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# Proposition 13 and Effective Property Tax Rates in San Francisco

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# ABSTRACT

This paper uses sales data and the entire city property assessment roll to calculate assessment ratios for all taxed properties in San Francisco in 1984. The estimated aggregate assessment ratio for the city is .55, indicating that the effective property tax rate for the city is slightly more than one-half the nominal rate. Effective assessment ratios differ significantly among and within property types, with on average business and private homeowners paying lower rates than owners of multiple-unit dwellings. Within property classes, assessment ratios are shown to be inversely related to property values.

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## 1.0 Proposition 13

In 1978 California voters endorsed a state constitutional amendment (Proposition 13) which restricted both property tax rates and the growth of the property tax base in the state. Under the provisions of the initiative, each piece of property subject to the property tax is assessed for tax purposes at its value for the 1975-76 fiscal year plus an annual increment of either the rate of change in the consumer price index or two percent, whichever is smaller, until the property is modified through construction or sold. In the event of construction, the newly-constructed portion of the property is appraised at current market value. In the event of sale, the entire property is reappraised to current market value (Leavitt, 1982).

As was widely discussed at the time of public debate over the amendment, the provisions of Proposition 13 were expected to have four major consequences for the effective rate of property taxation in California. First and most obviously, for jurisdictions with property tax rates in excess of the new statutory maximum, nominal rates were forced down.[1] Second, the legislation assured that average effective property tax rates, that is the ratio of tax liability to the market value of the taxed property, would always be less than the nominal tax rate for all jurisdictions as long as property values were increasing by more than 2 percent per year. This occurs because in any year the only properties to be assessed at market value and therefore to bear effective tax rates equal to the nominal rate would be those which sold; for all others appraised value would have fallen below market value. Third, the legislation would create

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[1] The maximum tax rate established by Proposition 13 was 1% of full market value. Jurisdictions could levy some taxes beyond this amount for service of indebtedness incurred prior to July 1st, 1978.

differences in effective property tax rates among classes of properties to the extent that turnover for one class of property is slower than turnover for another. This occurs because appraisals for slow-turnover properties will on average fall further behind market value than will appraisals for property types which sell frequently. Finally, within each property class, differences in holding times will be associated with differences in effective tax rates; as long as different properties sell at different times, the greater the mean duration of ownership the wider the dispersion of effective tax rates at any instant.[2]

All of these propositions save the first concern the equity of the tax system, that is the extent to which given the same nominal tax rates properties are taxed at the same effective rates.[3] Inequities, when they arise, may be classified into two groups. Vertical inequities involve variation in effective tax rates within properties of common classification. Horizontal inequities involve differences in effective tax rates among different classifications of properties.[4] Vertical inequity is the traditional focus of property tax admin-

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[2] In a stable real estate market, if holding periods are the same for all properties the presence of variation in effective rates of property taxation at a point in time does not necessarily mean that, when evaluated at the point of purchase, the present value of tax obligations of property ownership varies at all. Under existing tax law holding periods for certain types of assets (for example, new office buildings) may be largely determined by treatment of depreciation in the tax code and, as a result, near-uniform. This is a matter for additional study; the consequences of the Proposition 13 assessment procedures for holding period duration and total tax liability are beyond the scope of this paper. If holding periods are uniform assessment ratios at the point of sale should be similar; evidence presented later indicates this is not the case.

[3] Note that "equity" is used in this paper in the sense of equal, not fair. Criteria for fairness, e.g. assessment on a benefits basis, may call for unequal assessment.

[4] The definitions employed here, which follow Netzer (1968) and Paglin and Fogarty (1972), differ from usage in some other papers. See, for example, Reinmuth (1977), pp. 48-49.

istration studies. Horizontal inequities, especially insofar as such inequities appear in comparisons of properties classified on the basis of value or function, have been the focus of much economic work. Proposition 13 can be expected to increase both forms of inequity.

Despite widespread discussion of these effects, little evidence is available on the actual consequences of Proposition 13 for equity in assessment. This paper uses data on property assessments in San Francisco, California, to study effective property tax rates in that city and changes introduced in the nominal incidence of property taxes by Proposition 13. The emphasis is on measurement of assessment ratios for all privately-held properties. Six questions are considered:

1. What is the effective rate of property taxation in San Francisco?
2. How does the effective rate of property taxation differ by property class?
3. What would be the consequences for distribution of the property tax burden of a shift to uniform assessment.
4. How great is the variation within property classes in effective property tax rates?
5. To what extent are effective property tax rates correlated with property value?
6. How do the answers to these questions for the current tax system compare to the situation before Proposition 13 was implemented?

The focus of this paper is on estimation of market values of real estate under the existing institutions for property taxation and on use of these estimates for calculating effective tax rates at current market value. No attempt is made to speculate about the long-run, general incidence of the changes brought about by Proposition 13, since evaluating ultimate incidence involves making assumptions about the nature of relevant markets and the consequences of the innovation for factor supplies. Identification of the observable con-

sequences of Proposition 13 is an important step in constructing a general evaluation of its effects.

The paper is organized as follows. Section two below provides background information on trends in San Francisco's economy and property base. In section three a methodology is developed for study of the consequences of Proposition 13 for assessment ratios using both sales data and the aggregate assessment roll. Section four presents estimates of the assessment rates for the aggregate tax role and twelve property subclassifications. In section five the intraclass distribution of assessment rates is evaluated. Effective assessment rates and variations for the current tax rolls are compared in section six to data from years before Proposition 13. The answers to the six questions posed above are summarized in section seven.

## 2.0 Economy and Property in San Francisco

The consequences of the Proposition 13 assessment procedures for assessment ratios are dependent in part upon conditions in real estate markets. In this section background material on the San Francisco economy is presented along with an overview of tax assessment procedures and the tax roll itself.

**The Economy.** San Francisco is a peninsula city for which most developable land is in use for non-agricultural activities. By U.S. standards the density of population in the city, 5,891 persons per square kilometer, is relatively high. The city is the heart of the nine-county San Francisco Bay Area, and it is greatly affected by trends in the larger metropolitan area in microelectronics manufacture and in expansion of trade with the Pacific Rim. In recent years demand for real estate in San Francisco has grown substantially, pushed by both demographic and economic changes.

Unlike many older cities, population in San Francisco actually grew slightly (1.6 percent) during the 1974-84 period, and the consequent expansion in housing demand was amplified by the general downward trend in household size experienced nation-wide. While reliable measures of household income are not available on a city basis for intercensal years, the Department of Commerce's personal income figures indicate that real per capita personal income in San Francisco grew by about 3.7 percent between 1974 and 1984. This, too, contributed to an increase in the demand for housing.

At the same time that growth in income and population and declines in household size increased demand for housing, competition was strong for space for support of other activities. Between 1974 and 1984 wage and salary em-

ployment in the city increased by an amazing 17.2 percent. The overall increase in employment is largely the result of a dramatic increase in employment in retail trade, business services, and the FIRE triad of Finance, Insurance, and Real Estate. Much of this employment is located in the downtown financial sector; the skyline of the city has been dramatically transformed to accommodate it.

Expansion in the supply of both housing and business space has been impeded with varying intensity by land-use controls and, in the case of multiple unit housing, by rent control and restraints on condominium creation and conversion. The upshot has been a seller's market in uncontrolled or convertible residential and commercial real estate, with the commercial office space market weakening only slightly near the end of the period due to the influx of new building. Over the period 1977-1984 the rate of increase in the San Francisco-Oakland metropolitan area consumer price index averaged 11.6 percent per year. Given demand and the general trend in prices it is clear that, in the absence of Proposition 13, the property tax base would have grown at rates at least as great as the rate of change in general prices. This means that Proposition 13's 2% assessment increase restriction was binding for virtually all properties.

**The Property Tax System.** San Francisco is California's only combined city and county. In California an elected county assessor and his/her professional staff are responsible for real property valuation and assessment of property tax liability subject to budgetary control of the county board of supervisors and oversight by the State Board of Equalization. In San Francisco property assessments and tax liabilities are established effective July 1, at the beginning of the fiscal year, and tax payments are due December 10.

Although rarely used for anything except tax computations, the city's tax rolls provide a great deal of information about the city's economic base. The basic property data are divided among 42 general property classifications, and each parcel is described in terms of location, type, characteristics, sales history, and the assessed value of land, improvements, and related "unsecured" property. In general taxable property is classed as "secured" if the associated property tax bill can be enforced by a lien upon it. Most buildings and parcels fall in this category. The unsecured roll includes intangible assets such as rights to use of property owned by others (the concessions granted at Fisherman's Wharf are located on state-owned land) or movable items such as boats, machinery and equipment owned by business, and the like. The unsecured roll accounts for about 7 percent of taxable real property in the city (California State Controller, 1984).

This paper concentrates on the secured tax roll, since the unsecured roll is very heterogeneous and difficult to re-evaluate. In fiscal year 1984-85 the city's total secured property tax roll[5] amounted to $26.8 billion, up from $9.3 billion in fiscal year 1977-78, the last year before Proposition 13.[6] Thus despite the rollback instituted by the tax limitation initiative, overall property valuation has increased by about about 16 percent per year as a result of new construction and turnover.

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[5] For historical reasons certain types of properties located in the city and owned by public utilities are not assessed by the county assessor, but are instead taxed on the basis of valuations determined by the State Board of Equalization. The totals here include properties assessed by the State Board of Equalization.

[6] Between 1967 and 1981 properties in San Francisco were assessed at 25% of appraised value. All roll valuation figures cited in this paper for years during this interval have been converted to equivalents for assessment at 100% of appraised value, the procedure followed statewide beginning with the 1981-82 tax year.

San Francisco does not collect property taxes for all properties on the secured roll. California state law grants partial or complete exemption from property taxes in two situations. The first involves the nature of the occupant, and the second involves the nature of property use. The largest occupant exemption is for homeowners; the assessed value of the principal residence of each homeowner is reduced by $7,000. In addition, the residences of blind or totally disabled veterans are exempted from property taxation. The state reimburses the counties for the tax cost of the homeowners' exemption; until recently the cost of the veterans exemption was reimbursed as well. Property use exemptions are granted to religious and charitable organizations, cemeteries, colleges, consulates, and the like. Assessment figures are maintained in the rolls for properties in this category, but these assessments are used only to define the penalty applied to the organizations which own them and fail to file for property tax exemption on time. Because these assessments are likely to be considerably less accurate than assessments for other properties and because properties in exempt categories are often extremely difficult to value, they are excluded from this analysis. Properties which are exempted on the basis of occupant's characteristics are retained.

The exemptions adjustment is illustrated in table 1. In this table and the materials that follow the secured values for the city's 42 property classifications have been aggregated to twelve subclassifications distributed in four broad groups of residential, commercial, industrial, and miscellaneous properties.[7] Four things should be noted from table 1. First, the exclusion of use-exempt properties from analysis reduces the total number of parcels studied by only about 3%, from 161,013 units to 155,724. Second, $676 million of the re-

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[7] Detail on the classification system employed is presented in Appendix A.

maining property still escapes taxation, largely because of the homeowner's exemption.[8] Third, the last column indicates that about one-half of all property taxes are levied against residential properties. Similar computations for the FY 1978 property tax roll indicate that residential properties now bear a smaller share of the property tax load than was true prior to passage of Proposition 13. This is surprising given the frequent assertions at the time of Proposition 13's passage that the restrictions embodied in the legislation would shift the burden the other way (Chernick and Reschovsky, 1983). The decline is presumably attributable in part to the pace of downtown office construction; note that office buildings account for over one-fourth of the property tax base. The final point is that San Francisco's economy does not have a large industrial base; this is evident in the small number of industrial parcels.

Table 1 is constructed on the basis of assessed values. To study effective tax rates it is necessary to estimate market values. With market values it is possible to reconstruct the last column of table 1 to determine the share of the property tax bill that would be born by each class with uniform assessment.

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[8] Exemptions remaining for other than occupancy are attributable to cases in which portions, but not all, of a property are exempted because of use for charitable purposes.

Table 1
Taxed Real Property, San Francisco, 1984

| Property Type | Total Units, 1984 | Included Units (see text) | Assessed Value, Included Units ($mil) | Exempt-tions Value, Included Units ($mil) | Taxed Value, Included Units ($mil) | Share of Taxed Proper-ties |
|---|---|---|---|---|---|---|
| Residential: | 139,029 | 138,548 | 13,848 | 671 | 13,177 | 0.52 |
| Dwellings | 94,776 | 94,503 | 6,456 | 524 | 5,932 | 0.24 |
| Condominiums | 9,364 | 9,351 | 1,595 | 42 | 1,552 | 0.06 |
| Flats | 21,952 | 21,857 | 2,276 | 84 | 2,192 | 0.09 |
| Apartments | 12,937 | 12,837 | 3,521 | 20 | 3,501 | 0.14 |
| Commercial: | 8,559 | 8,280 | 9,944 | 5 | 9,939 | 0.40 |
| Hotels and Motels | 762 | 740 | 1,188 | 0 | 1,187 | 0.05 |
| Commercial Stores | 3,221 | 3,123 | 1,458 | 0 | 1,457 | 0.06 |
| Stores w Apts/Flts | 2,763 | 2,741 | 375 | 4 | 371 | 0.01 |
| Garage, Park, and Ga | 641 | 606 | 261 | 0 | 261 | 0.01 |
| Office Buildings | 1,172 | 1,070 | 6,663 | 0 | 6,663 | 0.26 |
| Industrial: | 2,855 | 2,734 | 1,028 | 0 | 1,028 | 0.04 |
| Miscellaneous: | 10,570 | 6,162 | 1,016 | 0 | 1,016 | 0.04 |
| Vacant Lots | 7,921 | 4,996 | 423 | 0 | 423 | 0.02 |
| Miscellaneous | 2,649 | 1,166 | 593 | 0 | 593 | 0.02 |
| Total | 161,013 | 155,724 | 25,835 | 676 | 25,159 | 1.00 |

Source: Figures supplied by Office of the Assessor, City and County of San Francisco. See Appendix A for category explanation. Due to Due to independent rounding, components may not cumulate exactly to match given totals.

## 3.0 Methodology

This section describes the data and the methodology that will be employed to answer the questions posed in section 1. The investigation is presented in two steps. In the first data on real estate sales in San Francisco between 1983 and 1984 are employed to calculate an estimate of market value for twelve classes of taxable real estate. When combined, these classes cover all taxable real estate in the city. These aggregate value estimates permit construction of the equivalent of the last column in table 1 for the market, as opposed to the assessed value of privately-owned, non-exempt property. The ratio of assessed to estimated market value for each class and for all properties combined provides an estimate of the aggregate assessment ratio for each property class and for all properties combined. Variations in assessment ratios across property classes, if they exist, create one form of horizontal inequity in property taxation.

In the second step of the investigation, the sales data are employed to measure vertical inequities within classifications and to conduct tests of the statistical significance of observed differences in assessment ratios for sold properties across property classes and, within property classes, across value categories.

### 3.1 Using Property Sales to Measure Property Values

The key to the results of this paper is use of data on sold properties in the city to estimate the market value of properties not sold. "Sold properties" are identified on the basis of Proposition 13 assessment conventions.

Ostensibly, collecting data on property transactions should be easy, albeit tiresome. Since all property transactions must by law be reported to the Office of the Assessor, that is the place to collect a sample. However, while the parcel records of the San Francisco Assessor include precise information on transactions, it is the policy of the Assessor not to make this information available in machine-readable form to the general public. It was possible, however, to obtain from the Assessor's Office an assessment roll tape for 1983 and 1984 which included location, use-category, date of construction, and assessed value for every assessment parcel in the city. When merged, these data allowed identification of properties which changed hands between assessment years. Effective assessment ratios were then calculated by comparing post-sale appraisal to predicted appraisal in the absence of the transaction.

The basis for the identification of sold properties is Proposition 13 itself. Under the tax limitation regulations, property cannot be reassessed except on sale or alteration. By conventions followed by the Assessor's office, alterations in virtually all cases change the assessed value of structures, but not land. As a result, sales can be identified in the assessment roles by searching for parcels in which land values changed by an amount greater than the 2% permitted by statute. The post-transaction assessment is required by law to be "full market value" and will differ from sales price to the extent that sales price is affected by special financial or other relationships. This full market value can be compared to what would have been assessed value in the absence of sale: 1.02 times the previous year's assessment plus the value of any improvements.

Once a sample of sales was identified, a market value equation was estimated by regressing for sales in each property type the property value (after sale)

in 1984 (VAL84) on the assessed value in the preceding year (VAL83) together with a series of dummy variables identifying the area of the city in which the property is located, the year of construction, and (for residential properties) whether or not the property was owner-occupied. The resulting equation was then used to estimate the market value of every other (non-sold) parcel in the tax roll. To predict market values for properties which incurred renovation between the 1983 and 1984 assessment dates, the difference between assessed value in 84 and expected assessed value under the 2% increase restriction was added to the predicted value on the basis of VAL83 and general characteristics alone. New properties or conversions were valued at assessment.[9]

Use of these data to estimate the market value of property and, given estimated market value, to calculate assessment ratios requires three critical assumptions that are sufficiently important to justify further comment. The assumptions are (1) that tax assessments provide a reliable estimate of market value; (2) that the criteria applied to identify sales will collect a representative sample of all properties; and (3) that property exchanges do not involve alteration prior to sale. These assumptions are considered in order.

(1) Tax assessments provide a reliable estimate of market value. For any illiquid asset, cash or market value is ambiguous. Here market value is interpreted as the expected sales price of the property given normal time for dissemination of information and buyer search. In the economics literature realized sales prices are generally accepted as measures of market value except

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[9] State-assessed properties could not be valued in this way, since valuation for this group was available only in aggregate. Market value of state assessed properties was estimated by inflating estimated (see footnote 5) assessed value by class by the inverse of the calculated assessment ratio for county-assessed properties.

when price incorporates adjustment for exceptional financial arrangements between buyer and seller. In theory the assessor's appraisers value property at sales price in absence of exceptional financial or other arrangements. To the extent this is true, post-sale appraisals, based as they are on both the appraiser's general knowledge of local real estate markets and the tangible evidence of transactions price, may provide a better estimate of market value than unadjusted sales price derived from other sources. Interviews with San Francisco's appraisers indicate that the Assessors' office does in fact attempt to adjust appraisals to market value, although of course in many cases the task is difficult.[10]

(2) The criteria applied to identify sales identifies a representative sample of all properties. Historically, two approaches have been taken in studies of assessment ratios. One, favored by economists, is to examine sales data. Such data provide genuine market "tests", and they are relatively easy to collect, especially in states which impose transfer taxes based on sales price. The other, favored by assessors, is to compare the assessments appearing in tax rolls for a random selection of properties to the results of independent assessments by experts. The economists' method has the advantage of basing market value estimates on actual transactions. However, to the extent that sales are not a representative sample of all properties, the assessment ratios calculated from such data will lead to biased estimates of the effective assessment ratio for the property tax base as a whole. When done correctly, the assessors' method has the advantage of being based on a representative sample, but even experts are likely to encounter problems in estimating the market value of

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[10] Recently such adjustments have been emphasized given published critical comments on the office's failure to do so in 1982-83. See California State Board of Equalization (1983), p. 12.

idiosyncratic properties in the absence of actual transactions. In practice, the higher the value of properties the greater the idiosyncratic character. In the presence of uncertainty, assessors tend to be conservative in estimating value. This tendency is possibly one source of the often-discovered inverse relation between assessment ratios and property values.[11]

The method used here allows some adjustment for the selection bias problem. Since predicted values derived from the sales sample are based on prior assessment plus age and location variables, it is possible to impute market value to each property in the unsold portion of the tax roll based on the same characteristics. But more information would have been very useful. Staff members in the Assessor's Office in San Francisco argue that properties which sell once are more likely than others to sell again; the tax rolls, in other words, have "movers" and "stayers". Given the Proposition 13 assessment procedures, this means sold properties are likely to have higher assessment ratios than all others, since time since last transaction will have been shorter. If this problem is important, the assessment ratios calculated below will be biased upward.

A related problem arises if there are in fact some properties that sell at prices which indicate that the associated land is overassessed. Such observations are automatically excluded from the sample, and if their number is significant the derived estimates of the assessment ratios will be biased downward. In fact very few general assessment changes of less than 2% were observed in the data, and the small number of properties in this category are probably all associated with fire or other events not related to sales.

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[11] See Oldman and Aaron (1965), Black (1972), Engel (1975), and Edelstein (1981).

(3) Property exchanges do not involve alteration prior to sale. If property transactions involve alterations, the procedure outlined above will treat changes in value that are the product of enhancement incorrectly as the product of underassessment. Clearly renovation is occurring continuously, especially in a "gentrifying" real estate market like San Francisco's. But real estate operators argue that pre-sale fix-up generally does not pay, since no buyer's tastes will be matched as well as they, themselves, can do after sales. Cases of major renovation, which are done speculatively, are likely to be caught by exclusion of properties for which "progress" assessments were reported for either 1983 or 1984. Progress assessment occurs in instances in which significant renovation is underway but uncompleted at the time of assessment. This problem of rehabilitation occurs with all studies based on sales data; it is generally not acknowledged. It could be avoided by comparing sales lists with building permits, but this would be in most jurisdictions an onerous job.

The procedure and assumptions outlined above were the basis for calculation of aggregate assessment ratios for the city's entire privately-owned nonexempt property tax base. These estimates are presented in section 4. The calculated aggregate assessment ratios for all properties will be compared to assessment ratios calculated on the basis of sold properties only to detect evidence of bias created by the possibly nonrandom character of sales. This comparison is important, since the most commonly used source of information on assessment ratios, vol. 2 of the Census of Governments, relies on sales data to calculate aggregate estimates of the market value of properties.[12]

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[12] See U.S. Bureau of the Census (1984).

## 3.2 Equity Analysis of Sales Data

The results of the aggregate analysis outlined above may be used for evaluation of the horizontal equity of the property tax as administered in San Francisco when property classification is done on the basis of use category. However, no statistical test of observed differences (if any) is possible, given the constructed character of the estimates. Furthermore, most equity analysis is done on the basis of properties, while the aggregate assessment ratio is not a simple average across parcels but rather a weighted average in which the weights are current value.

Given the the absence of market value information for a random sample of properties in each use category, this study returns to the sales data for equity evaluation. The results are therefore subject to the problem of selection bias arising from use of sales data, but they are directly comparable to results of other studies following a similar methodology.

Analysis of the distribution of assessment ratios within the sales data is carried out as follows. First, common distributional measures are calculated for assessment/value ratios for properties within each of the twelve subcategories identified earlier. These measures include the median and the coefficient of dispersion, that is the ratio of average absolute deviation from the median of each sold property's assessment ratio to the median value. Since the underlying distributions of the assessment ratios within each class are not known, nonparametric comparison of assessment distributions is carried out us-

ing Kruskal-Wallis tests for both equality of assessment levels and variability.[13]

Traditionally economists have been concerned about the relation, if any, between assessment ratios and property values, especially for residential property.[14] Under common assumptions about the degree of forward-shifting of property taxes and the elasticity of housing consumption with respect to income, if assessment ratios are inversely related to property values the regressive incidence of property taxation is enhanced (Edelstein, 1981). The approach to this problem followed below is to rank sold properties on the basis of assessment ratio in the absence of sale and again in terms of market value as established by sale. Then the null hypothesis of no regressivity can be tested by visual inspection of the association of average assessment ratios within subgroups -- say deciles of the value distribution -- and by application of the common Spearman test of correlation between the two rankings.

Given this overview of the methodology, the results are presented in the next two sections.

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[13] See Kruskal and Wallis (1952). Gloudemans (1977) discusses general principles of nonparametric evaluation of assessment performance.

[14] Property value is not the only "suspect classification" useful for studying vertical equity. Others include, for example, the race or income characteristics of the property owners or the neighborhoods in which the properties are located. For examples of equity evaluation of this type see Edelstein (1981) and Chun and Linneman (1985).

## 4.0 The Aggregate Tax Roll

The estimated prediction equations for market value for 1984 for each of the 12 property classes are presented in appendix B. In table 2 the results of application of the prediction equation to the entire property tax roll are reported by property class. The table has two parts. The first set of columns cover properties which sold. "Assessed value without sale" is the sum for all properties in the classification of assessed value had no transaction occurred. "Assessed value with sale" is actual assessment. The ratio of assessed value to aggregate value given sale is presented both for all properties in each class and for all properties combined.

Table 2
Imputation Results, San Francisco Property Tax Roll

| Property Type: | Properties Meeting Sales Criteria | | | | All Included Properties | | | |
|---|---|---|---|---|---|---|---|---|
| | Number of Parcels | Assessed Value: Without Sale ($Mil) | Assessed Value: With Sale ($Mil) | Assessment Ratio | Number of Parcels | Assessed Value ($Mil) | Estimated Market Value ($Mil) | Assessment Ratio |
| Residential: | 7,552 | 947 | 1,615 | 0.586 | 138,548 | 13,848 | 25,660 | 0.540 |
| Dwellings | 4,602 | 347 | 681 | 0.509 | 94,503 | 6,456 | 13,367 | 0.483 |
| Condominiums | 976 | 240 | 313 | 0.767 | 9,351 | 1,595 | 2,082 | 0.766 |
| Flats | 1,204 | 134 | 246 | 0.545 | 21,857 | 2,276 | 4,382 | 0.519 |
| Apartments | 770 | 226 | 376 | 0.602 | 12,837 | 3,521 | 5,830 | 0.604 |
| Commercial: | 500 | 419 | 1,007 | 0.416 | 8,280 | 9,944 | 17,323 | 0.574 |
| Hotels | 58 | 77 | 194 | 0.398 | 740 | 1,188 | 1,925 | 0.617 |
| Stores | 186 | 83 | 160 | 0.516 | 3,123 | 1,458 | 2,528 | 0.576 |
| Flats/Stores | 148 | 20 | 37 | 0.529 | 2,741 | 375 | 712 | 0.527 |
| Garages | 44 | 17 | 57 | 0.299 | 606 | 261 | 672 | 0.388 |
| Office Bldgs | 64 | 222 | 559 | 0.398 | 1,070 | 6,663 | 11,485 | 0.580 |
| Industrial: | 168 | 36 | 78 | 0.466 | 2,734 | 1,028 | 1,907 | 0.539 |
| Miscellaneous | 230 | 23 | 60 | 0.385 | 6,162 | 1,016 | 2,530 | 0.402 |
| Vacant Lots | 186 | 10 | 36 | 0.267 | 4,996 | 423 | 1,302 | 0.325 |
| Misc | 44 | 14 | 25 | 0.555 | 1,166 | 593 | 1,228 | 0.483 |
| Total | 8,450 | 1,425 | 2,761 | 0.516 | 155,724 | 25,835 | 47,421 | 0.547 |

Source: Calculations by author from data supplied by Office of the Assessor, City and County of San Francisco. See Appendix A for category explanation.

The second set of columns covers assessed and estimated market values of all properties. These values are calculated on the basis of estimates of the prediction equations for sold properties. As indicated, the estimated assessment ratio for all properties combined is slightly higher (.547) than the ratio for sales (.516). The sizable difference between estimated aggregate assessment ratio for all properties and the ratio calculated for sold properties alone indicates that sales are not a random sample of all properties and incidence of sales is correlated with property characteristics associated with assessment ratio variation.

The results in table 2 reveal considerable disparity in aggregate assessment ratios across property types and even within broad categories. In aggregate, assessment ratios for all included residential properties are only slightly lower than assessment ratios for commercial properties and are about equal to industrial assessments. But the residential category hides a significant difference between dwellings -- primarily owner-occupied single family residences -- which have an exceptionally low assessment ratio, and rental structures, especially apartment buildings, which have an exceptionally high one. The high ratio for condominiums reflects the fact that most condominium occupancy in the city is relatively recent. The high ratio for apartments is probably the result of the retarded rate of appreciation in apartment values given San Francisco's rent control ordinance. From the very low assessment ratio for vacant lots it appears that such properties don't sell very often.

Once adjusted for exemptions, the market value data from table 2 can be used to calculate the distribution of the property tax by class under uniform as-

sessment. The results of these calculations appear in table 3.[15] The last column in the table presents the percentage change in the taxes collected from each subclassification should the city shift to a uniform assessment ratio with a property tax rate that would produce roughly the same aggregate yield.[16] Again, changes in tax obligations are relatively small for broad classes of property, but for certain types of property the changes are substantial. Uniform assessment would shift the property tax from business to residential property and raise taxes collected from homeowners substantially.[17]

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[15] Calculation of the tax base under uniform assessment required estimating exemptions with assessment at market value or some constant fraction thereof. For this calculation it was assumed that the homeowner exemption stays constant in nominal terms and that all other exemptions stay constant as a proportion of assessed value.

[16] Uniform assessment is of course, impossible to achieve in practice. But, a well-administered assessment program can come close. See California State Board of Equalization (1971) for an example.

[17] The calculations in table 3 are not adjusted for the possibility that the shift in taxes that would result from movement toward uniform assessment would be capitalized. Even under a revenue-neutral adjustment the tax burden of low-turnover properties would rise relative to the burden on high-turnover properties.

Table 3
The Effect of Assessment Standardization on Taxes and Tax Share by Property Class, San Francisco, 1984

| Property Type | Share of Aggregate Taxes, Current Assessment | Share of Aggregate Taxes with Uniform Assessment | Percentage Change in Tax Payments, Uniform Assessment |
|---|---|---|---|
| Residential: | 52.4% | 53.5% | 2.1% |
| Dwellings | 23.6% | 27.5% | 16.5% |
| Condominiums | 6.2% | 4.4% | -29.3% |
| Flats | 8.7% | 9.2% | 5.5% |
| Apartments | 13.9% | 12.4% | -10.7% |
| Commercial: | 39.5% | 37.1% | -6.2% |
| Hotels and Motels | 4.7% | 4.1% | -12.8% |
| Other Commercial | 8.3% | 8.4% | 0.7% |
| Office Buildings | 26.5% | 24.6% | -7.2% |
| Industrial: | 4.1% | 4.1% | -0.1% |
| Miscellaneous: | 4.0% | 5.4% | 34.0% |
| Total | 100.0% | 100.0% | 0.0% |

Source: Calculations by author from data supplied by Office of the Assessor, City and County of San Francisco. See Appendix A for category explanation.

Of the 155,724 parcels in the 1984 San Francisco Assessment rolls meeting the inclusion criteria for this study, 8,450 satisfied the requirements for "newly sold" outlined above. For these properties the number of sales, median assessed value, median assessment ratio, and the coefficient of dispersion of the assessment ratio are reported in table 4.

Table 4
Assessment Ratio Distribution Characteristics,
Sold Properties, 1984

| Property Type | Number | Median Assessed Value, 1984 ($) | Median Assessment Ratio, 1984 | Coef. of Dispersion, Assessment Ratio | Mean Abs. Deviation, Assessment Ratio |
|---|---|---|---|---|---|
| Residential: | | | | | |
| Dwellings | 4,602 | 127,000 | 0.406 | 58.0% | 0.235 |
| Condominiums | 976 | 175,000 | 0.734 | 25.2% | 0.185 |
| Flats | 1,204 | 186,120 | 0.516 | 46.3% | 0.239 |
| Apartments | 770 | 154,995 | 0.595 | 38.1% | 0.227 |
| Commercial: | | | | | |
| Hotels and Motels | 58 | 917,500 | 0.431 | 48.2% | 0.208 |
| Commercial Stores | 186 | 350,000 | 0.541 | 40.8% | 0.221 |
| Stores w Apts/Flts | 148 | 206,962 | 0.517 | 51.1% | 0.264 |
| Garage, Park, Gas | 44 | 398,000 | 0.331 | 67.6% | 0.224 |
| Office Buildings | 64 | 1,586,083 | 0.356 | 62.9% | 0.224 |
| Industrial: | 168 | 290,000 | 0.423 | 50.7% | 0.215 |
| Miscellaneous: | | | | | |
| Vacant Lots | 186 | 35,000 | 0.420 | 47.8% | 0.201 |
| Miscellaneous | 44 | 133,900 | 0.429 | 50.3% | 0.216 |

Source: Calculations by author from data supplied by Office of the Assessor, City and County of San Francisco. See Appendix A for category explanation.

These results are generally consistent with the implications of the aggregate assessment ratio comparisons presented in table 2. The highest median assessment ratio, 73%, is calculated for condominiums. The lowest assessment ratios are recorded for the garage - gas station - parking lot group. But it is apparent that sales samples are misleading; while the sales data alone indicate that the median assessment ratio for office buildings *from table 4) is 36% and the weighted average assessment ratio (from table 2) is still just 40%, reweighting the sample to account for the characteristics of all properties raises the estimated assessment ratio to 58% (last column, table 2). The dispersion of assessment ratios is remarkable: the 58% coefficient of dispersion reported for dwellings implies that for the dwelling with median value ($127,000), taxes paid (at 1% of assessed value) range from $216 at the average deviation below the median and $813 at the average deviation above. The tails, of course, stretch much further.[18] Comparison of the median assessment ratio for sold properties to the estimated aggregate assessment ratio for the class as reported in the last column of table 2 indicates that for all properties except vacant lots the aggregate assessment ratio is greater than the median assessment ratio for sold properties. This consistency may be explained by two possible behaviors. One is that sold properties tend to be those held for the longest times, and as a result the general inflation has pushed assessment ratios down. This cannot be, however, since if true the statement implies that stayers are disproportionately found among movers. The alternative is that sold properties tend to be located in areas of greatest rate of change in values. If this is the case, caution is appropriate in making inferences about aggregate assessment ratios from the characteristics of sold properties alone, even in jurisdictions

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[18] Table 4 also reveals no property class for which dispersion of assessment ratios for properties at point of sale is sufficiently narrow to imply equality of holding periods. This rules out the possibility posed in note 2.

in which falling assessment ratios are solely the product of lags in assessment adjustment. A final point is that, with exception of owners of apartments and condominiums, more than half of owners of sold properties in each category would have opposed assessment equalization to a common ratio, even if tax rates were adjusted so that the outcome would be revenue neutral.

Not surprisingly, application of the Kruskal-Wallace test to the distribution of assessment ratios for sales data leads to rejection of the hypothesis that the distributions of assessment ratios across each property class are identical at the .001 level of significance.[19]

Finally, table 5 reports results of tests of the association between assessment ratio and property value. Both the preferred nonparametric test and a parametric test are reported.[20] The results indicate that for all properties the Spearman correlation coefficient between assessment ratio and market value is negative; for 9 of the 12 classes the inverse relationship is statistically significant at the 10% confidence level or lower. The relationship is apparent in the parametric evaluation as well; with the exception of condominiums the results of the two evaluations are similar.

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[19] The nonparametric Kruskal-Wallace test involves pooling of all the sales data, ranking by assessment ratio, and then evaluating whether the distribution of properties within the general rank continuum is random by class. The test was also applied, with the same result, to the distribution of absolute deviation of assessment ratios from class medians.

[20] The parametric test is based on the elasticity of the assessment ratio with respect to market value. The tested parameter is the VAL84 coefficient from a regression of the logarithm of the assessment ratio on the logarithm of VAL84 plus other variables for each property class. These regressions are available on request from the author.

Table 5
Statistical Evaluation of the Assessment Ratio/
Property Value Relationship, Sold Properties

| Property Type | Number | Spearman Correlation Coefficient | Elasticity of AR wrt Value, 1984 | Assessment Median | Assessment Mean |
|---|---|---|---|---|---|
| Residential: | | | | | |
| Dwellings (Dw) | 4,602 | -0.068 **** | -0.092 **** | 0.406 | 0.516 |
| Condominiums (Co) | 976 | -0.061 * | 0.009 -- | 0.734 | 0.711 |
| Flats (Fl) | 1,204 | -0.049 * | -0.098 *** | 0.516 | 0.556 |
| Apartments (Ap) | 770 | -0.024 -- | -0.042 -- | 0.590 | 0.600 |
| Commercial: | | | | | |
| Hotels and Motels (Ho) | 58 | -0.306 ** | -0.141 ** | 0.431 | 0.507 |
| Commercial Stores (CS) | 186 | -0.184 ** | -0.119 *** | 0.541 | 0.544 |
| Stores w Apts/Flts (SF) | 148 | -0.165 ** | -0.310 ** | 0.517 | 0.560 |
| Garage, Park, and Gas (GG) | 44 | -0.410 *** | -0.264 *** | 0.331 | 0.433 |
| Office Buildings (Of) | 64 | -0.367 *** | -0.110 * | 0.356 | 0.454 |
| Industrial: | 168 | -0.156 ** | -0.088 * | 0.423 | 0.496 |
| Miscellaneous: | | | | | |
| Vacant Lots (VL) | 186 | -0.109 -- | -0.021 -- | 0.420 | 0.452 |
| Miscellaneous (Ms) | 44 | -0.077 -- | -0.042 -- | 0.429 | 0.459 |

* = reject null hypothesis of no relationship at .10 significance level
** = reject null hypothesis of no relationship at .05 significance level
*** = reject null hypothesis of no relationship at .01 significance level
**** = reject null hypothesis of no relationship at .001 significance level

| | Mean Assessment Ratio, By Decile of Value Distribution -- (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | Mean, Deciles (1-5) | Mean, Deciles (6-10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential: | | | | | | | | | | | | |
| Dw | 0.54 | 0.51 | 0.53 | 0.53 | 0.51 | 0.48 | 0.52 | 0.51 | 0.54 | 0.49 | 0.525 | 0.507 |
| Co | 0.72 | 0.75 | 0.75 | 0.69 | 0.72 | 0.71 | 0.73 | 0.68 | 0.70 | 0.65 | 0.728 | 0.694 |
| Fl | 0.58 | 0.57 | 0.57 | 0.57 | 0.49 | 0.57 | 0.60 | 0.57 | 0.54 | 0.50 | 0.555 | 0.557 |
| Ap | 0.61 | 0.66 | 0.60 | 0.58 | 0.57 | 0.63 | 0.61 | 0.62 | 0.56 | 0.59 | 0.603 | 0.600 |
| Commercial: | | | | | | | | | | | | |
| Ho | 0.52 | 0.52 | 0.65 | 0.64 | 0.59 | 0.61 | 0.39 | 0.44 | 0.31 | 0.40 | 0.583 | 0.429 |
| CS | 0.65 | 0.67 | 0.54 | 0.50 | 0.54 | 0.53 | 0.51 | 0.51 | 0.44 | 0.54 | 0.579 | 0.508 |
| SF | 0.67 | 0.64 | 0.57 | 0.58 | 0.45 | 0.44 | 0.61 | 0.66 | 0.49 | 0.47 | 0.583 | 0.533 |
| GG | 0.46 | 0.64 | 0.55 | 0.65 | 0.58 | 0.31 | 0.26 | 0.27 | 0.34 | 0.23 | 0.576 | 0.282 |
| Of | 0.57 | 0.69 | 0.42 | 0.53 | 0.43 | 0.48 | 0.31 | 0.25 | 0.37 | 0.46 | 0.529 | 0.374 |
| Industrial: | | | | | | | | | | | | |
| | 0.52 | 0.46 | 0.51 | 0.43 | 0.63 | 0.69 | 0.51 | 0.50 | 0.36 | 0.37 | 0.510 | 0.484 |
| Miscellaneous: | | | | | | | | | | | | |
| VL | 0.48 | 0.46 | 0.44 | 0.43 | 0.52 | 0.49 | 0.44 | 0.49 | 0.41 | 0.36 | 0.466 | 0.437 |
| Ms | 0.53 | 0.37 | 0.55 | 0.45 | 0.50 | 0.44 | 0.41 | 0.45 | 0.44 | 0.47 | 0.481 | 0.440 |

Source: Calculations by author from data supplied by Office of the Assessor, City and County of San Francisco. See Appendix A for category explanation.

While statistically significant, the assessment ratio - value relation for residential properties is not very important. For example on average dwellings in the lower five deciles of the value distribution (for sold properties) would be expected to pay effective rates that were about 3.6% higher than properties in the upper five deciles, a difference that is probably largely offset by the fact that the homeowner's exemption is invariant with home value. But for commercial properties undervaluation of properties at the high end of the value distribution seems more systematic and more significant: the upper 50% of hotels and motels pay effective tax rates that are about 26% less than the rates paid by the lower 50% of properties. For garages, parking lots, and gas stations the tax rates for the upper half of all sold properties (ranked by value) average 49% of the rates for the lower half.

## 6.0 The Results in Historical Perspective

As indicated earlier, it was not possible to obtain similar data for 1977 and 1978 so that computations identical to those presented above could be completed for the last assessment year before proposition 13. However, it is possible to gain a rough impression of the changing incidence of San Francisco's property tax by comparing some of the results for sold properties to work reported elsewhere.

Fortunately, assessment ratios for San Francisco have been calculated in a variety of ways, at a variety of times, by a variety of authors. These results are summarized in table 6 by study. With the exception of the 1974 results, all data apply to single-family residential units. Despite the usual problems of comparability, the data in table 6 tell a consistent story. Prior to a general reform of the city's assessment practices in 1966 assessment ratios were low and inequity was great. Reform produced a computer-based assessment program, a major jump in tax liability, and a remarkable reduction in inequality of assessment ratios across properties. The effects of this reform eroded over time, however, as the assessor's office failed to keep up with rapidly-escalating property prices. The Proposition 13 assessment mechanism continued the general decline in assessment ratios and greatly enhanced the dispersion. By 1984 the median assessment ratio was approaching the pre-reform low and the coefficient of dispersion was considerably greater.

The assessor that produced the results reported for 1964 was put in jail.[21] The framers of Proposition 13 have avoided this penalty, so far.

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[21] After discovery that assessment ratios were correlated with gratuities rendered to the assessor himself. For a useful discussion of this episode

Table 6
Estimated Assessment Ratios, Residential Property
San Francisco, 1964-1984

| Study | Reference Year | Method (1) | Sample Size | Median Assessment Ratio | Coef. of Dispersion | Est. Aggr. Assmnt Ratio |
|---|---|---|---|---|---|---|
| Paul (1975) | 1964 | SD | 1,201 | 0.36 (2) | 0.44 (3) | n.c. (4) |
| California State Board of Eq. (1971) | 1968 | EA | 217 | 0.79 | 0.09 | n.c. |
| Paul (1975) | 1970 | SD | 666 | 0.76 (2) | 0.16 (3) | n.c. |
| California State Board of Eq. (1977) | 1974 | EA | 220 (5) | 0.67 (6) | 0.15 | n.c. |
| U.S. Bureau of the Census (1978) | 1977 | SD | 2,370 | 0.56 | 0.14 | 0.60 |
| U.S. Bureau of the Census (1982) | 1981 | SD | 1,564 | 0.44 | 0.53 | 0.52 |
| This Paper | 1984 | See Text | 4,602 | 0.41 | 0.58 | 0.48 |

Notes:

(1) Key: SD = evaluation based on sales data;
EA = evaluation based on expert appraisal.
(2) Mean, median not available.
(3) Coefficient of variation, coefficient of dispersion not available.
(4) n.c. = not calculated.
(5) Approximate; source not specific.
(6) Median ratio for "improved residential" category.

and comparisons of property taxation procedures in San Francisco and Boston see Paul (1975). An excellent discussion of the reform effort published in 1971 by the California State Board of Equalization argues that reform assessments were deliberately set at less than 100% of market value in anticipation that some of the increase in effective rates of taxation would be capitalized. The extent of capitalization is investigated in Smith (1970).

## 7.0 Summary and Conclusions

The object of this paper was to answer six questions. The answers are, in the order the questions were presented in section one, as follows:

1. The effective rate of property taxation in San Francisco is slightly more than half the nominal rate.

2. Among the twelve classes of property studied, effective tax rates range from 33% to 77% of the nominal rate. Half of San Francisco's property tax base is accounted for by single-family homes and office buildings. The effective rate of taxation on homes is 48% of the nominal rate; for offices the effective rate is 58% of the nominal rate.

3. Uniform assessment with a compensating change in the tax rate sufficient to leave total revenue unchanged would increase total taxes collected from single family dwellings and reduce taxes collected from office buildings, among other and varied changes.

4. The within-class variation of effective rates of taxation evaluated for sold properties is sizable: for sold properties mean deviations of assessment ratios from median values average half of the median value.

5. Judged from sales data, variations in effective property tax rates are significantly inversely related to property values. The relationship is particularly pronounced for commercial properties.

6. The inequity in assessment ratios and effective rates of property taxation, judged by the coefficient of dispersion, is on the order of four times greater than was characteristic of the outcomes of the assessment system prior to 1978.

In 1978 a majority of California voters chose to sacrifice equity in property taxation for certainty regarding year-to-year changes in tax liability. At the time of the election the equity cost of the gain in certainty was unknown. This paper has clarified what the cost has been ex post with a methodology that can be replicated elsewhere in California. These results should be considered in framing alternatives to or reforms of the Proposition 13 system.

## A.1 General Classification Scheme

| Code | Sub-Code | Category Name | Included Regression and Imputation Categories |
|---|---|---|---|
| 1 | | Residential | |
| | a | Residential: Dwellings | Dwellings |
| | b | Residential: Condominiums | Condominiums |
| | c | Residential: Flats | Flats |
| | d | Residential: Apartments | Apartments |
| 2 | | Commercial | |
| | a | Commercial: Hotels and Motels | Hotels and Motels |
| | b | Commercial: Retail and Wholesale Trade | Stores<br>Flats and Stores<br>Garage and Gas |
| | c | Commercial: Offices | Offices |
| 3 | | Industrial | Industrial |
| 4 | | Other | Vacant Lots<br>Miscellaneous |

## A.2 Codes Used by the San Francisco Assessor

| S.F. Code | Classification, this paper | San Francisco Assessor's Category |
|---|---|---|
| dd | 1a | Two Dwellings - One Parcel |
| df | 1a | One Flat & Dwelling - One Parcel |
| d | 1a | Dwellings |
| da | 1a | Dwellings - Apartments |
| co | 1b | Co-op Units |
| z | 1b | Condominium |
| fa | 1c | One Flat & One Apt. Bldg - One P |
| f | 1c | Flats & Duplex |
| a | 1d | Apartments |
| hc | 2a | Hotels with Commercial |
| h2 | 2a | Hotels - Other |
| m | 2a | Motels |
| h1 | 2a | Hotels - First Class |
| s | 2b | Gas Stations |
| g | 2b | Garages (Commercial) |
| gz | 2b | Garage Condominium |
| f2 | 2b | Flat & Store |
| p1 | 2b | Parking Lot |
| cz | 2b | Commercial Store Condominium |
| bz | 2b | Bank Condominium |
| c1 | 2b | Shopping Center |
| c | 2b | Commercial Stores |
| b | 2b | Banks |
| ac | 2b | Apartments & Commercial Stores |
| t | 2b | Theaters |
| o | 2c | Office Buildings |
| oz | 2c | Office Condominiums |
| i | 3 | Industrial |
| iw | 3 | Industrial Warehouse |
| xv | 4 | Single Structure Over Mult. Lots |
| n2 | 4 | Convalescent Homes, Nursing Home |
| u | 4 | Clubs, Lodges, Fraternal Organiz |
| y | 4 | Port Commission Property |
| pz | 4 | Parking Stall Condominium |
| n1 | 4 | Hospitals |
| p | 4 | Public Buildings (Government) |
| v | 4 | Vacant |
| gc | 4 | Golf Course |
| w | 4 | Churches, convents, Rectories |
| vr | 4 | Vacant Lot - Restrictions |
| x | 4 | Miscellaneous (Other Than Listed |
| e | 4 | Schools |
| | 4 | Incomplete Statistics |

## B.1 Regressions Used for Market Value Imputations

Dependent Variable is Assessed Value Following Sale (VAL84):

| Property Type | Note | Inter-cept INT | Assessed Value, 1983 VAL83 | Built Bef 1905 Y1 | Built Bef 1915 Y2 | Built Bef 1940 Y3 | Built Bef 1960 Y4 | Built Bef 1970 Y5 | Built Bef 1980 Y6 |
|---|---|---|---|---|---|---|---|---|---|
| Dwellings | | 172485 | 0.731944 | -11402.40 | 4297.287 | 3234.569 | -3872.815 | -11914.01 | 4403.697 |
| | | (9.804) | (25.566) | (-2.662) | (1.323) | (1.227) | (-0.580) | (-1.126) | (0.318) |
| Condominiums | | 70203.25 | 0.981552 | -12491.06 | 2922.678 | -1993.497 | -42750.68 | 51418.005 | 6957.597 |
| | | (6.039) | (19.269) | (-0.688) | (0.210) | (-0.080) | (-1.691) | (3.917) | (0.625) |
| Flats | | 141508 | 0.702659 | -11242.36 | -13402.71 | 9444.771 | -2213.3 | 12245.315 | 20147.919 |
| | | (5.816) | (18.381) | (-2.174) | (-2.168) | (1.073) | (-0.118) | (0.508) | (0.754) |
| Apartments | | 50345.122 | 1.211725 | -35504.79 | -34439.87 | -35570.15 | 16944.93 | -50075.15 | 239798 |
| | | (0.507) | (68.569) | (-1.493) | (-1.660) | (-1.056) | (0.432) | (-1.037) | (2.275) |
| Hotels, Motels | (1) | 37324831 | -0.74537 | Excl. | 720958 | Excl. | Excl. | Excl. | Excl. |
| | | (4.014) | (-1.021) | | (0.991) | | | | |
| Stores | (2) | 130012 | 1.49916 | 105279 | -51546.79 | 163679 | -122502 | 449668 | -231247 |
| | | (0.351) | (18.415) | (0.594) | (-0.427) | (1.102) | (-0.510) | (1.512) | (-0.540) |
| Flats/Stores | | 342045 | 0.874966 | -14727.49 | 10698.516 | -62444.56 | Excl. | Excl. | Excl. |
| | | (4.738) | (8.814) | (-0.474) | (0.321) | (-1.084) | | | |
| Garages | (3) | 548182 | 2.964281 | Excl. | -635421 | -109505 | -15247.32 | Excl. | Excl. |
| | | (1.068) | (7.616) | | (-1.495) | (-0.262) | (-0.033) | | |
| Office Bldgs. | | -633464 | 1.734937 | 1871034 | 1819968 | -7903126 | 1453324 | 8764620 | Excl. |
| | | (-0.071) | (7.471) | (0.391) | (0.384) | (-1.294) | (0.265) | (1.029) | |
| Industrial | (4) | 226580 | 1.216422 | -25285.02 | -70120.78 | 160607 | 19353.806 | 4783.092 | 2768.521 |
| | | (0.593) | (15.128) | (-0.144) | (-0.675) | (2.101) | (0.189) | (0.025) | (0.007) |
| Vacant Lots | | -135173 | 5.568482 | -39115.67 | Excl. | Excl. | Excl. | Excl. | Excl. |
| | | (-0.239) | (18.032) | (-0.071) | | | | | |
| Miscellaneous | | 646557 | 1.124418 | 320060 | -361714 | 242603 | 88226.536 | -183389 | Excl. |
| | | (1.266) | (14.926) | (1.222) | (-1.329) | (0.950) | (0.274) | (-0.344) | |

Notes:

For variable definitions see part 2 of this appendix. Individual property class regressions include some class-specific variables (identified in notes, below) for which estimated coefficients are not reported. Complete regression listings are available from the author.

(1) Hotel regression includes dummy variables (not shown) for motels and "other" (i.e., not "first class") hotels.

(2) Stores regression includes dummy variable (not shown) for banks.

(3) Garages regression includes dummy variable (not shown) for gasoline stations.

(4) Industrial properties regression includes dummy variable (not shown) for industrial warehouses.

| Property Type | Transit "Superdistrict" No. 2 | 3 | 4 | Homeowner Occupied | Home-AV Interact | Obs. | R2 (Adj.) |
|---|---|---|---|---|---|---|---|
| Dwellings | MTCSD2 | MTCSD3 | MTCSD4 | HOME | PHOME83 | | |
| | -18823.77 | -105310 | -82227.11 | -2560.12 | 0.376915 | 4602 | 0.5762 |
| | (-1.481) | (-8.385) | (-6.490) | (-0.755) | (11.248) | | |
| Condominiums | -19547.92 | -42616.30 | -73690.14 | -4306.54 | 0.140708 | 976 | 0.9934 |
| | (-2.536) | (-4.075) | (-1.299) | (-0.425) | (2.761) | | |
| Flats | -20037.08 | -76383.61 | -50813.62 | 4961.704 | 0.061325 | 1204 | 0.4471 |
| | (-2.491) | (-9.56) | (-4.581) | (0.643) | (1.004) | | |
| Apartments | -56896.14 | -123802 | -140160 | 8290.155 | 0.099296 | 770 | 0.8772 |
| | (-2.543) | (-5.076) | (-3.376) | (0.245) | (0.686) | | |
| Hotels, Motels | 298523 | 413709 | Excl. | N.A. | N.A. | 58 | 0.943 |
| | (0.424) | (0.520) | | | | | |
| Stores | -238904 | -232436 | -244448 | N.A. | N.A. | 186 | 0.8946 |
| | (-1.890) | (-1.838) | (-1.420) | | | | |
| Flats/Stores | -127607 | -196428 | -101799 | N.A. | N.A. | 148 | 0.4692 |
| | (-2.637) | (-4.342) | (-1.634) | | | | |
| Garages | -141486 | -306580 | Excl. | N.A. | N.A. | 44 | 0.6812 |
| | (-0.388) | (-0.682) | | | | | |
| Office Bldgs. | -6725879 | -5785195 | -5579526 | N.A. | N.A. | 64 | 0.6513 |
| | (-1.613) | (-1.145) | (-0.695) | | | | |
| Industrial | -165370 | -161482 | Excl. | N.A. | N.A. | 168 | 0.6265 |
| | (-1.883) | (-2.041) | | | | | |
| Vacant Lots | 105219 | 96005.86 | 142888 | N.A. | N.A. | 186 | 0.6819 |
| | (0.628) | (0.699) | (0.586) | | | | |
| Miscellaneous | -496325 | -625158 | Excl. | N.A. | N.A. | 44 | 0.8707 |
| | (-2.378) | (-3.020) | | | | | |

## B.2 Variable Definitions, Regressions

| Variable | Definition |
|---|---|
| INT | Intercept |
| VAL83 | Assessed Value of Parcel, 1983 (in dollars); includes land and structures |
| VAL84 | Assessed Value of Parcel, 1984 (in dollars); includes land and structures |
| Y1 | Structures on parcel built before 1905 |
| Y2 | Structures on parcel built before 1915 |
| Y3 | Structures on parcel built before 1940 |
| Y4 | Structures on parcel built before 1960 |
| Y5 | Structures on parcel built before 1970 |
| Y6 | Structures on parcel built before 1980 |
| Y7 | Structures on parcel built after 1979 (excluded group) |
| MTCSD1 | Metropolitan Transportation Commission "Super District" 1 (Downtown)(Excluded Group) |
| MTCSD2 | Metropolitan Transportation Commission "Super District" 2 (Northwest Quadrant) |
| MTCSD3 | Metropolitan Transportation Commission "Super District" 3 (Southeast Quadrant) |
| MTCSD4 | Metropolitan Transportation Commission "Super District" 3 (Southwest Quadrant) |
| HOME | Property qualified for homeowner exemption in 1983 |
| PHOME83 | HOME*VAL83 |

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