed by income-related taxes. If these tax sources remain under the jurisdiction of the higher levels of government then it is felt that they should have the burden of providing the services. This would alleviate the disparities in service and tax levels amongst the municipalities as well as improve the pervasive problem of externalities (Netzer, 1974).

The arguments against shifting responsibilities are presented by those who believe it would lead to the reduction or destruction of local autonomy. Both the Smith and Blair reports maintain that local autonomy is a tenet of our society and that such a shifting of responsibilities would likely be to society's disadvantage.

"It seems clear that autonomy without any financial responsibility is wholly unrealistic as an objective since the two are mutually exclusive." (Blair Report, 1977; p.3)

The alternative of municipalities levying income or sales taxes may be feasible; it may be the only method for cities to maintain their autonomy in the future (Silver, 1973). However, the Blair Report concludes that the local income tax would "yield most undesirable side effects." (Blair Report, 1977; p.7). Conversely, the earlier Smith Report maintained that "The provincial government must provide local governments with taxing power commensurate with the responsibilities assigned to them." (Smith Report, 1967; p.9). No answer as to how this might be accomplished was presented in either of the two Ontario reports. The regionalization of local government in Ontario and the increasing dependency on provincial grants indicates a shifting of responsibility to the higher levels of government.

## 2. Consistency With Economic Objectives (The Principle of Neutrality)

A tax system should not interfere with the "normal" structure of the economy, and then only to help achieve prescribed economic objectives. According to Netzer (1966), the Smith Report (1967), Harriss (1968) and Becker (1970), the property tax systems of both Canada and the United States are not neutral. Taxes on real property discriminate against the urban poor who consume proportionately more housing relative to their income (Netzer, 1966; p.40). A tax on housing may ultimately reduce the supply and quality of housing in cities, thereby contributing to the inflated housing market, overcrowding, abandoned housing and slum formation

characteristic of many United States central cities<sup>3</sup> (Walker, 1974; Harvey and Chatterjee, 1974).

Another distortion of the economic structure of the urban economy which may result from property taxation is that of "fiscal zoning". That is,

"... the control of land use to maximize the tax base of each of the many small suburban governmental units and to minimize public expenditure requirements." (Netzer, 1974; p.249)

B. Hamilton (1973) believes that fiscal zoning may have socially and economically undesirable effects. It encourages undesirable land use patterns as land uses become less dependent on the intrinsic merits of location and site. According to Tiebout (1956), and others expanding upon his theory, for example Oates (1969), consumers of housing will be attracted to municipalities where their tax benefits are maximized. Those municipalities which have established the greatest tax base will presumably be attractive to all income groups. Fiscal zoning prevents the development of low-income housing, thus segregating low-income groups even further. This restriction occurs because low-income occupants tend to demand a relatively greater proportion of services and contribute less to the tax base.

The view that the property tax is inconsistent with economic objectives is not held by all economists. Proponents of general equilibrium analysis believe that the property tax actually distorts very little in the overall national economy. According to Muth (1975), this is because the tax represents a very small part of the total tax system. He argues

that the property tax is really a tax on all capital and as such effects all capital, not just the housing sector.

The critics of the "new" view of the property tax argue that the tax cannot be considered a national tax due to significant differences in millage rates, tax bases, assessment practices and local real estate markets which render the tax sufficiently localized. The incidence of the tax will be discussed further within the section titled Social Justice.

### 3. Ease of Administration and Compliance

The tax system should contain an obvious base which is easily determined and collected. It should be levied at reasonable rates and be payable in a convenient manner. The public should be aware of how their tax liability is derived; that is, the tax should be highly "visible" in nature (Musgrave, 1959).

#### The Assessment Function - The Concept of Value

The objective of the assessment function is:

"... the valuation of real property for the specific statutory purpose of providing a tax base. It involves the determination of a fair valuation of real property for taxation purposes by using an efficient system which will provide a reasonably equitable relationship between and within all types of real property." (Finnis, 1972; p.71)

The difficulty of administering the property tax is a result of its being based on inexact valuation. Assessors have been plagued by the problem of how to achieve consistent and fair valuations for quite some time.

This objective is extremely important, as "the assessment process itself is the basis upon which any property tax system stands or falls." (Blair Report, 1977; p.15).

Three basic methods have been most commonly used for assessing real property. These are:

1. Depreciated replacement cost
2. Imputed income or capital value
3. Market data analysis

#### Depreciated Replacement Cost Approach

As outlined by Hamilton and Howard (1972), this approach to valuation involves:

1. The separation of land and building values.
2. Estimation of replacement cost of the building.
3. Determination of accrued depreciation.
4. Adding back land value to the net of replacement cost less accrued depreciation.

The problem with this approach is that it is difficult to estimate replacement cost since materials and methods used to construct buildings at one time may not be in use at another time. Accrued depreciation, caused by physical deterioration and functional obsolescence is also difficult to ascertain. Methods for evaluating net building value range from simple to detailed engineering estimates, basic accounting methods and simple comparative market analysis. The relative merits of these approaches are discussed by Hamilton and Howard (1972, ch.13).



### Imputed Income or Capital Value Approach

Capital value is here used to represent market value. It is most frequently used to appraise commercial and apartment buildings where rents are known and market comparisons unavailable. The key to determining capital value is the comprehensive estimation of the present value of future net income. It requires the selection of an appropriate capitalization rate and accurate long-range forecasting. It is this subjective element of using the net present value concept that has restricted its use for property tax assessment purposes, although it is become increasingly popular with business enterprises.

### Market Data Approach

The *market comparable* or *market sales data* approach is based upon the collection and comparison of sales data on similar properties. Comparisons for assessment purposes are made with respect to a range of variables including: age, location, lot size, floor space, number of rooms and functional adequacy. When a subject property is to be assessed, adjustments in valuations are made according to the absence or presence of characteristics found in a comparable property. For example, the greater the number of bedrooms, the greater will be the assessed value, *ceteris paribus*.

The use of multivariate statistical techniques to estimate the value of properties has augmented the usefulness of the *market comparable* approach. Where sales and comparable properties are numerous the procedure has great potential for obtaining adequate measures of market value. The weakness of this approach is evident where comparable properties are not

available.

### Assessment at Current Market Value

In Ontario, real property is to be assessed at current market value by statute.<sup>6</sup> This provision for assessment at market value dates back to 1850, yet no municipalities in Ontario presently assess properties using this criterion. This was documented in both the Smith Report (1967) and the Blair Report (1977). Assessments of property are often still based on 1940 values and cost factors which are out of date (Blair Report, 1977; p.8).

The pressure for reform, or compliance with stated laws, has been prompted by two issues: non-uniformity of assessments and a concurrent lack of public awareness regarding current assessment procedures. Assessment at current market value is considered by many to be the best method of obtaining fair valuations which the public comprehends (Smith Report, 1967; Netzer, 1973; Finnis, 1972; Shannon, 1973; Paglin and Fogarty, 1972; Denny and Grainger, 1974; Blair Report, 1977). Fractional assessments tend to confuse the public; many property owners are ignorant of how their tax bill is determined. Consequently they have no way of judging whether or not they are being treated fairly.

Current market value assessments allows taxpayers to determine if their tax liability is fair (Finnis, 1972; p.7). It imparts a degree of "visibility" to the property tax levy that is otherwise lacking.

"... the property tax should be comparable to the stake a property owner has in his community. We know of no standard other than market value that would accomplish this objective. We know of

no standard that, in the preponderance of cases, is capable of being better understood by more people ... market value is the only basis upon which a property tax system with acceptable criteria of fairness and equity may be built and last." (Blair Report, 1977; p.9)

Assessment at current market value can be accomplished in various ways. The Ontario Assessment Act has listed the most acceptable methods:

- (1) A recent free sale of the property itself where neither the conditions of the property nor the market have since changed;
- (2) Recent free sales of identical properties in the same neighborhood and market;
- (3) Recent free sales of comparable properties;

Since many properties sell infrequently, alternative (1) is not always appropriate. For properties which are unique due location, size, age, function and design, alternatives (2) and (3) are not consistently feasible either. Consequently, the ability of any assessment office to utilize market sales data for valuation purposes may be constrained. The inevitable consequence of this limitation is perhaps best reflected in the following rhyme.

"To find a value good and true  
 Here are three things for you to do  
 Consider your replacement cost  
 Determine value that is lost  
 Analyze your sales to see  
 What market value really should be  
 Now if these suggestions are not clear  
 Copy the figures you used last year."  
 (anonymous)

#### Underassessment of Real Property

Extensive systematic underassessment of properties persists in Ontario (Smith Report, 1967; p.48). This practice is not unique to this

province. Shannon (1967) and Paul (1975), describe the United States system's "chronic inability" to achieve compliance with full-value assessment laws. Studies of assessment-sales ratios within particular municipalities conclude that fractional assessment is a common feature of American and Canadian property tax administration (Black, 1972; Denny and Grainger, 1974; Paul, 1975).

### Rationalizations For Static Fractional Assessments

Persistent underassessment indicates that there are strong forces preventing assessment reform. The most common argument against using market value as the valuation standard upon which the tax is based stems from the belief that "property is selling for more than it is worth". The contention here is that the normal or intrinsic value of property is not represented by the inflated post-World War II prices. Reassessment at current market values could increase the property tax rates to a prohibitive level. If this is the case, conversion to current market value assessment may bring political disaster. Thus, assessments tend to be "frozen" during periods of inflation to shield assessment officials from potential political retribution (Shannon, 1967).

A second argument for fractional assessments is based on the fear that assessment inequities would only be aggravated by blanket increases in local assessment levels. This, however, is not the case. A \$500 error in valuation between two similar properties is less significant as the percentage of market value increases.

Full value assessment is not demanded by the public because they seem to believe they are "getting a break" with fractional assessment

and are afraid to spoil this advantage. Paul (1975), notes that this is just a cruel hoax; yet reassessment is analogous to increased taxes in the minds of the public. The authors of the Blair Report, aware of this antipathy towards potential tax increases, included a recommendation that expenditure guidelines be enforced to ensure that municipalities do not use the reform measures to "camouflage" expenditure increases. They recognized that the blame for the increased taxes would be borne by the provincial government which introduced the reform.

Political arguments against reform seem to be the most tenable in the final analysis. Inevitably reassessment will not be in the interests (real or perceived) of many individuals and groups. These parties are frequently able to apply political pressure to discontinue, amend, or at least delay implementation of the proposed reforms. For the government responsible for assessment administration, it is typically a case of being "damned if they do and damned if they don't."

#### Is the Property Tax Conceptually and Practically Administrable?

The property tax may be the most poorly administered of all taxes (Netzer, 1973a; Nader, 1975). It may not even be conceptually and practically administrable.

"It is very doubtful if assessment can ever be made a completely equitable process; at some stage or another ... the judgement of some person must be relied upon." (Finnis, 1972; p.6)

Geraci (1977), is of the opinion that assessors should be granted some reasonable margin of error "since assessment is not a precise science."

A margin of error of 20 per cent in assessments may be reasonable (Netzer, 1966). Yet, many believe 20 per cent to be too high an error; 5 or 10 per cent are considered more tolerable levels.

"If we discovered such loose performance associated with the administration of the sales tax or income tax we would consider it shocking." (Groves, 1969; p.18)

The 1961 *U.S. Census of Governments* assessment-sales ratio study revealed that only 6 of 47 states examined achieved a coefficient of dispersion less than 20 per cent.<sup>4</sup> The 1971 *U.S. Census of Governments* study on United States cities revealed that only 6 of the 20 largest were within a 20 per cent margin of error. None could boast a 10 per cent margin. In Ontario, the Smith Report's assessment survey revealed that only 6 of 22 municipalities were within the 20 per cent level.

Proposals for improving the administration of the tax have been offered, for example, by Aaron (1969), Smith (1971), S. Hamilton (1972), Paglin and Fogarty (1972), and Muth (1975). Aaron suggests concentration of appraisal effort on those types of properties exhibiting the greatest variation. Muth, suggests implementing a system of self-assessment. Black, Smith, and Hamilton are proponents of mass-appraisal techniques, involving assessment-sales ratio studies complete with multivariate statistical analysis and electronic data processing.

Although the improvement of the administration of the assessment function is thought to have potential social and economic benefits, the costs involved in attaining these improvements may prove to be prohibitive. Geraci (1977) and S. Hamilton (1972), have attempted to outline a

methodology to determine if the costs required to reduce non-uniformity in assessment ratios is justified by the potential benefits. The major conceptual problem according to Geraci, is in measuring the qualitative benefits from reducing the non-uniformity of assessments.

Despite the criticisms of the administration of the property tax many believe that the assessment process can be greatly improved if frequent reassessment at current market value is adopted. Besides which the present collection of the tax is relatively cheap, revenues are virtually assured and it is well suited to the local scene (Blair Report, 1977; p.4). However, the present poor administration of the tax in terms of underassessment and non-uniformity of assessments, its poor "visibility", and its excessive rates, make it questionable as a "good" tax with respect to the administrative principle.

### Social Justice - The Concept of Equity

One of the main principles of taxation outlined by Adam Smith was that a tax should be fair to the taxpayer. Fairness is often referred to as "social justice" or equity, which can be subdivided into horizontal and vertical equity. A good tax should exhibit both types of equity.

### Horizontal Equity

Horizontal equity implies that individuals or residences in the same or similar circumstances be treated in a similar manner. Inequities result when similar circumstances are not treated similarly. Horizontal inequity in the property tax comes from two sources, the intrinsic

characteristics of the tax itself and the administration of the assessment function.

Intrinsic horizontal inequity occurs because the level of consumption of housing varies greatly between those with similar circumstances (Netzer, 1973a). People will invariably invest their wealth in different sources. Since the property tax base now excludes personal property, those with a greater proportion of their wealth invested in real property are discriminated against with respect to their total tax bill. Reduction of one's consumption of housing to reduce the impact of the tax may not be possible for a large number of people. Reform measures such as "circuit-breakers", property tax exemptions and tax credits have been implemented in various places and with varying levels of success to reduce intrinsic horizontal inequity (Shannon, 1973).

The second major component of horizontal inequity which the property tax may exhibit is a result of non-uniformity in assessments. Much of the problem lies with the administration of the assessment function described earlier. It is generally held that systematic assessment inequalities exist within and between classes of property (Smith Report, 1967; Black, 1972; Denny and Grainger, 1974; Paul, 1975). Single-family homes are assessed at a consistently lower fraction of value than apartment buildings. New homes are frequently assessed at higher rates of market value than older homes because of reassessment lag (Black, 1972; Paul, 1975). Houses may be assessed differently because they are unique or uncommon. Assessment variation may exist over space and time simply because valuations were made by different assessors.

Underassessment is believed to contribute to non-uniformity. As



Shannon (1967, p.39) notes, there is ample evidence to prove that as under-assessment increases the uniformity of assessments deteriorates. The implications of this he claims, is that "the lower the assessment level, the larger becomes the administrative graveyard in which the assessor can bury his mistakes." (Shannon, 1967; p.45). Hence, although non-uniformity is not caused by underassessment it is more likely to be prevalent if fractional assessment is maintained.

### Vertical Equity

Vertical equity refers to the treatment of individuals or residences in different circumstances. The two criteria commonly used to evaluate the fairness of the allocation of tax burdens are the benefits received principle and the ability to pay principle. They are somewhat incongruous.

### Benefits Received

The benefits received principle implies that people be liable for the payment of taxes in relation to the use or benefits they receive from public expenditures. This principle is easily administered when it is obvious who is using the service and to what extent. However, it is not always possible to determine who uses public services or what the charges should be. Theoretical discussions of public expenditure charges have been provided by Tiebout (1956), Oates (1969), Musgrave (1959) and Thrall (1975, 1977).

The authors of the Blair Report recommended that:

"... the property tax should be seen purely as a means of spreading the cost of local government

over all the property in the jurisdiction and should not be construed to be a price exacted upon the sale of specific services to specific customers." (Blair Report, 1977; p.5)

Netzer (1973), opposes this idea; he believes that a greater emphasis on "properly designed user charges", (hence a highly visible quasi-user tax) is distinctly superior on efficiency and equity grounds (Netzer, 1973; p.23). The tax is seen to be inequitable to those who pay for services they do not use.<sup>5</sup>

The largest area for instituting user charges lies with educational costs. In Ontario, over one half the property tax yield is spent on education. There is obviously great variation in family sizes, yet the tax levy for education purposes is based solely on real property. The only choice property owners have in Ontario is whether to designate the education levy to the public school or separate (Catholic) school system.

#### Ability to Pay

One reason why user charges for education are not initiated is because this would be regressive with respect to the principle of ability to pay; that is, those who are most able to pay taxes should contribute more than those who are less able to pay. This liability for taxation should be either proportional or progressive with respect to income.

The vertical inequity with respect to ability to pay can be classified as intrinsic to the system itself or caused by the administration of the tax. The intrinsic inequity of the tax occurs because low-income households spend a greater proportion of their income on

housing, out of necessity, than higher-income households. Thus, the burden of the tax is greatest for the lower income groups who are often unable to substantially reduce their consumption of housing (Morton, 1955; Netzer, 1966). Furthermore, the regressiveness of the tax is increased because housing is subject to the law of decreasing costs. Each additional dollar spent on housing as income rises will yield more than the previous dollar. The implications are significant.

"The small man is accordingly penalized in two ways by the law of decreasing costs of housing: first, he must pay relatively more for the housing that he obtains; second, he must pay higher taxes in proportion to the space he occupies." (Morton, 1955; p.71)

If housing taxation decreases the size of houses, then it follows that the unit cost of living space rises and the regressivity of the tax is aggravated further.

Incidence studies in both the United States and Canada support the notion that the tax burden is greatest for the very lowest income groups, becoming more proportional as income rises (Clayton, 1958; Johnson, 1967; Netzer, 1966; Shannon, 1973; Musgrave, 1974).

The state of the art on property tax incidence has been criticized by economists in the past several years. Mieszkowski (1972), Aaron (1975), Gaffney (1973) and Muth (1975) believe that the tax is progressive; in order to gain a perspective of incidence it is necessary to consider the property tax within the total tax system, including both tax liabilities and benefits received from expenditures.

The debate over property tax incidence is not settled. Reviews

of both views of the incidence of the tax are presented by Finnis (1972), Bird (1976) and Paul (1975).

The public and politician's view of the property tax is that it is the most regressive of all taxes (Netzer, 1970). The burden of the blame again falls on the mode of assessment. Almost all the relevant literature cites the differential assessment ratios between low and high value housing as a major cause of property tax regressivity.

One reason for lower value properties being assessed at a higher fraction of market value stems from the ability of the assessors to more accurately value these common properties. Another plausible reason is that of expediency. Assessment appeals from higher income groups are more frequent; thus, in an effort to reduce annoying and potentially troublesome appeals from the more influential ratepayers, assessors systematically assess high value homes more conservatively (Ross, 1971).

Assessment lag is labelled as another cause of regressivity.

"... since assessments change very little over the years, if an area is declining in value, the ratio of assessment to sales will increase, and if an area is increasing in value, the ratio of assessment to sales will decrease."  
(Corsi and Price, 1972; p.143)

This finding is supported by Black (1972) and Peterson *et al.* (1973), who found that the central-city low-income neighborhoods in United States cities were bearing increased property tax burdens as values of their properties underwent a relative decrease over time.

Assessment-sales ratio studies undertaken by Black (1972), Smith (1971) and Paglin and Fogarty (1972) confirmed that much of the vertical

inequity in the property tax is caused by poor administration of the assessment function. The methodology and results of these studies will be reviewed in greater detail in Chapter 4.

The question of which criterion, benefits received or ability to pay, should be used in allocating the property tax burden is a matter of conflicting opinion.

"Probably the most serious weakness of the real property tax arises because few, if any, residents believe that it provides a fair method of allocating the costs of local government. Some believe that local taxes should be allocated to a greater extent according to ability to pay and think that this is not achieved through the real property tax ... Others, holding just the opposite point of view, want a closer relationship between costs and benefits than they think can be achieved through the real property tax." (Smith Report, 1967; p.15)

Indeed, the literature tends to criticize the property tax for holding to neither of these principles (Morton, 1955; Keith, 1966; Aaron, 1969).

Since the consensus of opinion also believes that the property tax exhibits horizontal inequities because of poor administration, the general conclusion is that that the property tax is seriously lacking in social justice.

#### Conclusion to the Chapter

This chapter provided an overview of the property tax and explained why the tax has been the subject of criticism. According to this general evaluation of the property tax, based on the literature, it fails on all principles of political acceptability. Its continuing role as the

prime source of financing local government is attributed to its ease of collection and lack of a substitute revenue base.

Chapter 4 will present a review of the methodological aspects of the literature regarding the use of assessment-sales ratios.

## CHAPTER 4

### ASSESSMENT-SALES RATIO STUDIES - LITERATURE REVIEW

Bird (1976) and Netzer (1970) remark that regardless of how the property tax is viewed as a concept, the administration of the assessment function is a more important factor in deciding the public's perception of the tax. Government based studies in both the United States and Canada reveal a tendency towards underassessment and non-uniformity of assessments (Netzer, 1966; Smith Report, 1967; Musgrave, 1973; Paul, 1975). Failure to achieve compliance with statutory assessments is political expediency; however, non-uniformity is a consequence of using other than market value as the criterion for valuation and the generally poor administration of the assessment function.

The use of assessment-sales ratios to evaluate the administration of the property tax is a salient literature within economics, though only recently introduced to the discipline of geography by Thrall (1977). The *U.S. Census of Governments* has utilized the ratios since World War II; though Canadian use of the ratios has been very meager.<sup>1</sup> The Smith Report's (1967) assessment survey was perhaps the first major attempt to apply the method in Ontario.

The rationale behind the use of these ratios is that the sale price of a property can be used as a surrogate for market value.<sup>2</sup> By forming a ratio of assessed value of a property ( $AV_i$ ) and sale price

( $MV_i$ ), an index can be determined. This simple technique can be a powerful tool for evaluating the uniformity and equity of assessments within and between classes and types of property; municipalities may also be compared by this ratio (Finnis, 1972; Shenkel, 1972; Smith, 1972). It can be used to evaluate individual assessors (Hendon, 1972), and serve as the basis for developing mass-appraisal systems (Smith, 1971; Hinshaw, 1969; Hamilton, 1972; Hamilton and Miller, 1972; Renshaw, 1958).

The minimum information required for an assessment-sales ratio study is: sale price, assessed value and property type (whether industrial, commercial or residential). Inferences about the variation of assessment ratios with respect to price or between types of property and evaluations of the uniformity of the tax can be made from the mean or median assessment ratio,  $\bar{r}$ . The range of descriptive statistics available will allow insight into the distribution of inequities (Shenkel, 1972). The most important statistics that accompany  $\bar{r}$  are the measures of dispersion (Shenkel, 1972; Cheng, 1970). The standard deviation is a commonly used measure of dispersion; large standard deviations imply a great variation in assessment ratios (Smith, 1971). The more useful measures of dispersion are those that can be expressed as a percentage, that is, relative dispersion. These measures allow comparisons to be meaningfully achieved. The coefficient of variation and the coefficient of dispersion are the most widely used. They measure the percentage average deviation of assessment ratios about  $\bar{r}$ . Black (1972, Peterson *et al.* (1973), and Netzer (1966) used the coefficient of determination in their studies, while Paglin and Fogarty (1972), and Paul (1975), used the coefficient of variation. For comparison purposes, both these measures have been



applied in this study. Their relative merits are discussed in Chapter 6.

The criterion for evaluation of the equity of the tax with respect to non-uniformity is based on subjective judgement. Netzer (1966), has espoused a relative dispersion of 20 per cent as a tolerable margin of error. He in turn had accepted this value which had been decided upon by the now classical work of F.L. Bird (1960). Many authors have since accepted this level for no other apparent reason than that Netzer claimed it was reasonable, for example Musgrave (1973) and Peterson *et al.* (1973).

Objections to allowing this level to be considered tolerable have been voiced (Groves, 1969; Smith, 1972; Paglin and Fogarty, 1972; Paul, 1975); however, there is a distinct lack of consensus as to what the more appropriate level should be. To some extent it may depend on the effective tax rate (Geraci, 1977), where the effective tax rate may be defined as  $\bar{r}$  times the local tax rate (Musgrave, 1973). A 10 per cent dispersion was the decision criterion for this study, based on a determination of hypothetical tax burdens described in Chapter 8.

The use of the coefficient of dispersion as a tool for evaluating the property tax administration has itself been subject to criticism (Paglin and Fogarty, 1972; Geraci, 1977; Stewart, 1977; Aaron, 1977). Geraci (1977), claims it does represent a very general value for the level of inequitable assessments but it cannot be considered a surrogate for the level of inequitable tax burdens. Hence, he suggests the use of a tax burden index to supplement the coefficient of dispersion. Aaron (1977), extends this concept, suggesting the development of a dispersion index which assigns higher relative weights to larger assessment errors which he notes create greater inequalities in tax burdens than can be

seen from the simple unweighted coefficient.<sup>3</sup> Paglin and Fogarty (1972) and Stewart (1977), believe that the coefficient of dispersion does not differentiate between the causes of non-uniformity. From a policy-making point of view it is most useful to know whether or not reform should be geared towards improving the quality of assessors or increasing the frequency of reappraisals.

One of the most important and often neglected aspects of conducting a significant assessment-sales ratio study is the treatment of the data (Shenkel, 1972). Collection procedures and the statistical treatment have not been uniform, he notes. The representativeness of the sample and the method of stratifying the data, for example, may exert a substantial influence on the interpretation of the results (Morrison, 1977). Statistical procedures for the design and stratification of the sample for assessment-sales ratio studies have been described by Cheng (1970) and Rackham (1972).

#### Spatial Analysis of Property Tax Inequities and the Use of Multivariate Statistical Techniques

The comprehensive evaluation of the property tax assessment administration requires stratifying sales data according to market value and location and the use of multivariate statistical techniques. The rationale behind stratifying the sample is to reveal systematic assessment inequalities that may occur with respect to price, location and other socio-economic and physical variables. Assessment-sales ratio studies focusing on the spatial characteristics of assessment inequities attempt to show a relationship between locational disadvantages and variables

such as price, income, age and ethnicity (Black, 1972; Smith, 1972; Corsi and Price, 1972; Denny and Grainger, 1974; Paul, 1975).

Black (1972), learned that older and poorer areas, with a high percentage of non-white inhabitants, were overassessed relative to the higher income white districts of Boston. This finding is similar to that found by Paul (1975) and Smith (1971), studying San Francisco and Hartford respectively. They conclude that these results are systematic, not random, features of these cities' assessment administration. Smith contends that much of the assessment inequities are caused by reappraisal lag. The poorer black districts have increased in value less rapidly relative to higher income areas over time, while assessments have remained relatively static. Peterson *et al.* (1973), Corsi and Price (1972) and Paglin and Fogarty (1972) reached similar conclusions.

Peterson *et al.* (1973), analyzing several cities across the United States reveal that this situation is especially prevalent in the older cities of the north-east where central-city property values have steadily declined over time amidst static assessments. These become downward transitional districts. Paul (1975), studying the assessment-sales ratios in several San Francisco districts, revealed that black districts remained overassessed relative to the white districts over time; however, these black districts were characterized by property value increases greater than the city mean and thereby upward transitional in nature. She attributes much of the systematic assessment inequities to racial discrimination.

The advent of electronic data processing has greatly expanded the potential for evaluating and improving property tax assessment administration (Hinshaw, 1969; Hamilton and Miller, 1972; Cole, 1969; Finnis,

1972). Development of mass-appraisal techniques will enable assessors to update assessments more frequently, eliminating inequities caused by reappraisal lag and reducing non-uniformity.

In order for a municipality to improve its assessment administration it must undertake to establish a computerized mass-appraisal system (Aaron, 1969; Hamilton, 1972; Hinshaw, 1969). This has been achieved in such jurisdictions as Lane County, Oregon and Orange County, California.

The purpose of using multiple regression techniques, including analysis of variance and discriminant analysis, is to develop a model for estimating assessed value. For example

$$Y = f(X_i) \quad i = 1, \dots, n \quad n \geq 1 \quad (4.1)$$

where:  $Y$  = assessed value

$X_i$  = characteristics associated with a property

Use of this technique for property taxation purposes was suggested by Renshaw (1958), though not implemented until the late 1960's (Hinshaw, 1969; Smith, 1971; Hamilton and Miller, 1972; Black, 1972; Paglin and Fogarty, 1972).

The use of multiple regression to aid in the market comparable approach to valuation requires the collection of a wide range of variables. Hinshaw (1969), for example, defined 83 variables to be used. The initial cost of mass-appraisal systems may be high, due to the requirement of a complete range of information of all land and housing units to be taxed; however, once the data base is established the costs to maintain the system may not be prohibitive (Smith, 1971; Hamilton, 1972).

Although multivariate techniques are in vogue for property valuation, weaknesses are inherent. Lessinger (1969), criticizes multiple regression techniques used for valuation purposes "because the fundamental assumptions are often contradicted by the actual conditions of the real estate markets." (Lessinger, 1969; p.501). He cites the problems of multicollinearity, heteroscedasticity and "interaction" between the variables as characteristic of real estate assessment studies.

There is an increasing trend towards adoption of mass-appraisal techniques since weaknesses of multiple regression can be corrected by proper model building and data collection. Ontario has examined the possibilities of instituting multivariate techniques to value residential property.<sup>4</sup> It is likely that province-wide institution of mass-appraisal systems will occur in the future.

#### Conclusion to the Chapter

The rationale behind assessment-sales ratio based studies and mass-appraisal techniques, including some of the methodological issues has been briefly presented. Assessment-sales ratio studies should not be viewed as the answer to the problem of assessment inequalities. Rather, careful use of this technique, including multivariate statistical analysis, may help in defining the nature of inequities and in improving the assessment function. Increasing the frequency of reassessment alone should contribute significantly in this regard.

The remainder of this paper is an attempt to apply some of the previously mentioned techniques to reveal the distribution of property tax assessment inequities in Hamilton.

## CHAPTER 5

### DATA DISCUSSION

#### Data Source

The data used for this study was obtained from the 1975-76 Multiple Listing Service (MLS) property transaction files maintained by the Metropolitan Hamilton Real Estate Board. These files are primarily used as a reference source for affiliated real estate firms. I would like to thank the Board for permitting access to these confidential files for research purposes, and S. Littlewood and D. Jambrosic for their help in collecting the information. The funds to finance this project were obtained from McMaster University Research Grant #214-7383.

The information compiled on each property is based primarily on Teela market surveys. Teela Inc. is a private Toronto-based firm which assembles property transaction data for most Canadian metropolitan areas and sells this information to their subscribers, predominantly real estate boards and city planning boards.

#### Comments on the Property Files

Each property listing includes sale price, mortgage details, assessed value, taxes paid, location, lot dimensions, number of rooms and other physical characteristics. This source of data is the best available to researchers in Hamilton. The Hamilton-Wentworth Planning Board will not grant access to their data files; this is a severe limitation of the

Ontario tax system since the public is thereby denied access to information upon which to judge whether or not their taxes are fairly levied.

The Metropolitan Hamilton Real Estate Board data has several limitations for comprehensive research purposes. It is organized by fiscal year and properties are listed in alphabetical order by street name to facilitate locating specific properties; however, it is difficult to compile for areal studies. For example, many of the streets in Hamilton traverse a variety of different districts. Transferring the information to a computer storage system would greatly augment its potential as a source of data for both real estate and research purposes.

A second weakness of this source of data is that many important variables are not listed, such as: date of construction, floor area and historical transaction information. For research purposes, household income would also be a valuable inclusion. The hypothesis that older houses are assessed at a different fraction of value cannot be tested because house age is not known. Inferences about the incidence of the tax must be very general as well. The lack of an in depth list of these variables and descriptive physical characteristics of the dwelling restricts the development of multivariate statistical models to forecast market value for Hamilton properties.

A thorough explanation of the distribution of property tax inequities is somewhat circumscribed by the lack of demographic data; however, an AV/MV ratio study with a large sample can be undertaken to evaluate the administration of the property tax assessment function in Hamilton. The major concern, as Shenkel (1972), maintains, is that the sample used for this type of study must be representative of the area's real

estate market. Representation bias in the sample may influence the outcome of the study. It should therefore be minimized, or at least its potential effects understood.

The major source of bias inherent in the data is that not all the property transactions in a city are listed with M.L.S. affiliated brokers. Thus, the M.L.S. total sample may not represent the true real estate market. New subdivision developments and especially higher value properties have a tendency not to be listed with the M.L.S. (Morrison, 1977). The market for higher value properties is limited to a smaller well-informed group of buyers who are restricted to purchasing within higher valued areas. Furthermore, the extra commission paid to brokers who list the property with the M.L.S. is greater for higher value properties.<sup>1</sup>

Tests on M.L.S. versus non-M.L.S. transactions in other cities have revealed that M.L.S. data slightly under-represents the highest value homes (Becker, 1972; Paul, 1975). However, Morrison (1977), analyzing comparisons between average prices of all Toronto sales and M.L.S. sales revealed that this trend has decreased over time. He suggests that there is a lower propensity for properties in higher value areas to list with the M.L.S. than properties in other areas. However, within areas M.L.S. properties could not be shown to be either "inferior or superior in their attributes from other properties selling within the same area." (Morrison, 1977; p.50).

No tests have been conducted to establish whether the Hamilton scenario is analogous to that of Toronto. The real estate market in Hamilton is different from that of Toronto. For example, if the mean prices of Morrison's (1977) Toronto-based sample and the Hamilton sample



used in this study are compared, Hamilton's mean of \$42,579 is 26 per cent less than Toronto's mean of \$57,581.<sup>2</sup> However, upon comparing the shape of the two distributions, in Figures 5.1 and 5.2, they can be seen to be reasonably similar. This is inconclusive evidence of the level of price-related bias in the Hamilton sample; however, it suggests that whatever biases affect the Toronto M.L.S. data also pertain to Hamilton.

There is an inherent bias in using any property transaction data because the higher-priced properties, which are fewer in number, also sell less frequently.

#### Sampling Procedure and Variables Used

A sample of 572 residential properties were selected for use in this study. The sample included single and multiple-family residential properties; apartment buildings and other types of property were excluded. The sampling was conducted in the following manner. M.L.S. files are arranged in alphabetical order by street name. Starting at the beginning of the file approximately every twentieth property was selected. No attempt was made to achieve a pre-determined sample distribution. The sampling bias was thereby likely to be minimized.<sup>3</sup> The desire to explain spatial patterns of property tax inequities necessitated the relatively large sample.<sup>4</sup>

The following information was recorded from the files: sale price (representing market value), assessed value, lot width and depth, number of bedrooms and total number of rooms. Street addresses were recorded and the properties assigned neighborhood numbers once located, using Hamilton neighborhood maps.<sup>5</sup>

FIGURE 5.1

DISTRIBUTION OF HOUSES SOLD THROUGH M.L.S. IN TORONTO (1975)\*  
AND HAMILTON (1975-76)†

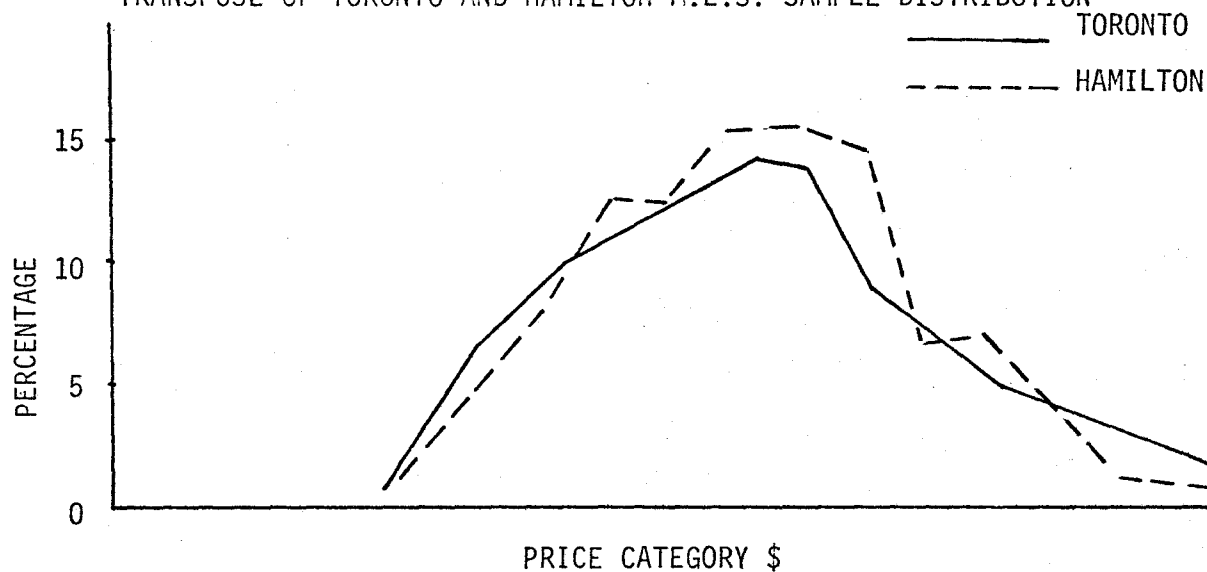


\* SOURCE: Toronto Real Estate Board: "Real Estate Price Trends, 1976" in Morrison, P.; *Data Sources on Residential Change and the Housing Market*, University of Toronto Centre for Urban and Community Studies, 1977, p.29.

† SOURCE: Calculated from 572 M.L.S. Sample Properties in Hamilton.

FIGURE 5.2

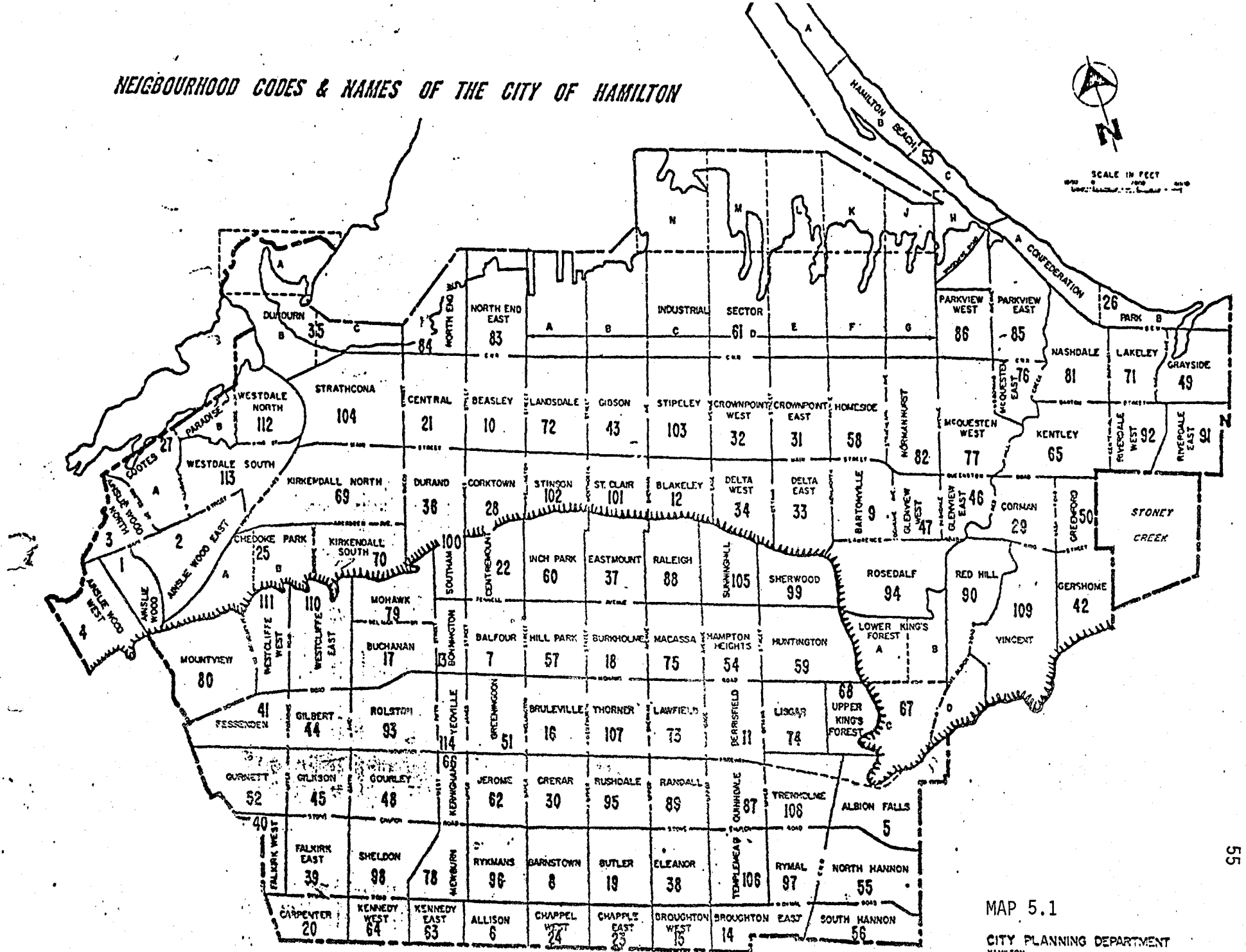
TRANSPOSE OF TORONTO AND HAMILTON M.L.S. SAMPLE DISTRIBUTION



# NEIGHBOURHOOD CODES & NAMES OF THE CITY OF HAMILTON



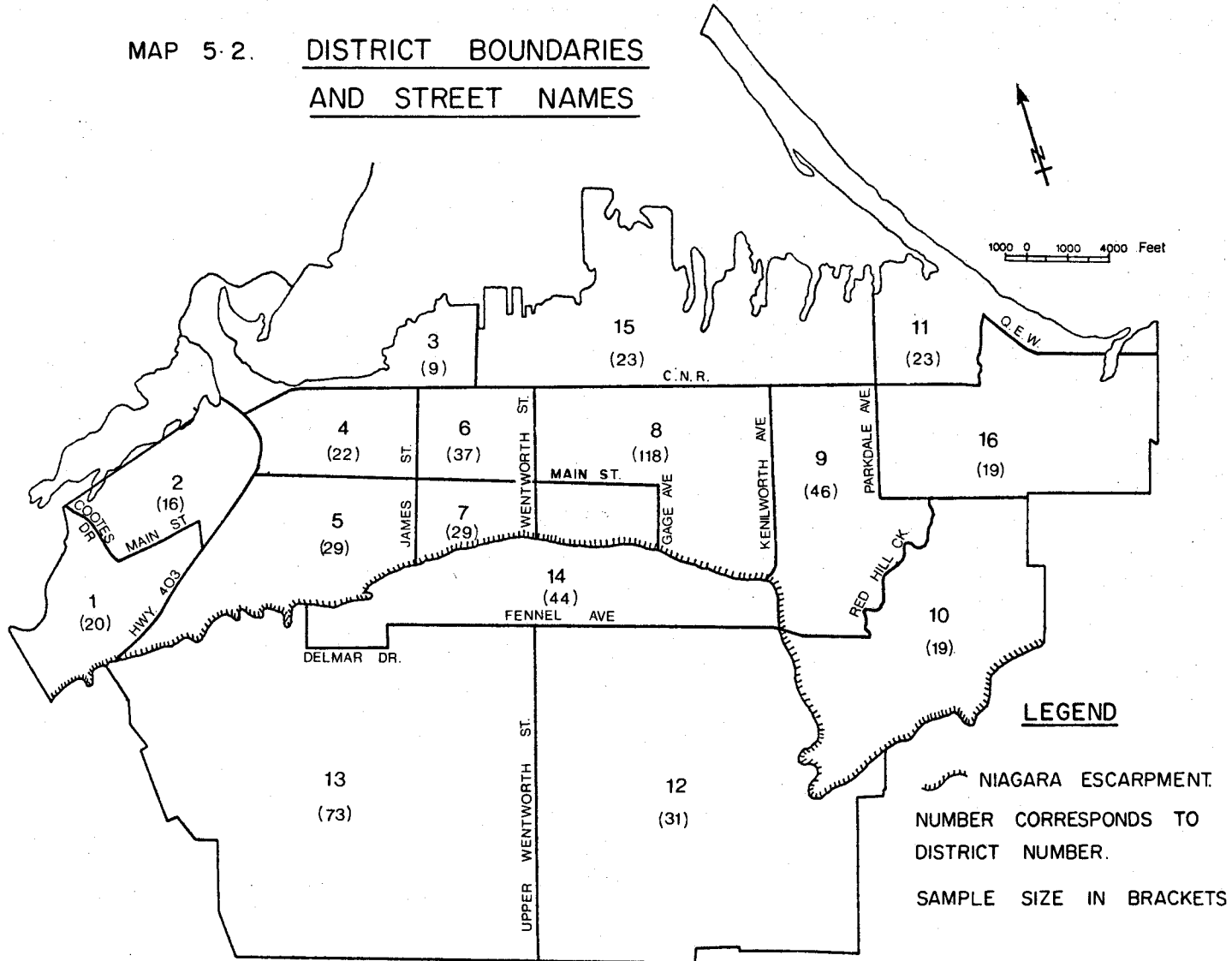
SCALE IN FEET  
 0 100 200 300 400 500



MAP 5.1

CITY PLANNING DEPARTMENT  
 HAMILTON  
 JANUARY 1972

MAP 5-2. DISTRICT BOUNDARIES  
AND STREET NAMES



The total sample was subdivided into 16 districts, according to boundaries delineated by the Hamilton Planning Board, and some conception of homogeneity. The purpose of this subdivision was to facilitate spatial analysis of the data. Map 5.1 is the Hamilton Planning Board's Neighborhood Map, and Map 5.2 reveals the 16 districts which were used for aggregative purposes.

Properties were also categorized into 3 price ranges, (under \$40,000; \$40,000 to \$70,000; over \$70,000) so that price-related effects could be more readily seen. The low value homes are all those below the median value of \$40,488. Since the sample distribution was positively skewed, the price range above the median was much greater than that below. Hence, a third category representing the highest value properties was created.

#### Conclusion to the Chapter

This chapter has outlined the data source and sample design. It has attempted to reveal the potential weaknesses in the data, with respect to the representativeness of the sample and the variables that could not be included. Stratification of the sample according to market value and location should allow the hypotheses regarding the distribution of property tax inequities to be evaluated.

## CHAPTER 6

### FRAMEWORK FOR ANALYSIS

#### Assessment-Sales Ratios and Measures of Relative Dispersion

This study consists of a basic assessment-sales ratio statistical analysis, including measures of central tendency and dispersion. These statistics are derived according to the function:

$$\bar{r} = \sum_{i=1}^n \frac{(AV_i/MV_i)}{N} 100 \quad (6.1)$$

where:  $\bar{r}$  = mean assessment-sales ratio expressed as a percentage

$AV_i$  = assessed value of property  $i$

$MV_i$  = market value of property  $i$

$N$  = sample size

Subdividing the sample according to the 3 classes of market value will allow useful comparisons between the classes, especially with respect to the measure of central tendency. A standard test of sample means will reveal whether or not any computed difference in the mean assessment ratio ( $r_p$  where  $p = 1, 2$  or  $3$ ) between price classes is significant. If this is the case, then this indicates differential tax burdens.

The dispersion of  $AV_i/MV_i$  values about the mean or median should reflect the level of non-uniformity of assessments that exists. Measures of absolute dispersion, for example the range and standard deviation are

available as descriptive statistics from equation 6.1. The more useful measures of relative dispersion, the coefficient of variation and the coefficient of dispersion are computed as well. The coefficient of variation reveals the standard deviation as a per cent of the mean. It is expressed as:

$$v = \frac{S\bar{r}}{\bar{r}} (100) \quad (6.2)$$

where:  $S\bar{r}$  = the standard deviation of  $\bar{r}$

$\bar{r}$  = the sample mean assessment-sales ratio

$v$  = the coefficient of variation expressed as a percentage

The coefficient of dispersion measures the average deviation as a per cent of the mean or median. It is computed as follows:

$$AD = \frac{\sum_{i=1}^n |(AV_i/MV_i) - \bar{r}|}{N} \quad (6.3)$$

$$d = \frac{AD}{\bar{r}} (100) \quad (6.4)$$

where:  $|(AV_i/MV_i) - \bar{r}|$  = the absolute difference between the assessment-sales ratio of property  $i$  and the mean or median ratio  $\bar{r}$

$AD$  = average deviation

$d$  = the coefficient of dispersion expressed as a percentage

$N$  = sample size

Each of these two measures has given advantages. The coefficient of variation is superior in the sense that it utilizes the standard deviation which has more desirable statistical properties than the simpler average deviation. For sample distributions,  $S\bar{r}$  represents an unbiased estimate of the population variance.

The more commonly used coefficient of dispersion has the advantage of substituting the median assessment-sales ratio for the mean ratio. The median ratio is frequently considered the more appropriate measure of central tendency because it is less affected by extreme values. Both measures will be calculated for each price class to establish whether or not non-uniformity varies amongst price classes of property, and which price class is most accurately assessed. Reduction in the city level of non-uniformity might most effectively be accomplished by a concentration of efforts in improving assessments where they are presently the worst.

#### Least Squares Regression Analysis

Bivariate and multiple linear regressions were used to elucidate the distribution of property tax assessment inequities. These models are of the form:

$$Y = b_0 + b_1X_1 + \dots + b_nX_n + \epsilon \quad (6.5)$$

where:  $Y$  = the dependent variable

$X_i$  = the various independent variables

$b_i$  = the regression coefficients determined so as to minimize  $\epsilon$

$\epsilon$  = the unexplained variance



Where  $b_i$  is positive (negative), it implies that an increase of 1 unit of  $X_i$  will have the effect of increasing (decreasing)  $Y$  by the corresponding value of  $b_i$ .

Least squares regressions have been utilized for two main purposes in this study; to help determine the strength of any price-related inequities and to ascertain the criteria upon which assessed value has been based.

The regressions to be used are:

- 1) Assessed value as the dependent variable and market value as the independent variable. This will determine the degree to which assessed value is explained by market value. Using the coefficient of determination,  $R^2$ , a value approaching 1 indicates that a large percentage of the variation in assessed values can be explained by market value. A perfectly equitable assessment system where all properties are assessed at a constant level of market value would thus be characterized by an  $R^2$  of 1.
- 2) Assessed value as the dependent variable and the following property characteristics as the independent variables: number of bedrooms; total number of rooms; lot width; lot depth; lot area. A stepwise multiple linear regression should help reveal what characteristics of a property are most influential in explaining assessed value.
- 3) Assessment-sales ratio of a property ( $AV_i/MV_i$ ) as the dependent variable and the identical list of independent variables as in 2) above. Pearson correlation coefficients are derived to help explain why assessment-sales ratios vary.

These regressions have been conducted for each price (MV) class as well as for the pooled city sample to permit a greater understanding of the underlying patterns.

### Analysis of Variance (Anova)

A one-way analysis of variance is used to examine the spatial distribution of assessment-sales ratios. This technique is similar to multiple regression analysis except that instead of a set of independent variables to explain the variation of assessment ratios, a factor (not measured on an interval scale) is used. In this study, the effect of location on  $(AV_i/MV_i)$  is being tested. The model can be expressed in the general form:

$$Y_{k_i} = \alpha_k + \epsilon_{k_i} \quad (6.6)$$

where:  $Y_{k_i}$  = the assessment ratio  $(AV_i/MV_i)$  of the  $i$ th property of the  $k$ th district

$\alpha_k$  = the mean assessment ratio  $(r_k)$  for the  $k$ th district

$\epsilon_{k_i}$  = the random error

The basic test involved is whether or not there is any significance between the various district means and the city mean. Thus, a null hypothesis is set us as follows:

$$H_0 (\alpha_1 = \alpha_2 = \alpha_3 = \dots = \alpha_k = \alpha) \quad (6.7)$$

where:  $H_0$  represents the null hypothesis

$\alpha_k$  = the mean assessment ratio for district  $k$  ( $r_k$ ) where  
 $k = 1$  to  $16$

$\alpha$  = the city mean assessment ratio ( $\bar{r}$ )

If the null hypothesis is accepted, this implies that the assessment-sales ratios do not vary significantly between districts. If the null is refuted, then these ratios are related to location. The pattern of districts which are under or over-assessed relative to the city mean ( $\bar{r}$ ) can be determined. Analysis of variance with market value as the dependent variable and location (district) as the independent factor has been included to aid in the explanation of the patterns of assessment ratios and coefficients of variation for each district have been computed, to see if non-uniformity varies over space.

#### Conclusion to the Chapter

This chapter has established the framework for which the analysis will be conducted. The assessment-sales ratios of the sample are the basis for the study; the associated statistical analysis is intended to elucidate the distribution and patterns of property tax assessment inequities. The analysis of the data will be conducted in Chapter 7. Chapter 8 will provide a series of illustrations of potential property tax burdens that the data analysis reveals may exist.

## CHAPTER 7

### DATA ANALYSIS

#### Vertical Administrative Inequity

Tables 7.1 through 7.4 summarize the relevant descriptive statistics derived from the S.P.S.S. (*Statistical Package for the Social Sciences*) program *Frequencies*, for the total city sample and the 3 market value classes. For the entire pooled sample, Table 7.1 reveals a mean market value of \$42,579, reasonably close to the mean value of \$44,400 presented in P. Barnard's (1976) study of the Hamilton housing market.<sup>1</sup> The very high kurtosis reveals a distribution which is highly concentrated about the mean. The positive skewness of the distribution indicates that there is a greater number of properties at the low end of the market than at the high end. These figures are in line with our intuitive perception of the local real estate market.

The city mean assessment ratio ( $\bar{r}$ ), is 10.4%. This mean ratio varies for each of the 3 market value classes; 10.6% for the lower value, 10.3% for the medium value and 9.0% for the higher value properties respectively. A test of the means reveal they were significantly different.

$F = 4.64$  degrees of freedom (2,551) confidence level = .99  
Thus, as the market value class increases assessed value as a percentage of market value decreases.

To determine the significance of the relationship between the assessment ratios ( $AV_i/MV_i$ ) and market value (MV) a simple regression of

Table 7.1  
Statistics For City Sample

<u>(N = 572)</u> <u>Statistic</u>	<u>Market Value</u> <u>(MV)</u>	<u>Assessed Value</u> <u>(AV)</u>	<u>Assessment</u> <u>Ratio (r)</u>
mean	42,579	4,347	10.4
median	40,488	4,190	10.2
kurtosis	7.68	11.01	3.67
skewness	1.92	2.15	.95
minimum	12,000	1,120	2.75
maximum	159,000	20,220	25.50
stand. dev.	17,397	1,906	2.46

Table 7.2  
Statistics For Market Value Range 12,000 to 40,000

<u>(N = 285)</u> <u>Statistic</u>	<u>Market Value</u>	<u>Assessed Value</u>	<u>Assessment</u> <u>Ratio</u>
mean	30,283	3,166	10.6
median	30,987	3,010	10.3
minimum	12,000	1,120	4.5
maximum	40,000	6,800	25.50
stand. dev.	6,632	961	2.84

Table 7.3

Statistics For Market Value Range 40,000 to 70,000

<u>(N = 257)</u> <u>Statistic</u>	<u>Market Value</u> <u>(MV)</u>	<u>Assessed Value</u> <u>(AV)</u>	<u>Assessment</u> <u>Ratio (<math>\bar{r}</math>)</u>
mean	50,300	5,172	10.3
median	48,904	5,028	10.2
minimum	40,300	1,540	3.5
maximum	69,900	10,030	18.98
stand. dev.	7,145	1,152	1.86

Table 7.4

Statistics For Market Value Range 70,000 and over

<u>(N = 30)</u> <u>Statistic</u>	<u>Market Value</u>	<u>Assessed Value</u>	<u>Assessment</u> <u>Ratio</u>
mean	91,622	8,539	9.0
median	82,000	7,660	9.5
minimum	72,500	1,830	2.75
maximum	159,000	20,220	13.48
stand. dev.	7,145	3,679	2.71

Table 7.5

Correlation Between Assessment-Sales Ratios and Market Value

<u>Market Value Class</u>	<u>R*</u>	<u>Significant at .05</u>
12,000 to 40,000	-.27	yes
40,000 to 70,000	-.06	no
70,000 and over	.07	no
Total sample	-.17	yes

$$R^2 \text{ for total sample} = .03 \quad (AV_i/MV_i) = 11.49 + -.257E - 04 MV_i$$

$$F = 19.4 \quad \text{Significance} = .001 \quad (T = -4.4)$$

R\* is the Pearson Correlation Coefficient

Table 7.6

Comparison of Measures of Dispersion of Assessment-Sales Ratios

<u>Statistic</u>	<u>Market Value (MV) (12,000 to 40,000)</u>	<u>MV (40,000 to 70,000)</u>	<u>MV over 70,000</u>	<u>Total Sample</u>
mean $\bar{r}^*$	10.6	10.3	9.0	10.4
median $\bar{r}^*$	10.3	10.2	9.5	10.2
Range	21.0	16.4	10.7	22.75
Stand. dev.	2.84	1.86	2.71	2.47
v†	26.8	18.0	30.0	23.7
d††	21.1	13.4	19.6	17.6

\*  $\bar{r}$  = the measure of central tendency of assessment-sales ratios (%)

† v = the coefficient of variation (%)

†† d = the coefficient of dispersion (%)

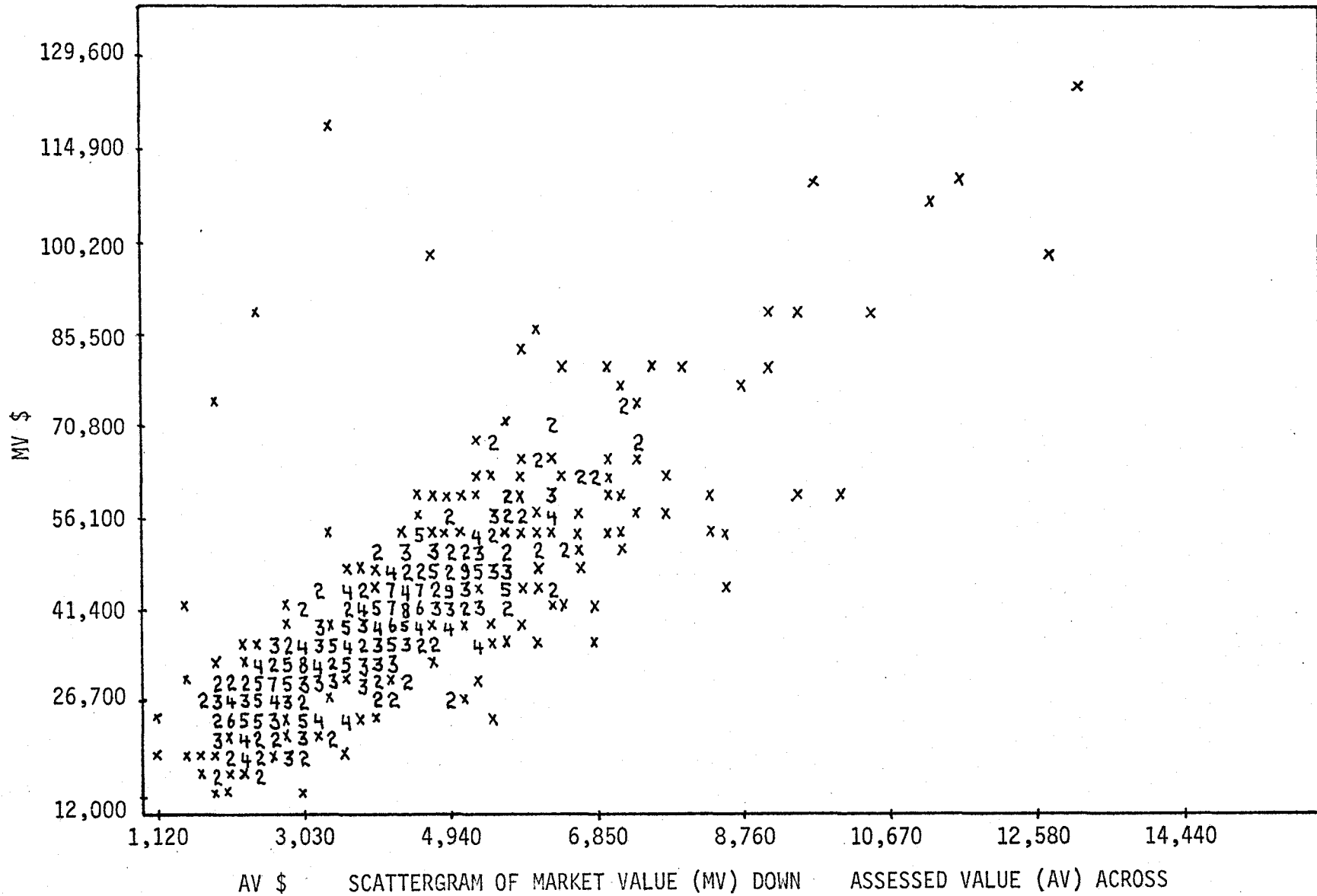


FIGURE 7.1



$(AV_i/MV_i)$  on  $(MV)$  was obtained for the entire sample and each market value class. The results are tabulated in Table 7.5. For the total sample, a negative correlation between assessment ratios and market value exists; however, a correlation of  $-.17$  does not indicate a strong relationship. The  $R^2$  value of  $.03$  reveals that only a slight variation in assessment ratios can be explained by market value. Hence, the vertical administrative inequity of the tax appears to be minimal. This is more evident when comparing the median assessment ratios for the 3 price classes; 10.3%, 10.2% and 9.5% respectively, which exhibit less variation than the mean assessment ratios. However, if the sample of high value properties were more equally represented, then the  $R^2$  value would likely increase, as the highest value properties are apparently assessed at a lower percentage of market value. The potential effect on tax burdens will be presented in Chapter 8.

#### Horizontal Administrative Inequity

The existence of non-uniformity of assessment ratios can be seen in Figure 7.1. Table 7.6 summarizes the statistics computed to reveal the dispersion of assessment ratios. The range of ratios for the entire sample was a very substantial 23% (minimum - 2.75; maximum - 25.5). The measures of relative dispersion, the coefficient of variation ( $v$ ) and the coefficient of dispersion ( $d$ ) are given. Regardless of which measure is selected, the pre-established tolerance level of a 10% margin of error is exceeded; the pattern between market value classes remains reasonably consistent. The city assessment department would fare better by using the coefficient of dispersion since this implies a lower variation in

assessment ratios. Proponents of assessment reform, critical of present tax administration, would undoubtedly utilize the higher values observed from the coefficient of variation. Both measures have different claims of representation of the sample. The implications for tax burdens are shown in Chapter 8.

There is a noticeable difference between non-uniformity and market value class. The coefficients of variation are: 26.8% for the \$12,000 to \$40,000 price range; 18.0% for the \$40,000 to \$70,000 price range; and 30.0% for the over \$70,000 properties. This pattern appears to conform to standard observations in the literature; the middle range of property values exhibit a greater uniformity of assessments than either the lower or higher value properties. The reason for this is that the medium value properties are easier to value. They are presumably the most common and most homogeneous.

#### Criteria for Assessments

A bivariate regression of assessed value ( $AV_i$ ) with market value ( $MV_i$ ) for the entire sample yields an  $R^2$  of .70.

$$AV_i = 456 + .091 MV \quad (F = 1302; \text{Sig.} = .001)$$

Standard deviation (1053.8)

This indicates that 1 - .70, or 30% of the variation in assessments can be explained by variables *other* than market value. According to the mandate of assessment at current market value this is not an acceptable situation.

In order to determine the influence of certain factors on assessed value, stepwise multiple linear regressions were run with the set of property characteristics described in Chapter 6 as independent variables. The lack of a range of reasonable variables limits the scope of this analysis; however, comparison of the available variables according to market value class is revealing. The summary of these regressions are presented in Tables 7.7 - 7.10.

The percentage of the variation of assessed values explained by these 5 variables varies noticeably by market value class.<sup>2</sup> The highest price category had an  $R^2$  of .81, whereas it was only .26 and .28 for the lower price classes. Thus, it appears reasonable to assume that assessors consider these variables more closely when assessing the higher value properties, especially the number of rooms. Presumably the higher value properties which are less common and tend to be more unique are more difficult to assess. This is supported by the high level of dispersion (Table 7.6). It is entirely possible that in recognition of the difficulty in reaching an accurate measure of value for these properties, assessors rely more heavily on the simple measures, such as the number of rooms.<sup>3</sup> The consistent dominance of this variable certainly implies that it is an important measure of value. For the entire sample, an increase of an additional room would have the effect of increasing the assessed value of a typical property by \$486, as shown by the estimated regression coefficient in step 5 of Table 7.7.

In order to help explain the non-uniformity in assessments, the correlation between assessment ratios and several variables have been computed and are presented in Table 7.11. The strongest correlation

Table 7.7

Stepwise Multiple Regression For City Sample:Dependent Variable: Assessed Value (AV)

<u>(N = 572)</u> <u>Step</u>	<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>Standard Error</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Sig.</u>
1	intercept	618.5	245.3			
	# of rooms	556.1	35.4	.31	246	.001
2	intercept	-332	240.4			
	# of rooms	533.5	32.4			
	lot width	28.2	2.6	.43	204	.001
3	intercept	-409	241.6			
	# of rooms	529.8	32.2			
	lot width	36.1	4.0			
	lot area	-.44E-01	.2	.43	140	.001
4	intercept	-1417.7	310.9			
	# of rooms	512.4	31.7			
	lot width	45.8	4.4			
	lot area	-.13	.2			
	lot depth	10.34	2.1	.46	116	.001
5	intercept	-1466.3	314.4			
	# of rooms	486.2	40.6			
	lot width	45.7	4.4			
	lot area	-.13	.2			
	lot depth	10.3	2.1			
	# of bedrooms	72.8	70.4	.46	93	.001

Table 7.8

Stepwise Multiple Regression For Market Value Range12,000 to 40,000: Dependent Variable: Assessed Value (AV)

<u>(N = 285)</u> <u>Step</u>	<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>Standard Error</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Sig.</u>
1	intercept	1249	233.2	.20	67.6	.001
	# of rooms	293.5	35.7			
2	intercept	594	318.1	.22	39.9	.001
	# of rooms	290.7	35.1			
	lot depth	7.3	2.3			
3	intercept	413.7	323.5	.24	29.2	.001
	# of rooms	290.6	34.8			
	lot depth	7.3	2.3			
	lot width	6.1	2.5			
4	intercept	-380	475.4	.26	23.5	.001
	# of rooms	285.4	34.6			
	lot depth	15.6	4.3			
	lot width	33.1	12.2			
	lot area	-.27	.1			
5	intercept	-377	474.5	.26	19.3	.001
	# of rooms	239.1	47.6			
	lot depth	15.6	4.2			
	lot width	34.1	12.2			
	lot area	-.27	.1			
	# of bedrooms	92.7	65.5			

Table 7.9

Stepwise Multiple Regression For Market Value Range40,000 to 70,000: Dependent Variable: Assessed Value (AV)

<u>(N = 257)</u> <u>Step</u>	<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>Standard Error</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Sig.</u>
1	intercept	3390	246.3			
	# of rooms	265.3	35.4	.18	56.0	.001
2	intercept	2428	326.2			
	# of rooms	290.7	34.7			
	lot width	18.0	4.2	.24	39.3	.001
3	intercept	2599	363.0			
	# of rooms	227.9	43.7			
	lot width	18.8	4.2			
	# of bedrooms	165.6	86.5	.27	22.3	.001
4	intercept	2586	363.6			
	# of rooms	228.3	43.7			
	lot width	22.6	6.2			
	# of bedrooms	165.7	86.5			
	lot area	-.32E-01	.04	.27	18.0	.001
5	intercept	2241	428.5			
	# of rooms	223.2	43.7			
	lot width	29.0	7.4			
	# of bedrooms	163.5	86.3			
	lot area	-.85E-01	.05			
	lot depth	3.3	2.2	.28	15.4	.001

Table 7.10

Stepwise Multiple Regression For Market Value Range  
Over 70,000: Dependent Variable: Assessed Value (AV)

<u>(N = 30)</u> <u>Step</u>	<u>Independent Variable</u>	<u>Regression Coefficient</u>	<u>Standard Error</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Sig.</u>
1	intercept	-1190	1137.3			
	# of rooms	1021.7	113.9	.76	80.4	.001
2	intercept	-2010	1468.3			
	# of rooms	1045.8	117.6			
	lot width	7.8	8.7	.77	40.3	.001
3	intercept	-2178	1450.6			
	# of rooms	984.9	124.4			
	lot width	27.0	16.8			
	lot area	-.51E-02	.04	.79	28.3	.001
4	intercept	-4435	2033.6			
	# of rooms	992.4	120.9			
	lot width	50.6	22.4			
	lot area	-.15	.07			
	lot depth	11.4	7.4	.81	17.9	.001
5	intercept	-4636	2107.0			
	# of rooms	959.2	139.5			
	lot width	52.1	22.9			
	lot area	-.15	.07			
	lot depth	11.6	7.5			
	# of bedrooms	105.0	207.9	.81	17.9	.001

Table 7.11  
Correlation Between Assessment-Sales Ratios  
and Selected Variables†

	Market Value (MV) 12,000 to 40,000	MV 40,000 to 70,000	MV over 70,000	Total Sample
Market value	-.27*	-.06	.07	-.17*
Number of rooms	.49*	.42*	.71*	.38*
Number of bedrooms	.37*	.32*	.33*	.31*
Lot width	.07	-.01	-.44*	-.07
Lot depth	.03	.04	-.66*	-.11*
Lot area	.06	-.04	-.66*	-.17*

† correlation determined by Pearson Correlation Coefficients

\* asterisked coefficients significant at .05 or better

Table 7.12  
Lot Size Characteristics

Market value class	Mean lot area	minimum	maximum	Standard deviation
12,000 to 40,000	2,943	600	34,560	2,241
40,000 to 70,000	4,916	1600	21,912	2,477
over 70,000	13,814	1386	97,500	19,632
Total sample	4,376	600	97,500	5,438

\* Lot area measured in square feet. Computed by multiplying (lot width) x (lot depth).



with assessment ratios for each market value class was the number of rooms, a further indication of the importance of this variable in determining assessed value. Perhaps the most revealing information with respect to why non-uniformity in assessments may exist are the lot size characteristics. For the two lowest market value classes, the correlation between assessment ratio and lot size is insignificant (thus, lot size contributes little to non-uniformity). However, the correlation is significantly negative for the highest value properties. Thus, as lot size increases for the highest value houses, the assessment ratio actually tends to decrease. It would appear that land is given very little consideration when assessing property, especially lot depth. Yet land prices have increased at a greater rate than any other cost influencing the price of housing, and represent the single largest component of new housing costs (Spurr, 1976; ch. 2).

As evident in Table 7.12 the mean lot area increases with each price class. Yet, as seen in Table 7.7, an increase in lot area has the effect of reducing the assessed value of a property (negative regression coefficient). Hence, the tendency to underestimate land contributes significantly to the non-uniformity of assessments and may well be an important part of the regressivity of assessments, as witnessed by the lower assessment ratios in the highest market value classes.

#### The Spatial Distribution of Administrative Inequities - Analysis of Variance

The results of the analysis of variance on market value and assessment-sales ratios, with respect to the 16 districts, are summarized in Table 7.13. The computed F - statistic of 5.59 with degrees of freedom (15,542) was significant at the .001 confidence level. Thus, the null

hypothesis that the district means are not significantly different from the city mean can be refuted. From this we can infer that the mean assessment-sales ratio will differ between districts.

Map 7.1 reveals this distribution of mean assessment ratios. A significant pattern emerges. The districts on the waterfront and near the Central business district (CBD) have mean assessment ratios greater than the city mean. These are the older, most deteriorated residential areas of the city. The waterfront of Hamilton has a high concentration of heavy industry, creating obvious negative externalities for residential dwellings (see Map 7.4). Conversely, those districts with a mean assessment ratio less than the city mean are relatively newer or more pleasant residential areas located peripheral to the city center and the waterfront. This includes the prestigious west end, the new developments of the east end, and the recent subdivisions on top of the Niagara Escarpment (Hamilton Mountain).

The distribution of market values can be seen in Map 7.2. The pattern observed changes very little. Of the 7 districts which are relatively over-assessed, 6 have mean property values less than the city mean. District 5's high mean property value can be attributed to several very high value properties on Bay Street and south of Aberdeen Avenue proximate to the escarpment.<sup>4</sup> Correspondingly, 7 of the 9 districts which are relatively underassessed have mean property values greater than the city mean.<sup>5</sup> Thus, the correlation between district "quality" and mean assessment ratio is evident. Although the lack of a strong positive relationship between market value and assessment ratios implied little systematic vertical inequity, the clear spatial pattern noted above reveals

Table 7.13  
Analysis of Variance (Market Value, Assessment-Sales  
Ratios by District)

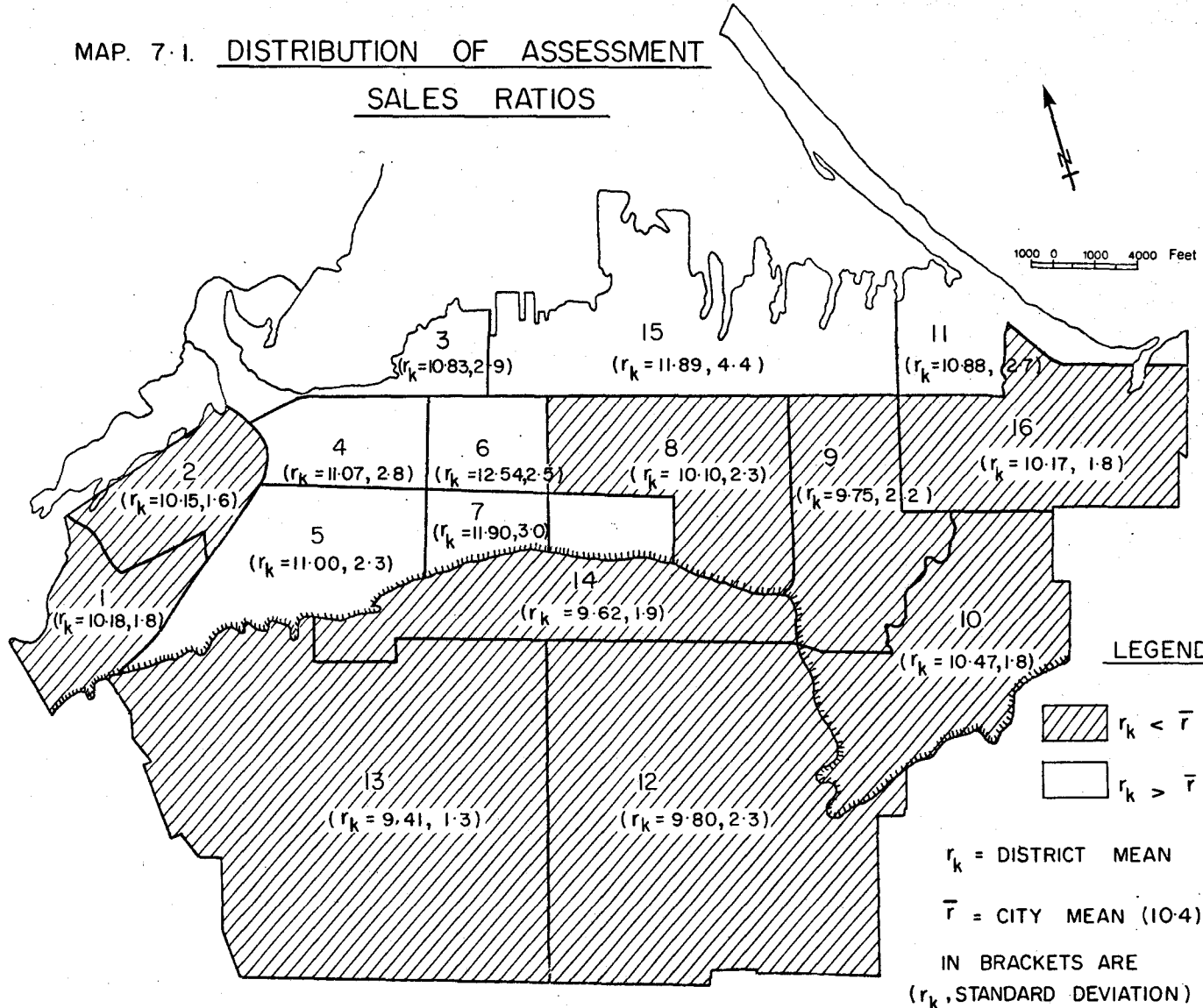
District	Sample Size	Mean Market Value	$r_k^*$	Sr†	Min. $r_i$	Max. $r_i$	Range $r_i$	v††
1	20	51,932	10.18	1.8	7.22	13.81	6.59	17.7
2	16	49,518	10.15	1.6	7.78	13.49	5.71	16.1
3	9	23,800	10.83	2.9	6.44	16.39	9.85	27.0
4	22	29,895	11.07	2.8	5.22	16.99	11.77	25.4
5	29	56,065	11.00	2.3	5.69	15.23	9.54	20.9
6	37	36,662	12.54	2.5	8.48	18.98	10.50	20.2
7	29	28,403	11.90	3.0	8.34	21.81	13.46	25.2
8	118	34,420	10.10	2.3	3.50	16.89	13.39	22.4
9	46	38,278	9.75	2.2	5.84	15.24	9.40	22.4
10	19	60,836	10.47	1.8	7.68	16.20	8.52	17.6
11	23	34,723	10.88	2.7	7.17	18.26	11.09	24.7
12	31	54,358	9.80	2.3	2.75	13.44	10.69	24.1
13	73	54,938	9.41	1.3	4.93	12.23	7.30	14.2
14	44	46,731	9.62	1.9	6.81	15.61	8.80	19.8
15	23	25,682	11.89	4.4	6.48	25.50	19.02	37.4
16	19	48,715	10.17	1.8	6.66	15.44	8.78	17.7
City	572	42,579	10.40	2.5	2.75	25.50	22.75	23.7

\*  $r_k$  = district mean assessment-sales ratio

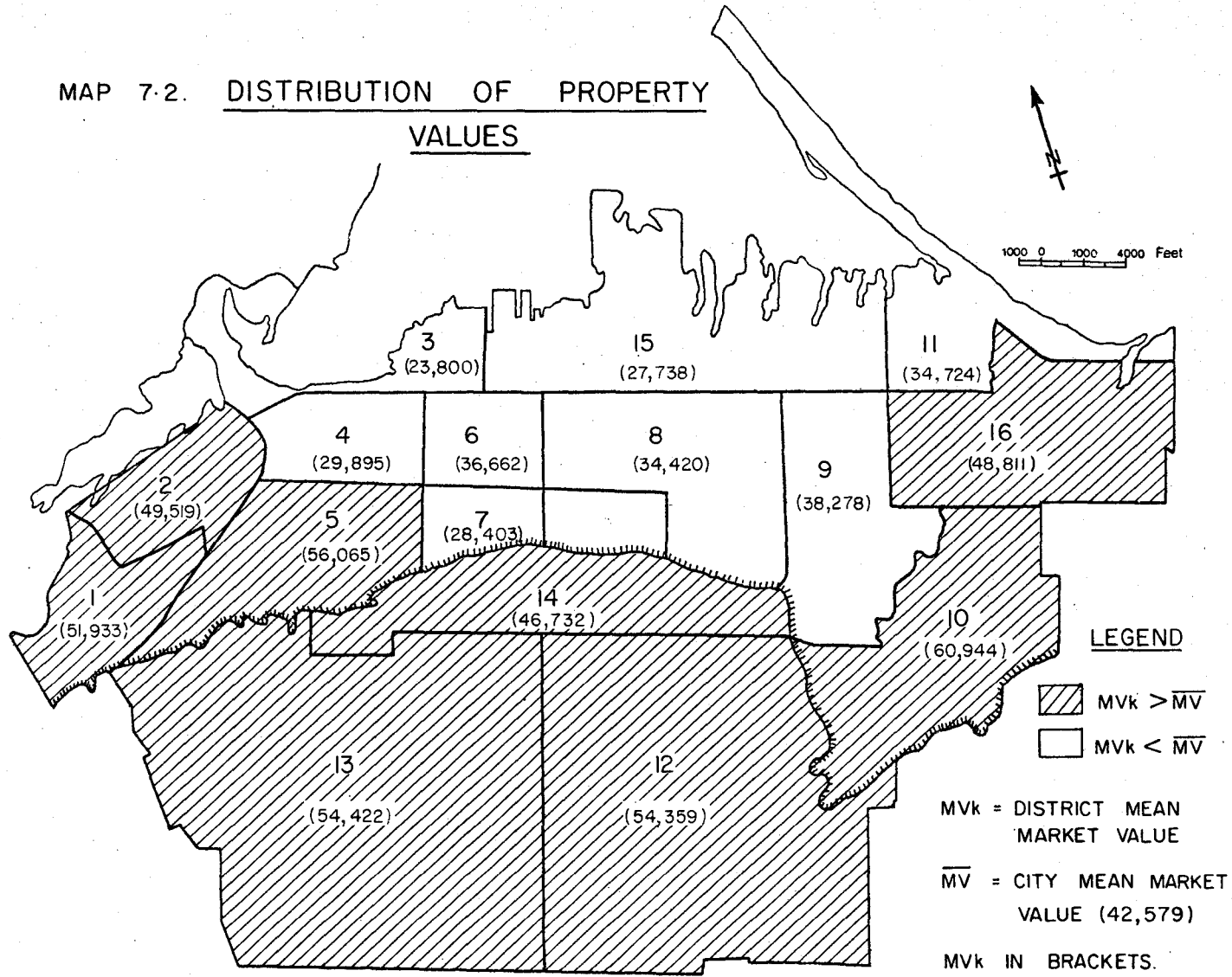
† Sr = standard deviation of assessment-sales ratios ( $r_i$ )

†† v = coefficient of variation (a measure of relative dispersion)

MAP. 7-1. DISTRIBUTION OF ASSESSMENT  
SALES RATIOS

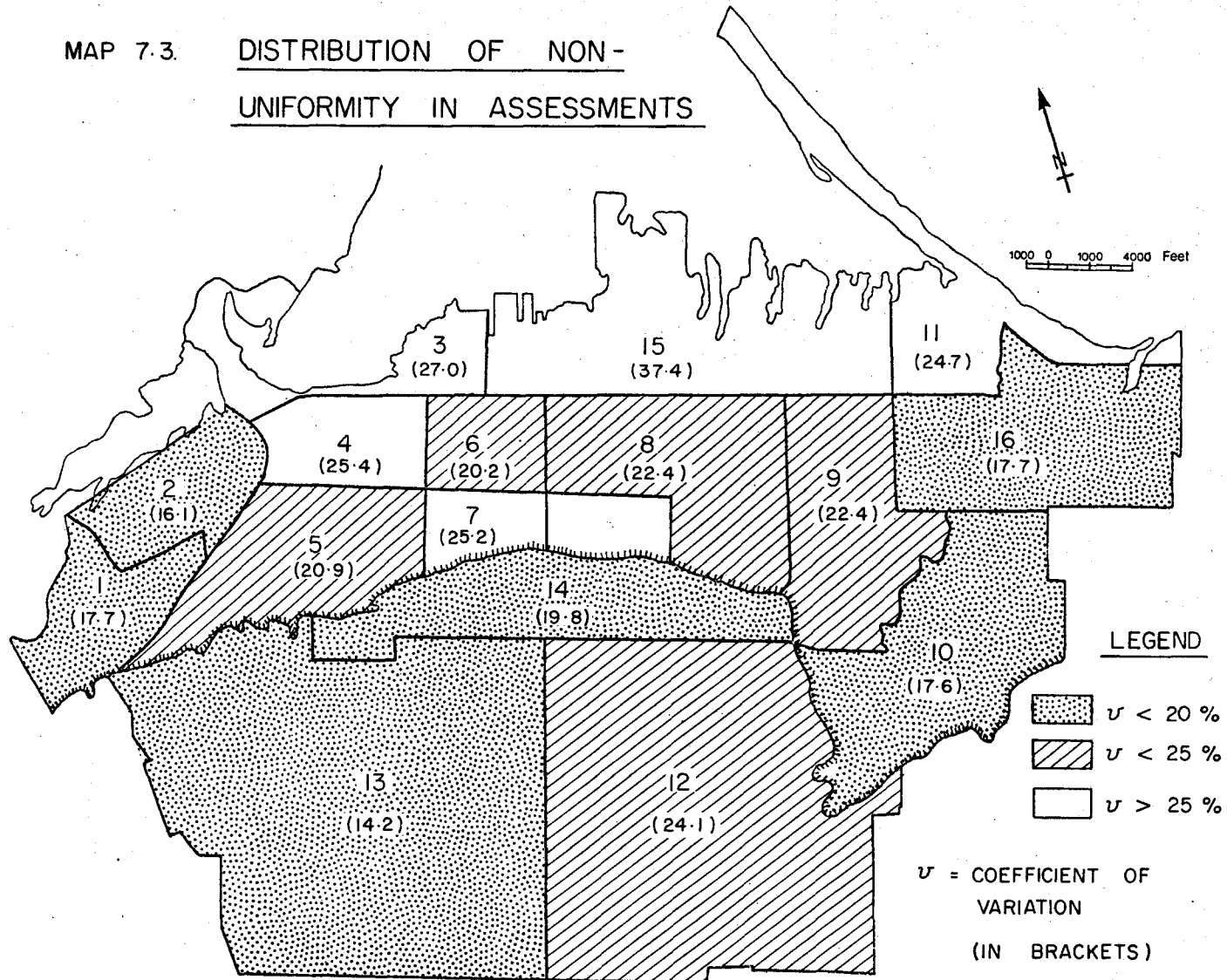


MAP 7-2. DISTRIBUTION OF PROPERTY VALUES



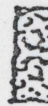



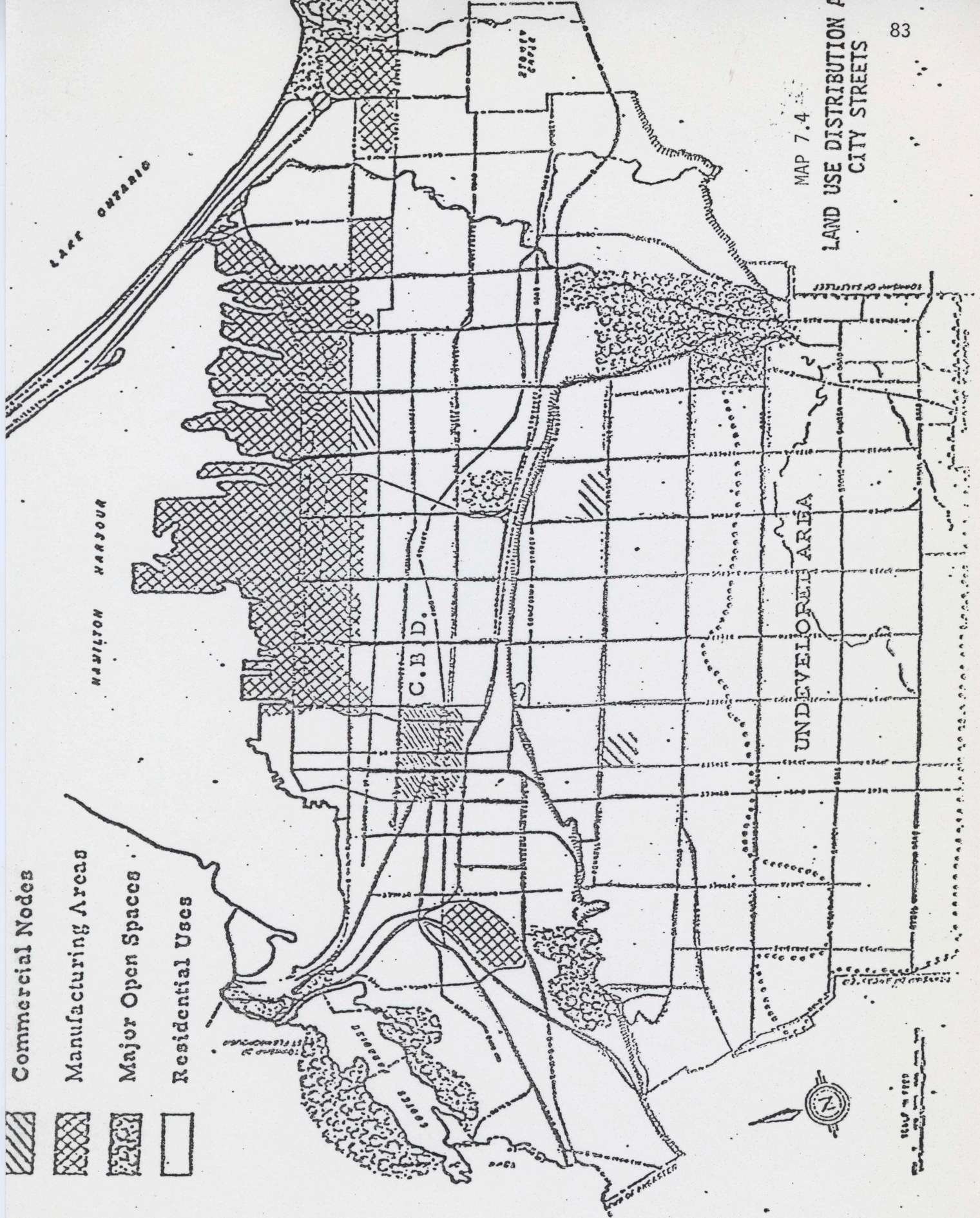
MAP 7.3.

DISTRIBUTION OF NON-  
UNIFORMITY IN ASSESSMENTS





-  Commercial Nodes
-  Manufacturing Areas
-  Major Open Spaces
-  Residential Uses



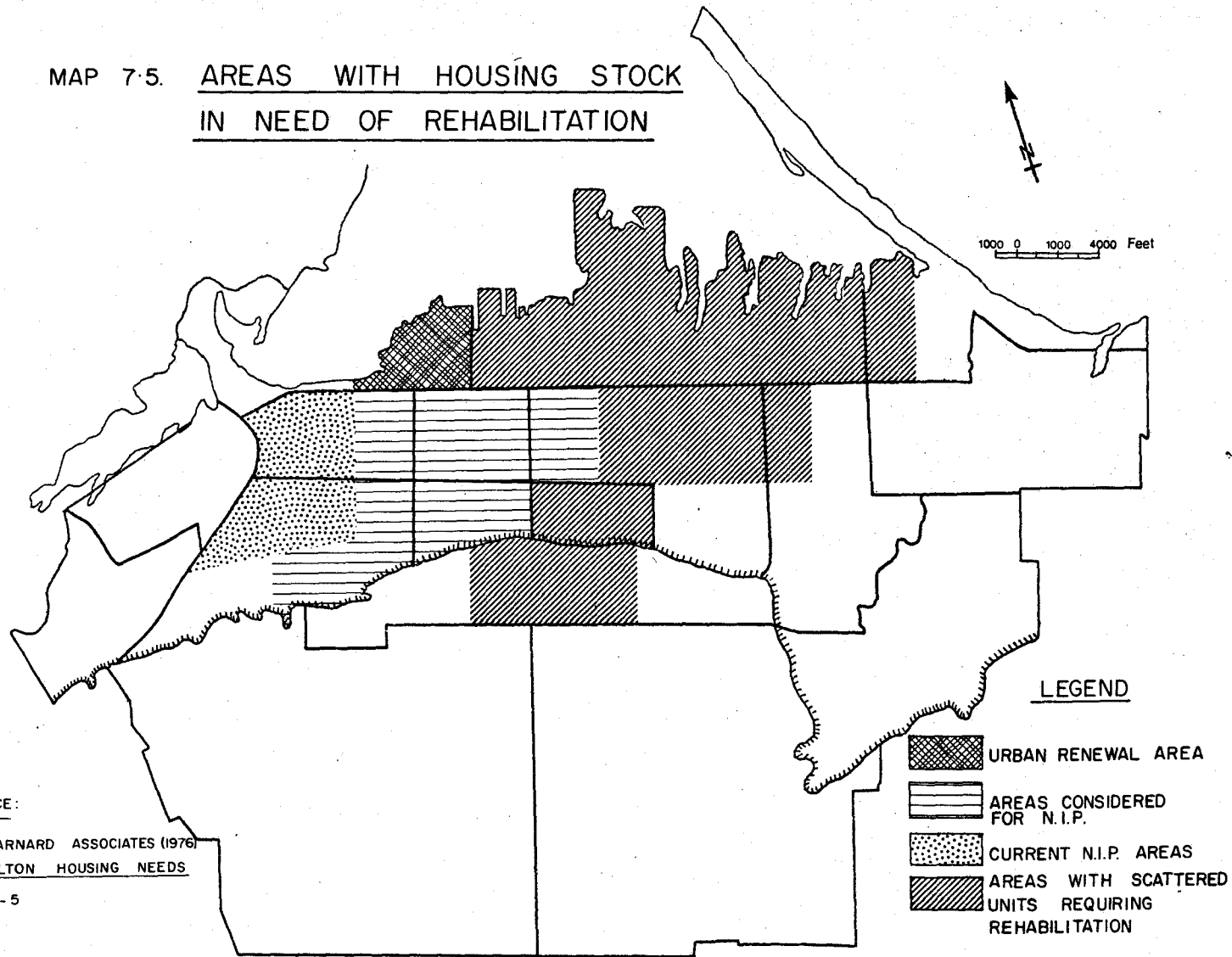
MAP 7.4  
 LAND USE DISTRIBUTION AND  
 CITY STREETS



SCALE 1:50,000



MAP 7-5. AREAS WITH HOUSING STOCK  
IN NEED OF REHABILITATION



SOURCE:

P. BARNARD ASSOCIATES (1976)  
HAMILTON HOUSING NEEDS

P. B - 5



that there are significant inequities occurring over space.

The apparent relationship between market value and mean assessment ratio characterized over space implies that to a considerable degree the problem may be related to reassessment lag. The less favorable districts are older and characterized by a higher percentage of deteriorated housing. P. Barnard's (1976) study of housing quality in Hamilton concluded that "areas of concentrated blight are the older neighborhoods surrounding the downtown neighborhoods of the City ... [and] the Hamilton Beach area." P. Barnard (1976; p.B-5). Map 7.5 reveals the areas of the city where the housing stock is in need of rehabilitation. These areas are presumably "downward transitional", characterized by below average price increases, and have become relatively overassessed since assessments have remained essentially static. Comparing Maps 7.4 and 7.5 there is a strong relationship between areas with high concentrations of manufacturing and commercial activity and areas with high concentrations of deteriorated housing.

The districts located furthest from these negative externalities can be considered "upward transitional" (including districts 8 and 9), becoming the beneficiaries of static assessments. This general pattern corresponds to that of most of the empirical literature (Black, 1972; Smith, 1971; Peterson *et al.* 1973; Paglin and Fogarty, 1972; Denny and Grainger, 1974).

A second, related reason why the lower value districts may be over-assessed is that these districts generally have smaller lot sizes. Since the demand for land has increased enormously in the past decade and it is the newer, peripheral districts of the city which have the greatest lot sizes, it is these areas which have increased in value commensurate with

their land holdings. As noted earlier, the negative correlation between lot areas and assessment ratios reveals that land value is not given much consideration in assessment of real property. Hence, this exacerbates the advantage to properties with large lots, which are predominantly in the suburban fringe districts.

Due to the size of many of the districts there is a fairly complete range of property values in each. Since the assessment ratios of the high value properties in the downward transitional neighborhoods are likely to be higher than those of the upward transitional neighborhoods of equal value, this tends to reduce the strength of the correlation between market value and assessment ratios. Thus, the regressive element of the Hamilton property tax assessment administration appears to be largely a function of location.

Not only do mean assessment ratios exhibit a spatial difference, but the level of non-uniformity also varies noticeably between the districts. This can be seen from Map 7.3. The pattern once more resembles those observed in Maps 7.1 and 7.2. The lower value areas, which are generally overassessed, frequently have the greatest dispersion of assessment ratios. This would seem to be related to the inability of assessors to effectively evaluate the effect of negative environmental externalities. This is supported by the negative correlation between market value and assessment ratios of  $-.27$  for the lowest property class in Table 7.8. The major discrepancy is the high dispersion of district 12 on the suburbanized Hamilton Mountain area, which has a high mean market value and a low mean assessment ratio. This anomalous situation can be explained by the fact that a few properties with extremely large

lot sizes are valued at a very small percentage of market value.

### Conclusion to the Chapter

Through the use of assessment-sales ratio information this study has revealed that there is a substantial dispersion or non-uniformity in assessment as a percentage of market value. The differentials in mean district assessment-sales ratios can to a large degree be explained by spatial factors. It has been demonstrated that inequities in assessments do in fact exist but there is little indication of the tax burdens involved. The next chapter presents a detailed illustration of the tax burden implications which the above results reveal.

## CHAPTER 8

### DIFFERENTIAL TAX BURDENS ILLUSTRATED

The inability to achieve an assessment system which assesses all residential properties at the same percentage of market value creates inequities. If these inequities are related to market value then we may infer that this is regressive assessment administration. If these inequities are caused by or include non-uniformity of properties of similar market value, then horizontal inequities are present. The purpose of the following examples is to illustrate tax burden differentials, (real and hypothetical) that have been elucidated by this study.

#### Vertical Administrative Inequity and Tax Burdens

To illustrate the extent of vertical administrative inequity on tax burdens I have utilized the method established by Paglin and Fogarty (1972).<sup>1</sup> Their test of vertical inequity is shown graphically in Figure 8.1. The *ee* line is the mean assessment ratio, shown as a slope ( $b_e$ ). If all properties were assessed at this value, perfect equity would be achieved. The *ii* line is based on a least squares regression of assessed value on market value. This slope, ( $b_i$ ) represents the vertical administrative inequity, that is, the regressive incidence of the property tax attributed to the administration of the assessment function. The degree of this inequity is determined by the equation:

$$VAI = 1 - \frac{b_i}{b_e} \quad (8.1)$$

where: VAI = vertical administrative inequity

$b_i$  = slope of the regression line

$b_e$  = slope of the perfect equity line

This reflects the difference between the slope of the regression line from that of the perfect equity line. The shaded area above the *ee* line represents the increased tax burdens resulting from the administration of the assessment function while the shaded area below this line represents the decreased tax burdens relative to the intrinsic incidence of the tax.

The perfect equity line or slope in this study would be equal to .104, the city mean assessment-sales ratio. A least squares regression of assessed value with market value yields the equation:

$$AV = 456 + .091 MV \quad (8.2)$$

$$R^2 = .70 \quad (F = 1302; \text{Sig.} = .001)$$

$$\text{Standard deviation} = (1053.8)$$

With the intercept and slope of  $b_i$  known, the two lines can be graphed, as has been done in Figure 8.2. The degree of vertical administrative inequity is equal to:

$$\begin{aligned} VAI &= 1 - \frac{.104}{.091} \\ &= .125 \end{aligned} \quad (8.3)$$

This coefficient compares favorably with that of .17 determined by Paglin

FIGURE 8.1  
PERFECT EQUITY LINE (*ee*) AND HYPOTHETICAL AV-MV REGRESSIONS (*ii*)  
SHOWING TYPICAL VERTICAL INEQUITY

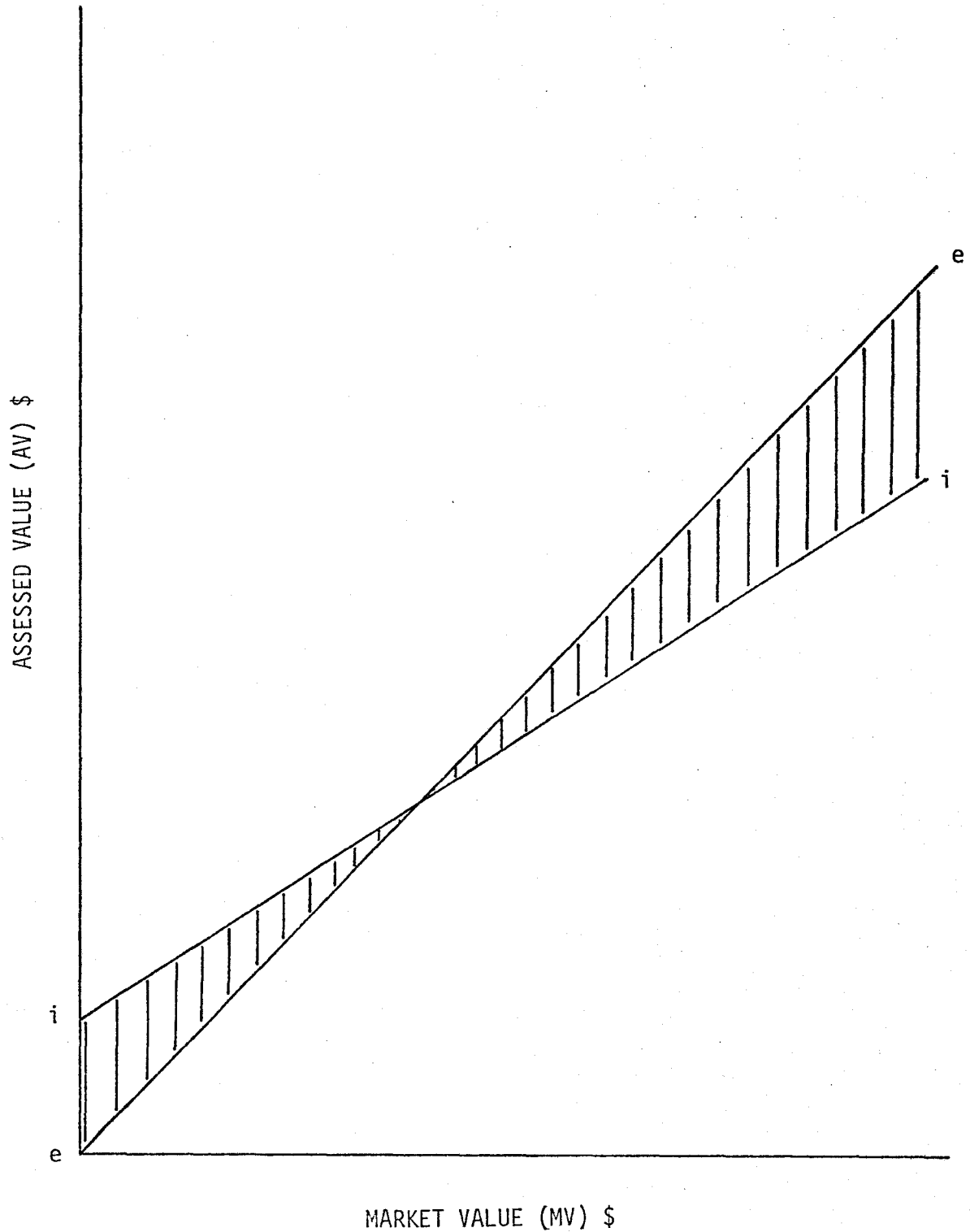


FIGURE 8.2

CALCULATED *ii* REGRESSION FOR HAMILTON SAMPLE ( $AV = 456 + .091 MV$ )

$ee = .104$

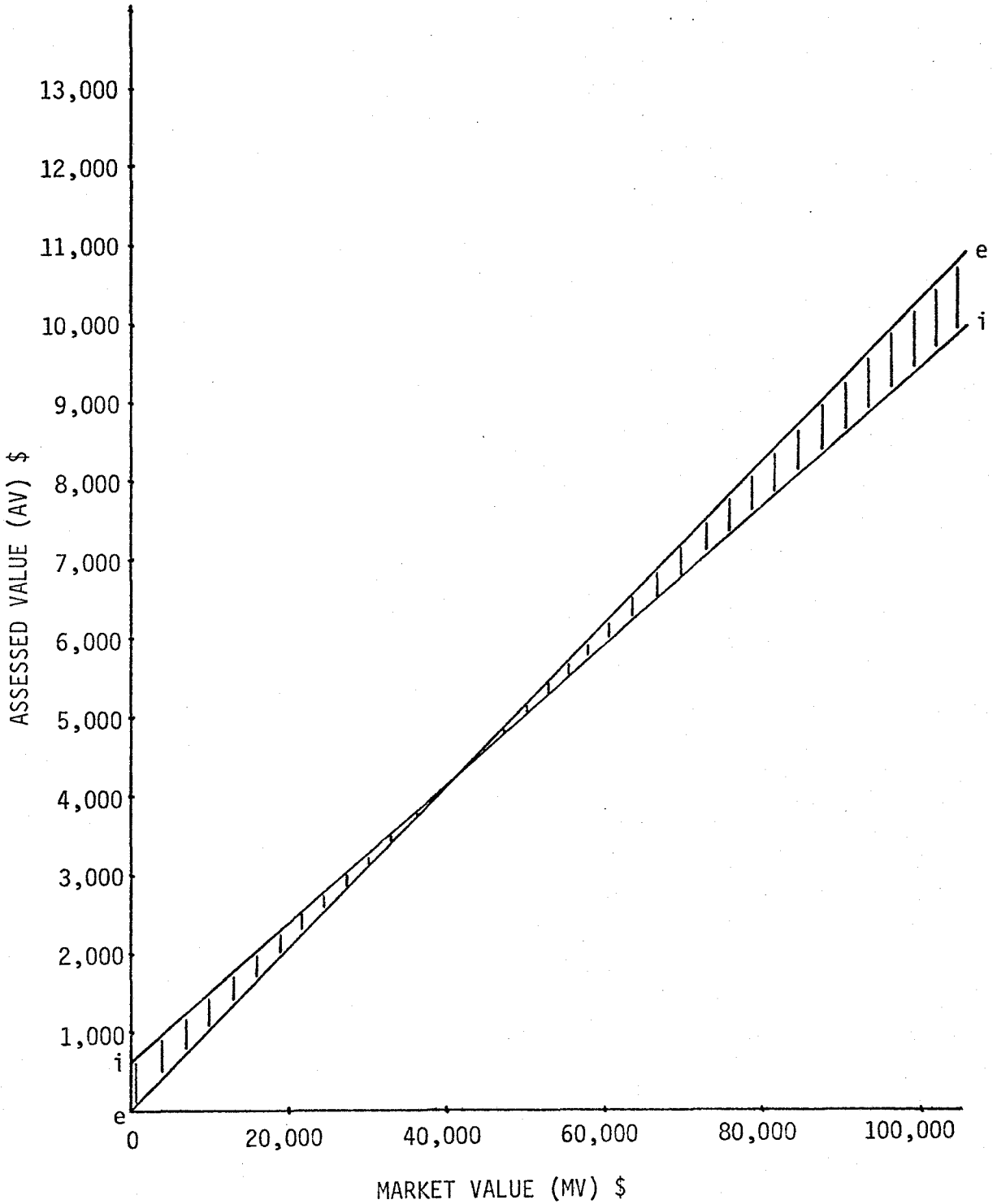


Table 8.1

Vertical Administrative Inequity

(1) Market Value of Property	(2) Theoretical Tax Bill* (.1276)( <i>ee</i> )	(3) Actual Tax Bill† (.1276)( <i>ii</i> )	(4) Impact of VAI on Incidence (%)†† $((3)/(2))-1 \cdot (100)$	(5) Absolute Benefit††† Col. (3) - (2)
\$20,000	\$265	\$290	+9.4	-35
30,000	398	404	+2.1	-8
35,000	464	464	0	0
40,000	530	523	-1.3	7
50,000	664	639	-3.8	25
60,000	796	755	-5.2	41
70,000	929	871	-6.2	58
80,000	1,062	987	-7.1	75

\* 1976 mill rate for Hamilton was .1276; *ee* represents slope of perfect equity line (.104)

† *ii* represents slope of regression of assessed value on market value; that is,  $AV = 456 + .091 MV$

†† VAI represents vertical administrative inequity

††† minus sign implies loss



and Fogarty (1972) for Eugene, Oregon. The effect in both dollar and percentage terms can be seen in Table 8.1. Owners of property worth \$20,000 will typically pay \$35 more in property taxes as a result of assessment administration. This amounts to a 9.4 per cent increase in their tax burden. Those with property worth over \$35,000 will be the beneficiaries of a reduction in their tax burdens. For example, properties worth \$70,000 will face a tax burden \$58 or 6.2 per cent less than they would if there were no VAI. The utility lost by the \$20,000 property owner with an increased tax burden of \$35 will likely be greater than the utility gained by the \$70,000 property owner's reduced tax burden of \$58. This discrepancy may not seem that significant until one considers that the lower value houses are occupied by a much lower income group than that of the \$70,000 homes.

#### Horizontal Administrative Inequity and Tax Burdens

As concluded in Chapter 7, the non-uniformity of assessment ratios in Hamilton is substantial. The following tables illustrate hypothetical tax burdens based on the results of this study. The 1976 Hamilton mill rate (or tax rate) of .1276 is used to calculate the tax levys. Table 8.2 reveals the differential tax burden that the typical property owner bears, based on both the coefficient of variation and the coefficient of dispersion. The median market values for the total sample as well as for each price class are used. The two dispersion measures yield different results; however, regardless of which is used, the tax differentials are significant.

The differentials that would result from permitting progressively higher margins of error are shown for the city median value as well, using the more "conservative" coefficient of dispersion. It seemed to be

inappropriate to allow the typical property owner's tax bill to be \$108, or 20% different from the average tax bill. On this basis I decided that \$54, or a 10% margin of error was a more acceptable level.

Table 8.3 reveals, for different market values what the hypothetical tax burden would be according to certain significant assessment ratios observed in this study. Using \$40,000 as an example, the tax bill if a property were valued at the maximum observed assessment ratio would be \$1,302, or \$1,162 greater than the minimum assessment ratio and \$771 greater than the city mean assessment ratio. This represents a difference of 145% between the maximum and mean ratios.

The potential tax burden differentials according to a few selected districts are shown in Table 8.4. Since nearly all 16 districts had property values as low as \$30,000 and as high as \$50,000, these hypothetical differentials may be reasonable to expect. The typical tax burden for the property owner of a \$40,000 house in district 15 would be \$156 different from the mean tax bill. In district 6 it would be \$164.

There is not only a significant difference within districts but between them as well. The mean tax burden of district 15 and district 13 is \$127, a difference of 26% (assuming market value equal to \$40,000 in both districts). Between district 6 and district 13 it is \$160, a 33% difference. The mean tax bill of a \$40,000 house is approximately \$109 or 21% greater in district 6 than the city mean.

To show that this hypothetical data is illustrative of actual Hamilton assessment inequities, refer to Table 8.5. Selecting the mode market value of \$45,000, the tax bills for the minimum, maximum and mean assessment ratios of the 13 \$45,000 properties were calculated. The actual

Table 8.2

Typical Tax Differentials According to Measures of

Relative Dispersion\*\*\*

Market Value Class	Class Mean Median	v* d	Market Values			
			30,987**	40,488†	48,904††	82,000†††
12,000 to 40,000	10.6 10.3	26.8 21.1	+112 ± 86			
40,000 to 70,000	10.3 10.2	18.0 13.4			+116 ± 85	
over 70,000	9.0 9.5	30.0 19.6				+283 ±195
Total sample	10.4 10.3	23.7 17.6		+127 ± 93		
Total sample	10.4	d = 5.0 d =10.0 d =15.0 d =20.0		+ 27 ± 54 ± 81 ±108		

\* v = coefficient of variation (%); d = coefficient of dispersion (%)

\*\* median market value for price class 12,000 to 40,000

† median market value for total city sample

†† median market value for price class 40,000 to 70,000

††† median market value for price class over 70,000

\*\*\* tax differential calculated by multiplying 1978 Hamilton mill rate of .1276 times the mean assessed value (or median) times the measure of relative dispersion. Tax burdens in dollars.

Table 8.3  
Tax Burdens of Various Assessment-Sales Ratios and  
Market Values†

<u>Various Assessment Ratios</u>	<u>Market Values</u>		
	<u>30,000</u>	<u>40,000</u>	<u>50,000</u>
Minimum (2.75)	105	140	175
Maximum (25.5)	976	1302	1627
Average minimum* (6.2)	237	316	396
Average maximum* (15.6)	597	796	995
City mean ( $\bar{r}$ ) (10.4)	398	531	664
$\bar{r}$ - Minimum		391	
Maximum - $\bar{r}$		771	
Maximum - Minimum		1162	

\* average minimum and maximum represent the average of the mean minimum and maximum values for the 16 districts

† tax burdens in dollars

Table 8.4

Tax Burdens of Selected Districts and Market Values \*\*\*

Various assessment ratios	Market Values		
	30,000	40,000	50,000
district 13 min (4.93)	188	252	315
district 13 mean (9.41)	360	480	600
district 13 max (12.23)	468	624	780
district 13 max-min	280	372	465
district 1 min (7.22)	276	369	461
district 1 mean (10.18)	390	520	649
district 1 max (13.80)	528	704	880
district 1 max-min	252	335	419
City mean ( $\bar{r}$ ) (10.40)	398	531	664
district 15 min (6.48)	248	331	413
district 15 mean (11.89)	455	607	759
district 15 max (25.50)	976	1302	1627
district 15 max-min	728	971	1214
district 6 min (8.48)	325	433	541
district 6 mean (12.54)	480	640	800
district 6 max (18.98)	727	967	1211
district 6 max-min	402	534	670
district 6 mean - district 13 mean		160	
district 6 mean - $\bar{r}$		109	
$\bar{r}$ - district 13 mean		51	
	<u>27,737†</u>	<u>54,358††</u>	<u>54,422†††</u>
district 13 v* (14.2)	+93		
district 15 v (37.4)			+156
district 12 v (24.1)		+164	

\* v = coefficient of variation (%); Tax differentials = mill rate (v/100) x (mean AV)

† mean market value for district 13

†† mean market value for district 15

††† mean market value for district 12

\*\*\* Tax burdens computed by multiplying mill rate by each specified mean AV where AV = assessment ratio times market value. Tax burdens in dollars.

Table 8.5

Actual Tax Burdens of All Properties With a MarketValue of \$45,000\*

(N = 13)		
<u>Various Assessment Ratios</u>		<u>MV = \$45,000</u>
Minimum	(7.22)	415
City Mean ( $\bar{r}$ )	(10.4)	597
MV = \$45,000 mean	(11.3)	649
Maximum	(18.98)	1090
Maximum-minimum		675

---

\* Tax bill determined by multiplying market value by assessment ratio by the mill rate of .1276. Tax burdens in dollars.

tax differential between properties of the same market value was as great as \$675.

#### Conclusion to the Chapter

The differential tax burdens illustrated here are representative of current differentials in Hamilton. They give an indication, in dollar terms, of the inequitable tax burdens that some property owners will face relative to others. Measures of relative dispersion and varying assessment-sales ratios seem to be easily disregarded. Examples of different tax bills, especially with magnitudes as great as observed here should induce the government to respond and restructure the current mode of assessment for property taxes.

## CHAPTER 9

### SUMMARY AND CONCLUSIONS

The purpose of this paper was to discover the distribution of property tax assessment inequities in Hamilton and on that basis evaluate the city's administration of the assessment function. It has been shown that both vertical and horizontal administrative inequities are evident. The regressivity of tax assessments appears to be less of a problem than non-uniformity; that is, the tax burden differentials are potentially greater for those in similar circumstances than those in different circumstances. It has also been shown that a large measure of the difference in assessment-sales ratios can be attributed to location.

According to the decision criterion that a tolerable margin of error with respect to the uniformity of assessments should not exceed 10 per cent, the administration of the property tax assessment function in Hamilton is unacceptable. The coefficient of variation for the city sample was 23.7%. Within the lowest and highest property classes it was 26.8% and 30% respectively. This implies that the typical single residential property owner's assessment-sales ratio is substantially different from the mean ratio. The inequitable distribution of tax burdens which may result is not insignificant, as has been illustrated.

Undoubtedly, many people feel they are paying a disproportionate amount of property taxes, yet few are aware of the extent to which their burden differs from what it should be. This general ignorance is a result,



in part, of the lack of public awareness as to the criteria upon which their properties are valued. Fractional assessments do not readily allow individual ratepayers to evaluate whether or not they are being treated fairly. As has been mentioned, the fundamental problem is not fractional assessment but non-uniformity of assessments; however, the tendency towards underassessment coupled with the static nature of the reassessment process creates the situation whereby non-uniformity may flourish.

The solution to the problem of both inequitable assessments and lack of public awareness would appear to be assessment at current market value. The taxable assessment could, as recommended in the Blair Report, be made at 50 per cent or any fraction of full value that is regarded as a fair allocation of the tax burden to the residential sector. However, a policy of full disclosure should accompany the taxable assessment which is based on full market value, so that property owners will be able to determine whether or not they are receiving equal treatment. If each property owner knew that his tax liability in a given year should, for example, be 10.4 per cent of market value, then he could easily estimate what his assessment should be. If he noticed a major discrepancy then he should be able to make an appeal.

Unfortunately, at present many people are simply unaware of how to lodge an appeal. Even if they did they would probably not be much further ahead, as the bureaucracy involved in assessment appeal has mired the process.

"The present appeal procedure is not only protracted, cumbersome and bewildering, but its outcome is ever in doubt ... Thus the present state of local appeal procedure in Ontario:

a non-hierarchical contortion of four appeal levels that flounder in imprecision." (Smith Report, 1967; p.360-61)

Thus, a rationalization of the appeal process would have great potential for ensuring that the property tax assessment administration would yield equitable results.

I believe that the first step in maintaining an appeal process would be to set up a property tax information system, not unlike that of the income tax. This would involve the creation of an information retrieval system, presumably based on a computerized mass-appraisal system which in itself would help reduce non-uniformity. If confidentiality needs to be maintained, access to information on the file could be granted to those who possessed identification, such as their notice of assessment. I do believe it is important that a full range of information be included in these property files, and that access for research purposes be allowed.

These suggestions are by no means original; in fact, assessment at current market value has been a reform proposal since the early 19th Century. The history of the property tax in Ontario has been characterized by the slow process of change. This is likely due to the transitional problems involved in changing the status quo, especially for those who stand to lose by any change. The approximately 2,400 submissions made to the Blair Commission in 1978 indicates the tremendous disparity of interests that are enmeshed in the property tax system. In addition, the present concern with government-created inflation in the economy has forced the provincial government into a period of austerity. Thus, in order to actually implement reform it appears very important that the politicians be presented with concrete proof that:

- 1) The present administration of the tax is a major cause of inequities and that it must be improved.
- 2) That current market value assessment is the best solution to this pervasive problem.
- 3) That the political consequences of reform are acceptable. The costs, both in dollars and political terms, should not exceed the benefits the new system will bring.

It should be noted that no tax revenue to local municipalities will be lost. What will occur is a shifting of the tax burden in a more equitable fashion. As stated in the Blair Report, those who have faced excess burdens in the past should be given justice immediately; those who have been beneficiaries of the system should contribute their fair share immediately.

#### Areas for Further Research

The potential for research in this area is substantial, although it generally requires the collection of a more comprehensive set of variables than was available for this study. Collection of time series data, coupled with a more comprehensive areal delineation according to homogeneous neighborhoods, would enable the researcher to ascertain which classes of property and areas of the city are most affected by price changes and static assessments.

If an extensive range of physical and locational variables could be compiled for each property of a large sample, a model for determining market value could be developed. Such a model, (see for example Hamilton and Miller, 1972) would enable the researcher to evaluate which factors

contribute to market value and thus suggest areas where assessors could concentrate their appraisal efforts in order to improve the administration of assessments. Such a model could, if comprehensively developed and proved accurate, form the basis of a property tax assessment system.

## FOOTNOTES

### CHAPTER 1

1. *The Blair Report (1977)* So named because of the Chairman of the Committee, W. Blair.
2. Single residential properties are houses. They may be single family dwelling units or multi-family units. Apartment buildings of any size have been excluded.

### CHAPTER 2

1. Vineberg, S. (1912); *Provincial and Local Taxation in Canada*; Columbia University, New York, p.12.
2. Aitchison, J. (1953); *The Development of Local Government in Upper Canada 1783-1850*. Ph.D. thesis, Department of Political Economy, University of Toronto. Reprinted from E.A. Cruickshank, *The Simcoe Papers*, Vol. III, 1793, p.54.
3. Personal property would include such items as livestock as well as stocks and bonds. Real property refers to the land and improvements made upon it.
4. At 4 year intervals the assessment act was to be reviewed, primarily to alter valuations and incorporate new items.
5. McEvoy, J. (1889); *The Ontario Township*; Warwick and Sons, Toronto, p.17.
6. Aitchison, J. (1953); *op. cit.* Reprinted from *The Examiner*, May 5, 1841.
7. Actual value could be defined in contemporary terms as imputed rental value: this system has its antecedents in British Customs. The notable exemptions being crown lands, churches and schools.
8. Vineberg, S. (1912); *op. cit.* p.36.
9. Again certain exemptions were permitted. For example, investment in Government Bonds; stock in toll roads and personal property invested in Land Mortgages. See Vineberg, S. (1912) *Ibid*, p.40.
10. It was called the single tax because Henry George believed that a tax on land value should be the only Government tax to support public

expenditures. It is now commonly referred to as site-value taxation.

### CHAPTER 3

1. Shannon, J. (1973); "The Property Tax: Reform or Relief," in: *Property Tax Reform*, G. Peterson ed. The Urban Institute, Washington, D.C., p.25, he cites 3 studies:
  1. Advisory Commission on Intergovernmental Relations "Public Opinion and Taxes", Washington, D.C., 1972.
  2. Nations Cities, 1971, p.15.
  3. Washington Post, April 14, 1973, p.A13.
2. Ontario, Ministry of Treasury, Economics and Intergovernmental Affairs, "Reform of Property Taxation in Ontario," *Ontario Budget 1976*; Toronto, 1976.
3. This is the traditional view of housing supply and demand curves. Thrall (1977), has determined that this is overly simplistic. The effect of property taxes is a function, amongst other things, of location and city efficiency in supplying public goods.
4. The coefficient of dispersion refers to the average per cent by which the assessment ratios deviate from the median ratio. It is commonly used as a measurement of horizontal inequity.
5. For example, local road improvement changes are often based on property frontage. If a property owner with a large frontage does not use the road, this is not totally fair. There are of course many who use the road who have no property abutting it.

### CHAPTER 4

1. There is in fact a noticeable lack of important individual research into this area. This may in part be a result of the confidentiality of property tax information in Ontario.
2. Except for "non-fair" transactions, where the price is observably below market value. Transactions should be verified, so as to ensure that they are representative of the market.
3. This assumes a non-linear negative relationship between overassessment and utility. This seems reasonable to expect.
4. Ontario, "Multivariate Analysis and Residential Property Valuation in Ontario", Methodology Section, Assessment Standards Branch, Ontario Department of Municipal Affairs, Oct. 1970, 36pp.

CHAPTER 5

1. An exclusive listing elicits a charge of 5% of sale price, whereas it is 6% for a M.L.S. listing. Therefore, the greater the value of the property, the greater the incentive for exclusive listing.
2. Toronto's mean house price refers to the mean of all M.L.S. properties. For Hamilton, it is the mean of the M.L.S. sample of 572 properties.
3. Although no one has suggested that a correlation between housing characteristics and street name exists - the fact that many streets are very long and could draw a large % of the sample is important, especially on major thoroughfares, where housing on these streets may have certain specific characteristics.
4. In the *Smith Report* (1967), The Assessment Survey of Ontario Municipalities had only 3 municipalities with a sample size exceeding 100. The average sample size was approximately 60. Some of the United States studies referenced in Chapters 3 and 4 had extremely large samples.
5. Unfortunately several of the properties in the newest subdivisions were excluded from the spatial analysis, as the latest Hamilton Planning Department Neighborhood Map does not include the streets of some new subdivisions.

CHAPTER 7

1. This value is based on 1975 M.L.S. prices for resale houses.
2. Multicollinearity between variables is substantial, thus the computed  $R^2$  is probably overstated. The estimate of the regression coefficients should be less affected by multicollinearity. No attempt was made to reduce this problem since a model for estimating assessed value is not being developed. The general relationships are all that are of concern here.
3. This may not necessarily be the case. The exclusion of a complete range of variables due to lack of availability limits the assuredness of this statement. In fact, assessors consider many cost factors, such as floor space, length of electrical wiring etc. which may be directly correlated with the number of rooms.
4. District 5 is an example of a non-homogeneous district with respect to market value. The properties to the North of this district, close to Main St. W. resemble those of district 4 which are of low-value. The properties closer to the escarpment are of a much higher quality and value. A more comprehensive subdivision according to homogeneity of properties would reveal a more distinct pattern than that noted in this study.

5. Districts 8 and 9, though below the city average market price, are generally less affected by negative externalities as they are further from the commercial and industrial areas of the waterfront and the C.B.D., especially towards the south.

#### CHAPTER 8

1. Paglin and Fogarty (1972); "Equity and the Property Tax: A New Conceptual Framework"; *National Tax Journal*. Vol. 25, 1972. A Critique of the method is offered by Sabella, E. "Equity and the Property Tax: A Comment and an Alternative Conceptual Framework"; *National Tax Journal*. Vol. 26, 1973.



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