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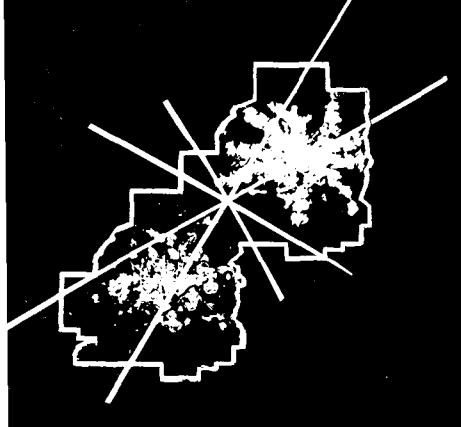

DETERMINANTS OF TAX REVENUES AND CURRENT EXPENDITURES OF SUBURBAN COMMUNITIES IN THE TWIN CITIES METROPOLITAN AREA

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CONTENTS

Page

Preface iii

Introduction 1

Fiscal Study of Community Development 2

Stage of Community Development and Property Tax Rate 3

Community Land Use and Its Fiscal Effects 9

Economic and Social Determinants of Variations in Local Government Revenues and Expenditures 11

Summary and Conclusions 16

Appendix 17

PREFACE

This study is part of a project that began in the summer of 1967 as a University of Minnesota Community Service program entitled "Metropolitan Growth: The Impact of Alternative Patterns." The total program has emphasized both educational and related research efforts.

One of the conclusions reached early in the project was that property taxation is of critical importance in the economics of local communities and in their revenue systems. The taxation of land and improvements provide for the bulk of tax revenues in the Twin Cities metropolitan area and in many communities a heavy tax burden on real property has been a contributing factor in urban blight and a barrier to the optimum development of land use. Many community leaders are deeply interested in the relationships between land uses and land taxation and their effects on community economic growth.

In an effort to strengthen their revenue resources many communities have invited new industries to locate within their borders and existing industries to expand their operations. Questions have arisen concerning the effects of these policies on property tax revenues and local government expenditures. This study was undertaken to help answer these and other current problems of land use and property taxation. Dr. Nelson's study probes into the influence of local property taxes and land uses in sixty-one suburban communities in the Twin Cities Metropolitan area. The author notes the limitations of his data, conclusion, and the methodology used in this study. His contribution will be of interest to those who are studying and determining the appropriate role of property taxation as a local revenue source.

Without the fiscal support acknowledged on the title page of this report, this effort could not have been accomplished. Appreciation is also expressed to the other members of the program staff and to the members of both the Community Advisory Group and the University Faculty Advisors who have consistently supported this program.

John S. Hoyt, Jr., Program Director

INTRODUCTION

Since World War II, nearly all of Minnesota's population growth has occurred in urban areas. The heart of this growth is Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties, which form the seven-county Twin Cities Metropolitan Region. In 1968 over 1.7 million people lived in 555,800 dwelling units in the region. Forty-six percent of the state's school-age children were educated in public schools in the region's 60 school districts and lived in 26 cities, 105 villages, and 68 townships.[1] Often their parents worked in one municipality, lived in another, and participated in the recreational and cultural activities of a third.

The region is fragmented into more than 300 separate taxing districts. Variations in incomes and wealth of the citizens in these districts cause marked differences in the public services provided. The mobility of the metropolitan populace and the fact that the area is a common labor market create problems that transcend traditional political boundaries. Despite the integrated nature of much of the metropolitan economy, most local government revenue still comes from property taxes. Communities must compete with each other to build strong property tax bases.

Despite increased state and federal aid to local government, inflation and demands for more and higher quality services have raised public service expenditures faster than metropolitan property values. Property tax revenue is a function of the tax rate applied to the tax base, which is measured by the assessed valuation of all eligible real and personal property in the taxing jurisdiction of the local governmental unit. If tax revenues are to increase, the tax rate and/or base must increase. In the Twin Cities Metropolitan Area - with population increasing in the suburban communities and health and welfare demands increasing in the central cities - the demand for public services is growing more rapidly than the tax base. Consequently, the tax rate has risen in all communities.

Trying to strengthen revenue resources, leaders of many communities invite new industries and businesses to locate within their boundaries, and encourage existing industries and commerce to expand operations. They believe that the new community development will increase the tax base and the advantages to the community will outweigh any added costs for additional public services. In a metropolitan complex the advantages of new industrial or commercial development depends a great deal on where its labor force will live. The type (skilled or unskilled) of labor force employed in a community and the wage level paid will be reflected in the value of homes, the ratio of multiple to single-family dwelling units in the community, and indirectly, the tax base. The advantages of industry or commerce are offset, if the highly paid employees live in neighboring communities and the poorly paid ones live near their work, creating a burden on the school system, and public parks, recreation and welfare,

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1. Metropolitan Council, Outline of Revised Standard Speech for Metropolitan Council Members, February 1968.

and police departments. Thus, community leaders must analyze how the decisions they make during various stages can determine the community's future sources of property-tax-based revenues and public service expenditures. The purpose of this study is to help communities make intelligent development decisions.

FISCAL STUDY OF COMMUNITY DEVELOPMENT

This study provides needed data and analysis to facilitate a better understanding of the fiscal effect of alternative growth and development patterns in the Twin Cities Metropolitan Area. The study focuses specifically on the individual taxpayer, his municipality, county, and school district.

Communities in the metropolitan area, considered rural a decade ago, are yielding rapidly to the pressures of urbanization. Commercial and industrial establishments, once confined to the two central cities, now are scattered throughout the region. New and old suburban communities show unprecedented interest in land-use controls. Predominantly residential or rural communities are discovering that, as the metropolitan population grows, more and more of the vacant land is suitable for shopping centers, manufacturing plants, and research centers. With financial aid from the Department of Housing and Urban Development (under Section 701 of the Housing Act of 1954), many municipalities are creating planning commissions to draw up master plans, usually with generous allowances for nonresidential land uses. Demographic and aesthetic considerations undoubtedly are important to planning officials, but fiscal considerations are increasingly crucial in their municipal development policy making. Sometimes without adequate knowledge of the fiscal implications, leaders of municipalities are encouraging development they feel will add more revenue than expenditure and are discouraging land uses and economic groups they feel will raise their tax rate.

Procedure

Analyses of community development and the fiscal implications take three forms in this report: (1) Communities in the metropolitan area are classed by subregions based on their proximity to Minneapolis and St. Paul; (2) Community types are studied by land use, such as residential, commercial, industrial, etc. An attempt is made to understand the relationship between land use, tax base, and public service expenditures; and (3) Cross sectional data and regression analysis are used to study the indirect effects of community attitude, and the effects of social and economic characteristics of the community population on the tax base and expenditure level.

Data were compiled for 63 Twin Cities area municipalities, their 43 school districts, and the seven counties which form the metropolitan region.

The 63 municipalities studied include the Twin Cities and the 61 (named in Appendix C) most populous suburban communities (all with populations over 2,500). The Twin Cities were excluded from the second and third phases of the study to focus on the suburban communities.

STAGE OF COMMUNITY DEVELOPMENT AND PROPERTY TAX RATE

Suburban communities were classified by location relative to Minneapolis and St. Paul to aid in examining two factors that influence the tax base and the level of expenditures. First, the community is defined by age and the stage of its growth and economic development. Second, the communities are grouped by population density. Table 1 shows the number of communities in each subregion and the relative sizes of these subregions in land area and population.

The Twin Cities have a high density 46.3 percent of the population on 8.2 percent of the land. At the other extreme, the outer ring of communities has over two-fifths of the land area (44 percent of the total), but only 11.2 percent of the population.

Minnesota's taxable wealth is mainly real property. In addition to real estate, the local property tax base includes tangible personal property, such as plant machinery, store inventories, and household items in rental property. Each year the State Board of Equalization of the Minnesota Department of Taxation prepares for each city, village, and township a table of equalized valuations showing the sales ratio of the assessor's valuation to the properties' actual selling price. However, only the residential property sales ratios are made public. The ratio for residential property is obtained by averaging for all bona fide transactions in the municipality the ratio of the sales price to the assessed value. This ratio was used to obtain values of residential property. In this study the total market value of a municipality's nonresidential real property is the adjusted market value multiplied by three: the standard assessment ratio of all property.

Table 1 relates the distribution of the real property market value in 1967 (for 1968 tax collection) to land area and population. When taxable real property values are compared in this way, a regional pattern emerges. The density of real property (market value per square mile) follows a similar pattern to population density, decreasing as it moves away from the central cities. This pattern is not nearly so strong when account is taken of differences in population in the per capita figures. When a comparison is made of the two central cities with the 61 suburban communities, it becomes apparent that while the central cities hold a decisive advantage in per acre value the difference is relatively small when population differences are considered.

Table 1. Sizes of metropolitan subregions and estimated market value of real taxable property, 1967: total value, population per acre, and per capita value.

Subregion	Number of cities	Land area (acres)	Population 1967	Population per acre	Market value of real property		
					Value (millions)	Per acre	Per capita
Central cities	2	73,464	773,939	10.53	$4913.3	$66,880	$6,348
Inner ring*	16	84,243	397,705	4.72	2302.8	27,335	5,790
Intermediate ring*	17	179,667	312,248	1.74	1459.4	8,123	4,674
Outer ring*	28	263,471	187,315	0.71	915.9	3,476	4,890
Total noncentral cities	61	527,381	897,268	1.70	4678.1	8,871	5,214
Total	63	600,845	1,671,207	2.78	9591.4	15,963	5,739

*See Appendix C.

Source: The Joint Program, Information Bulletin No. 8; Minnesota Department of Taxation, State Board of Equalization; Metropolitan Council, Data-log No. 2 October 1968.

Table 2. Estimated market value of taxable real property within subregions: 63 metropolitan communities, 1967.

	Estimated market value of all real property (millions)	Type of property as percent of subregion						
		Residential	Commercial	Industrial	Farm	Public Utility land	Other Property	Total
		Percent						
Central cities	$4,913.3	53.4	31.1	10.2	0.0	4.0	1.3	100
Inner ring	2,302.8	71.3	17.5	10.0	0.1	1.0	0.1	100
Intermediate ring	1,459.4	76.6	12.9	7.4	1.6	0.7	0.8	100
Outer ring	915.9	71.9	9.6	5.0	5.2	7.3	1.0	100
Total noncentral cities	4,678.1	73.2	14.6	8.3	1.6	2.1	0.2	100
Total	9,591.4	63.0	23.0	9.3	0.8	3.1	0.8	100

Table 2 shows the relative importance of residential, commercial, industrial, farm, and public utility real property by subregion. It is not surprising to note the increasing importance of industrial and commercial property as the suburban rings draw nearer the central cities. Residential property accounts for over half of the market value of taxable property in all of the subregions, but is as high as 76.6 percent in the intermediate ring and as low as 53 percent in the Twin Cities.

The substantial growth in the metropolitan region during the past 5 years has been diffused throughout the region as table 3 indicates. The value of real taxable property rose 24 percent during the 5-year period and almost 44 percent in the 61 suburban communities. Growth increased most in the intermediate ring of municipalities: 58.5 percent increase - from $920 million to $1,459 million.

Growth in residential market value was strongest in the outer ring for municipalities with a 54.9 percent increase, but closely followed by intermediate ring with a 46.8 percent gain. Although the data in table 3 cover only 5 years, they seem to support the view that decentralization of commercial and industrial construction has meant a relative decline in the growth of the tax base of older communities. Industrial and commercial growth rates were highest for the intermediate ring of communities with 107.9 and 189.0 percent increases, respectively. As with residential property, the increase in industrial and commercial property was considerably smaller in the central cities than in the 61 suburban communities.

Despite the apparent move of industry and commerce from the central cities, note in table 4 that the two central cities still contain 43 percent of the market value of residential property, 69 percent of the industry, 56 percent of the commercial value, and 66 percent of the public utility property of the 63 largest communities in the metropolitan region.

Table 3. Market value of real property in 63 communities in the metropolitan region, 1962 and 1967, and percentage increase, 1962-1967.

Market value by type of property	Central cities	Inner ring	Intermediate ring	Outer ring	Total noncentral cities	Total
Total real property						
municipalities	2	16	17	28	61	63
1967 value (000)	4,913,298	2,302,820	1,459,380	915,949	4,678,150	9,591,447
1962 value (000)	4,485,585	1,697,356	920,488	633,900	3,251,744	7,737,329
Percent change	9.5	35.7	58.5	44.5	43.9	24.0
Residential property						
municipalities	2	16	17	28	61	63
1967 value (000)	2,621,020	1,645,925	1,118,428	659,034	3,423,386	6,044,406
1962 value (000)	2,317,290	1,350,447	761,699	425,553	2,537,699	4,854,989
Percent change	13.1	21.9	46.8	54.9	34.9	24.5
Industrial property						
municipalities	2	13	16	20	49	51
1967 value (000)	502,048	235,785	108,767	45,529	390,081	892,129
1962 value (000)	455,627	136,925	52,325	31,542	220,791	676,418
Percent change	10.2	72.2	107.9	44.3	76.7	31.9
Commercial property						
municipalities	2	16	16	28	60	62
1967 value (000)	1,525,662	407,864	181,383	87,533	683,780	2,209,442
1962 value (000)	1,507,292	183,391	65,193	49,526	298,111	1,805,403
Percent change	1.2	122.4	189.0	76.7	129.4	22.4
Farm property						
municipalities	1	7	12	22	41	42
1967 value (000)	415	4,029	23,069	47,154	74,252	74,668
1962 value (000)	432	15,279	23,080	37,309	75,665	76,097
Percent change	-3.8	-73.6	0.0	26.4	-1.9	-1.9

Table 3 (continued)

Market value by type of property	Central cities	Inner ring	Intermediate ring	Outer ring	Total noncentral cities	Total
Public utility property municipalities	2	14	13	22	49	51
1967 value (000)	195,120	22,794	10,194	67,218	100,025	295,325
1962 value (000)	201,529	11,515	9,711	85,757	106,984	308,512
Percent change	-3.2	97.9	5.0	-21.6	-6.3	-4.3

Source: Calculated from data obtained from the Minnesota Department of Taxation, State Board of Equalization.

Table 4. Relative Proportion of taxable real property among subregions. 63 metropolitan communities, 1967.

		Type of property as percent of same class of property				
Subregion	Est. true mkt. value of all real property percent of total sub-region	Residential	Industrial	Commercial	Farm	Public Utility
Central Cities	51.2	43.4	69.0	56.3	0.6	66.1
Inner ring*	24.0	27.2	18.5	26.4	5.4	7.7
Intermediate ring*	15.2	18.5	8.5	12.2	30.9	3.4
Outer ring*	9.6	10.9	4.0	5.1	63.1	22.8
Total noncentral cities	48.8	56.6	31.0	43.7	99.4	33.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Derived from data in The Joint Program, Information Bulletin No. 8; Minnesota Department of Taxation, State Board of Equalization.

A measure of the real property tax level that adjusts for departures from a 100 percent assessment ratio can be obtained by taking the ratio of the tax levy on the property to its full market value and expressing the ratio as a percentage. This ratio is commonly referred to as the "effective tax rate." Since real property in Minnesota is assessed at less than 100 percent of full market value, the effective tax rate is normally much lower than the official tax rate.

Table 5 compares the effective tax rates of the four groups of communities. The mean effective tax rate is considerably higher in the 17 intermediate ring communities than in the other three classes of communities. The community characteristic which appears to be most closely associated with the local property tax rate is the stage or rate of community growth and development. The high tax rate of the intermediate ring of communities appears to be associated with the growth in residential, industrial, and commercial taxable property as shown in table 3. This may not be surprising considering the added expenditures for such things as public safety, highways, sanitation, storm sewers, and added pressures on the school system, often accompanying community growth. Obviously new development in a community whether it be industry, commerce, or residential development provides a substantial boost to the tax base, but this can be a mixed blessing to the community. The fiscal advantages (if any) of new development to a community depends on the community's present stage of development. When new fire protection equipment or new sanitation facilities and new schools are required to meet the needs of a new industry, the fiscal advantage of the new development can fail to materialize. Table 3 illustrates this point. While the intermediate ring had the greatest percentage increase in market value (58.5%) the dollar value growth of $538.892 million was less than the dollar value growth of the inner ring of communities and close to the central cities with $605.464 million and $427.713 million of growth in market value or taxable real property, respectively. It seems reasonable that part of the difference in the size of the effective tax rate among communities is their respective present stages of development.

Table 5. Mean effective tax rate by subregion for 63 metropolitan communities. 1967.

Subregion	Number of municipalities	Mean effective tax rate (percent)	Range of effective tax rates
Central cities	2	3.22	2.92-3.41
Inner ring	16	3.37	2.50-4.53
Intermediate ring	17	4.55	2.35-7.33
Outer ring	28	3.42	1.35-5.64

COMMUNITY LAND USE AND ITS FISCAL EFFECTS

The second part of this paper explores the fiscal effects of alternative land uses in the Twin Cities metropolitan area. The property tax base of the 61 largest suburban communities in the seven county metropolitan area is analyzed on per capita expenditures for municipal, public school, and county current expenditures.

Expenditures for capital outlays were not included in the analyses because of their irregularities. With few exceptions school district and municipal boundaries are not coterminous in the metropolitan area. The majority of the school districts contain all or part of several municipalities. However, in 1967 the State Board of Equalization, Minnesota Department of Taxation, maintained a record of the assessed value of all real and personal taxable property for each Minnesota school district by city, village, and township. It was possible to ascertain the property tax base of each school district by municipality. The assumption was made that the school expenditures of property tax revenues by municipality is measured by the school levy in that municipality.

For further breakdown, the suburban communities were classified as one of five types, industrial, commercial, residential, high value residential, and low value residential with two criteria as a basis: the ratio of the property of interest to the total taxable property within each municipality, and that the per capita dollar value of the class of property be above the average value for that class of property by a specified number of dollars.[2] If a municipality met either of these criteria it was sufficient to place it in one of the five classes.

Having classified the suburban communities into the five classes just mentioned, the next step was to test each group of communities for differences in their tax base and public service current expenditure. It was hypothesized that industrial, commercial, and high value residential municipalities have a decisive advantage in per capita tax resources; that residential communities have no significant advantage or disadvantage in per capita tax base; and that low value residential communities have a decisive disadvantage in per capita tax resources. It is felt that this hypothesis seems to conform with many city officials' and chambers' of commerce opinions that industrial, commercial, and high value residential development is advantageous to the community while low value residential development is to be discouraged.

Considering first industrial and commercial municipalities, it was further hypothesized that industrial and commercial cities have considerably higher per capita municipal and nonschool current expenditures, but have

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2. The specified level of acceptance was one-half standard deviation above or below the mean municipality.

significantly lower per capita school expenditures.

Industrial and commercial enterprises, require services such as sanitation, highways, and fire protection provided by the city or county. However, there appears to be no a priori reason why the need for school services would vary with the degree of industrialization or commercial activity.

Next, considering residential property it was hypothesized that residential communities, whether low or high value, will place considerably higher demands on school services resulting in higher per capita expenditures. Nonschool expenditures were hypothesized to remain at approximately the same level as for nonresidential communities for which considerably higher city and county per capita expenditures were expected to be found.

Many of the nonschool expenditures resulting from residential development, such as streets, water, sewer, walks, and gutters are covered by special assessments on the homeowner and are not considered as part of the municipal current expenditures. As the community residential population increases, new highways, added police, fire proteciton, and recreational facilities will be required, but these are not expected to exceed those of highly nonresidential communities. A different situation may prevail in low value residential communities where welfare and public health assistance may result in high nonschool expenditures. The increased need for police and fire protection may result from high density housing which is normally associated with low value residential areas.

The results of testing the above hypotheses are classified by type of municipality and summarized in table 6. A statistical test[3] has been applied to determine whether there is actually a difference between the mean tax base, and municipal, school, and county expenditures of each of the five classified community types and the mean for those communities not included in each specific class. For example, 16 of the 61 municipalities included in this study are classified as industrial based on the two previously stated criteria. Table 6, column 2, shows that the 16 industrial municipalities (group 1) had a mean-tax base per capita of $685.60 compared to a mean-tax base of $551.30 for the 45 (61-16) non-industrial communities called group 2. For column 3, the 21 communities of group 1 are the commercial municipalities and group 2 is the 40 non-commercial municipalities, etc. Table 6 shows that industrial communities do have a higher per capita tax base, but they also spend more for their municipal local services: 1.9 times as much per capita as the low-value residential units, and 1.5 and 1.3 times as much as the residential and high-value residential communities, respectively.

Commercial municipalities failed to show a significant difference in their per capita tax base in relation to noncommercial communities, but there

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3. A statistical t-test.

appears to be some spread between group 1 and group 2 means. Municipal current expenditures, however, are significantly higher than those of noncommercial municipalities and are close in value to industrial municipal expenditures per capita.

High value residential mean values conform to expectations although county current expenditures per capita seem unusually high. Residential and low value residential land use communities both show a lower tax base per capita than do their neighboring communities. This is contrary to expectation in the case of residential property. The significantly lower municipal and county expenditures for low value residential communities is difficult to explain, but it may be due in part to the lower tax base from which tax revenue can be obtained.

The premise that all industrial and commercial development of any sort and under any conditions is advantageous to the community may not hold up under closer examination. The new industrial development in a community may well increase the tax base sufficiently to be of benefit to the individual property owner who pays a municipal, school, and county tax levy on his home. However, unless the school districts receive a smaller percentage of the property tax revenue based on the increase in their tax base, the homeowner will probably see his taxes rise to cover the increased costs of municipal and county government.

ECONOMIC AND SOCIAL DETERMINANTS OF VARIATIONS IN LOCAL GOVERNMENT REVENUES AND EXPENDITURES

The final part of this paper is concerned with the nature of housing, employment, income, and wealth and the way in which they reflect the ability of the community to finance local school and nonschool public services.

Data for this part of the study were obtained on 61 Twin Cities suburban communities that were included in parts one and two of this paper. The 61 communities include both highly urbanized and sparsely populated areas.

Wide differences in the tax base and the level of specific public expenditures were found to exist among communities in the last section of this paper. As a step toward explaining the variations which exist among the communities in their property tax revenues per capita, municipal and school property tax revenues by municipality were compared to their respective per capita tax bases. Based on statistical analyses[4] a direct relationship was found to exist between city and school property tax revenue per capita and the per capita tax base. The data indicated that city tax revenue

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4. See appendix D for a complete explanation of the statistical model used and the technical results obtained.

Table 6. Comparisons of per capita mean tax base by type of community.

Community tax base or expenditures (1)	Industrial land use vs. other uses (2)	Commercial land use vs. other uses (3)	High value residential land use vs. other uses (4)	Residential land use vs. other uses (5)	Low value residential land use vs. other uses (6)
Number of communities					
Group 1[1]	16	21	10	16	16
Group 2	45	40	51	45	45
Tax base per capita					
Mean-group 1	$685.60	$654.50	$838.50	$492.40	$434.40
Mean-group 2	551.30	550.90	537.20	620.10	640.70
t-value[2]	2.40*	1.97	5.25*	-2.28*	-3.96*
Municipal current expense					
Mean-group 1	58.09	57.67	44.39	37.54	29.35
Mean-group 2	42.73	41.02	47.22	50.03	52.94
t-value	2.24*	2.66*	-0.33	-1.79	-3.65*
School current expense					
Mean-group 1	181.45	159.05	200.81	165.56	151.38
Mean-group 2	160.54	169.69	159.21	166.20	171.24
t-value	1.42	-0.77	2.45*	-0.04	-1.34
County current expenses					
Mean-group 1	68.89	58.23	79.83	46.49	43.31
Mean-group 2	50.97	54.33	50.94	58.94	60.07
t-value	2.17*	0.49	3.05*	-1.48	-2.02*

*Denotes significant difference between the means.

1. Group 1 refers to that group of communities classed as industrial, commercial, etc. Group 2 are the remaining communities.
2. t=2.02 at .05 level of significance and 59 degrees of freedom.

increased by 9.6 percent for each 10 percent increase in the tax base and school property tax revenues increased by 6.9 percent.

A positive correlation between a community's property tax base and tax revenues was to be expected since high property valuations are associated with an ability to finance government expenditures. This relationship would seem to indicate that municipal and school revenues are more responsive to a community's ability to finance government than on the need for tax funds to finance community school and nonschool local services. This observation is more apparent when one recalls from part two of this study that low property value residential communities had significantly lower local expenditures than their neighboring communities despite the increased demands they place on government services.

Comparing school and county property tax revenues to municipal tax revenues failed to show any significant relationship. It was expected that communities having high school or county property tax levies would compensate by levying a lower municipal tax, but the data did not bear this out. Likewise, school districts located within municipalities levying relatively high property taxes were not found to receive less property tax revenue as a compensation to the taxpayers for the high nonschool revenues. The most valid explanation of the level of per capita city or school property tax revenues rests with the total tax base (property value) per capita.

A statistical regression technique was employed to help explain some of the reasons for differences existing in communities' per capita property tax base.[5] The following five possible reasons for the difference between the communities were examined: (1) Median value of homes, (2) percent of population over 17 years of age employed in industrial or manufacturing firms in 1965, (3) percent of community's dwelling units classified as multiple dwelling units in 1967 (units in structures containing three or more housing units), (4) percent of community's single family owner dwelling units occupied in 1967, and (5) population per acre in 1967. The relationships between the per capita tax base and the five explanatory variables are indicated by their respective elasticities which are quantitative descriptive measures of responsiveness of the per capita tax base to change in an explanatory variable. The elasticity is negative when the per capita tax base is inversely related to an explanatory variable, and positive when per capita tax base is directly related. An absolute value for elasticity of 1 would mean that a percentage change in an explanatory variable produced the same relative change in the per capita tax base. A value of zero for elasticity means that the dependent variable does not change with a change of an explanatory variable.

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5. See Appendix D for regression results.

Table 7. Elasticities of communities tax base and local expenditures with five explanatory variables, twin cities metropolitan area. 1967

Explanatory variables	Tax base per capita	Elasticities		
		City Expenditure per capita	School expenditure per capita	City expenditure per capita
Median value of home (1959)	1.1056	0.0871	0.6396	0.5410
Percent of population over age 18 employed by industrial and manufacturing firms	0.1424	0.1653	0.0647	0.1101
Percent multiple dwelling units	0.0063	-.0079	0.0075	-.0509
Percent single-family, owner-occupied dwelling units	0.0225	-.0122	-.0089	0.0079
Population per acre	-.0822	0.1941	-.0796	0.0957

For example, the first column of data in table 7 shows that the median value of a community's homes has a substantial effect on the per capita tax base. The high elasticity of 1.1056 would seem to indicate that differences between communities in their per capita tax bases and, therefore, the ability to finance public services is greater than the differences in the value of their homes. Part of the reason for this relationship may be the fact that the homestead exemption applies only to the first $4,000 of adjusted market value. Thus, as home values rise, the proportional exemption falls and, therefore, taxable values rise more rapidly than market values.

As might be expected, a high correlation was found between the value of homes in a community and the community's median family income.[6] When the two variables were compared, the elasticity was 1.1653 meaning the median value of homes increase slightly faster than median family income. This is further evidence that residents of high income, wealthy communities find it easier to finance needed public services.

Industrial and commercial employment has a significant effect on the tax base as does the population per acre of a community, however, the latter

6. See Appendix D for the value of the correlation coefficient.

effect is inverse. The positive effect of industrial and commercial employment on the tax base was expected since employment provides an indication of economic growth and development in the property value of a community. The negative elasticity for population per acre lends support to the general assumption that high tax rate communities are generally the most populous. The most populous communities are usually located near the central cities and are the older communities.

The variables - percent multiple dwelling and single family owner occupied dwelling units - were found not to be useful in explaining variations in the per capita tax base. Apparently these variables do not account for a large enough proportion of the community tax base or show sufficient variation among communities to contribute substantially to the analysis.

The same five explanatory variables were also used to explain variations in expenditures, per capita school current expenditures and per capita county current expenditures. Only two variables, industrial and commercial employment and population per acre were significantly different from a zero value in explaining per capita city current expenditures. The combination of the five explanatory variables accounts for very little of the variation in nonschool expenditures among communities.

Multiple dwelling unit construction has been expanding rapidly in the metropolitan area and it is expected to continue. Between 1962 and the end of 1967 the number of multiple family dwellings increased by 41,796 units in the seven county area. Of the 17,612 total dwelling units constructed during 1967, multiple family units accounted for 10,043 of 57 percent.[7] Many communities have tried to keep multiple dwellings from being constructed within their boundaries, feeling that apartments are a tax drain. This question remains unanswered in this study because of insufficient data and the difficulty of measuring nonschool expenditures that should be attributed to multiple dwelling units. Several communities have undertaken interval studies to determine the fiscal effect of apartments on their schools. Many of the case studies have shown that apartments are more than paying their own way,[8] especially outside the central cities where apartment occupants often are young married childless couples or retired couples whose children are grown and live elsewhere. Thus, very little additional burden is placed on the school district with the addition of multiple family dwelling units while the tax base and, therefore, school revenue is increased. Some village and city councils have adopted policies of limiting apartment developers to two-bedroom apartment units, intending to limit the number of school age children per unit.

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7. Minnesota Highway Department, Residential Building Permit Inventory Twin Cities Area 1967, May 1968.

8. One such study was undertaken by the Roseville Planning Commission. Roseville Village Newsletter, Vol. 1, No. 3, January 1969.

SUMMARY AND CONCLUSIONS

Local property taxes in the Twin Cities Metropolitan Area are definitely related to the stage of urban development in the region. High tax rate communities are generally those with the fastest rate of growth in residential, industrial, and commercial taxable property. However, the intensity of change in absolute dollars of property value of communities that have little remaining undeveloped land area may be greater than the rapidly developing communities. Generally, these communities have a favorable tax rate in relation to the rest of the metropolitan area.

The impact of commercial, industrial, and three classes of residential communities was studied to compare advantages or disadvantages in per capita tax resources and per capita municipal, school, and county expenditure.

The statistics support the common impression that industrial and commercial cities enjoy a favorable fiscal position. The advantage in resources appears to outweigh the disadvantage in total local expenditures. The advantages in added resources over expenditures appear to result from school needs not varying substantially with the degree of commercialization and industrialization. The influence of commerce and industry was found to be most closely associated with nonschool local services.

Industrial, commercial, and high value residential communities had significantly higher tax bases (assessed value) per capita than their neighboring communities. This did not, however, always result in a lower tax rate. Communities with high tax bases were also found to have the highest per capita school and nonschool expenditures. Ability to pay as reflected through the per capita tax base and median family income becomes the most powerful explanation of the level of per capita city or school property tax revenues.

The dependence on the property tax for local support of city and schools has apparently helped create a variation in the total expenditure per capita in the metropolitan area. Richer communities, in terms of taxable property and income, tend to spend considerably more per capita for municipal and school services than do poorer communities.

This study on the fiscal effects of the property tax on local government has many shortcomings. Refinement to take account of secondary effects would no doubt give more precise answers. But the analysis may be useful in suggesting some guidelines for assessing the fiscal benefits and cost of alternative policies for community development.

Appendix A. Communities in study by subregion

Inner Ring	Intermediate Ring	Outer Ring
Brooklyn Center	Arden Hills	Anoka
Columbia Heights	Bloomington	Bayport
Edina	Brooklyn Park	Belle Plaine
Falcon Heights	Coon Rapids	Blaine
Fridley	Crystal	Brunsville
Golden Valley	Eden Prairie	Chanhassen
Maplewood	Hopkins	Chaska
Mendota Heights	Inver Grove Heights	Circle Pines
Newport	Little Canada	Cottage Grove
Richfield	Minnetonka	Deephaven
Robbinsdale	New Brighton	Farmington
Roseville	New Hope	Forest Lake
St. Anthony	North St. Paul	Hastings
St. Louis Park	Plymouth	Lakeville
South St. Paul	St. Paul Park	Lino Lakes
West St. Paul	Shoreview	Maple Grove
	Spring Lake Park	Medina
		Minnetrista
		Mound
		Mounds View
		Orono
		Osseo
		Shakopee
		Shorewood
		Stillwater
		Vadnais Heights
		Wayzata
		White Bear Lake

Appendix B. Table of demographic and economic data: 61 suburban communities of the Twin Cities Metropolitan Area

	1968 estimated population[a]	Area in acres[b]	1965 industrial & commercial employment[c]	Distribution of tax levy			Per capita tax base 1967[d]	Percent of total real taxable value				
				City	School	County		Residential	Commercial	Industrial	Farm	Public utility
Anoka County												
Anoka	12,333	2,844.7	4,186	15.7	63.7	20.4	549.53	66.5	19.8	12.9	0.2	0.5
Blaine	16,958	21,960.7	386	13.0	64.3	21.8	341.18	87.3	6.5	0.3	4.9	0.2
Circle Pines	3,742	1,254.8	106	19.5	62.8	17.3	266.99	94.7	4.6	0.7	.0	.0
Columbia Heights	24,894	2,260.4	2,669	20.2	58.4	21.3	560.24	83.6	13.5	2.8	.0	0.1
Coon Rapids	27,969	14,864.3	1,511	17.8	60.3	21.1	373.03	88.6	5.7	0.7	2.6	2.3
Fridley	27,670	6,839.1	5,187	13.4	64.7	21.1	625.57	70.6	15.5	13.0	.0	0.4
Lino Lakes	3,246	21,380.0	14	14.3	63.4	20.8	279.29	67.5	3.2	.0	28.0	0.4
Spring Lake Park	5,504	1,324.1	497	14.5	63.7	21.1	397.63	89.3	10.3	0.3	.0	.0
Carver County												
Chanhassen	4,666	19,366.2	249	10.9	63.5	25.4	482.74	67.1	5.4	0.2	25.5	.0
Chaska	3,707	5,269.3	880	23.8	52.6	23.5	522.70	66.0	12.9	13.5	6.8	.0
Dakota County												
Burnsville	15,538	16,892.2	655	8.8	68.5	22.4	1,184.56	48.1	5.1	3.0	3.7	39.9
Farmington	3,028	890.6	371				532.21	74.3	21.9	.0	0.9	2.9
Hastings	11,329	6,359.1	1,997	25.4	55.2	17.0	419.73	72.5	18.3	6.9	1.2	1.1
Inver Grove Heights	11,408	19,529.2	715	4.4	71.1	24.2	433.13	75.8	10.3	0.1	8.8	5.1
Lakeville	5,460	30,678.5	278	13.1	67.3	19.4	566.00	52.9	9.2	0.8	25.3	11.1
Mendota Heights	6,444	6,452.4	469	10.7	65.8	23.3	762.10	88.1	3.4	0.5	2.8	5.2
South St. Paul	25,439	3,792.0	9,033	23.6	58.1	18.2	613.99	66.8	11.1	21.5	.0	0.7
West St. Paul	19,021	3,167.9	2,317	15.4	62.4	22.0	537.51	81.0	18.6	0.2	0.2	.0

Appendix B (Continued)

	1968 estimated population[a]	Area in acres[b]	1965 industrial & commercial employment	Distribution of tax levy			Per capita tax base 1967[d]	Percent of total real taxable value				
				City	School	County		Residential	Commercial	Industrial	Farm	Public utility
Hennepin County												
Bloomington	77,475	24,686.8	21,085	14.6	62.7	21.7	632.03	67.9	21.7	9.8	.0	0.6
Brooklyn Center	33,087	5,521.2	3,388	16.3	63.2	19.8	498.99	77.2	19.8	2.4	.0	0.6
Brooklyn Park	19,851	17,097.4	880	15.2	63.9	20.1	443.48	83.8	8.3	.0	6.1	1.7
Crystal	30,697	3,741.1	3,715	16.6	59.7	22.8	455.45	86.1	10.4	3.5	.0	.0
Deephaven	3,555	1,511.5	200	10.3	70.0	18.9	840.05	96.0	2.0	.0	.0	1.9
Eden Prairie	6,312	22,632.9	1,057	13.3	62.6	23.1	720.53	76.5	3.7	9.1	10.5	.0
Edina	42,835	10,073.3	8,451	10.4	63.0	24.5	1,064.75	79.9	17.4	2.7	.0	.0
Golden Valley	23,375	6,797.3	11,456	13.7	61.9	23.5	1,030.71	66.4	14.5	18.3	.0	0.8
Hopkins	13,756	2,556.0	11,262	16.7	63.3	19.0	948.93	53.9	21.0	24.7	0.2	0.2
Maple Grove	5,020	22,569.9	514	15.3	64.5	19.5	464.76	65.3	2.7	8.6	22.7	0.6
Medina	2,223	17,299.7	132	-	-	-	503.97	52.4	5.6	0.5	41.4	.0
Minnetonka	33,617	18,998.3	3,157	11.8	66.7	20.6	633.84	94.0	4.8	0.9	.0	0.2
Minnetrista	2,815	19,963.9	49	-	-	-	646.31	72.2	1.1	0.3	23.6	0.1
Mound	6,495	2,803.7	1,825	-	-	-	560.06	78.1	12.6	6.0	.0	0.5
New Hope	18,545	3,305.3	2,087	11.6	63.3	24.1	449.66	82.0	14.7	3.1	.0	0.2
Orono	6,322	16,515.9	93	9.9	70.8	19.3	890.38	88.3	4.6	0.8	2.9	0.1
Osseo	2,916	454.4	1,654	14.1	66.8	19.4	525.75	69.1	24.3	6.2	0.2	0.1
Plymouth	15,440	22,817.0	2,301	11.6	66.2	31.4	571.13	80.0	2.7	11.9	5.2	.0
Richfield	49,059	4,642.3	5,823	16.3	61.0	21.7	537.02	75.0	24.9	.0	.0	0.8
Robbinsdale	18,979	1,887.1	2,745	17.1	59.4	22.6	469.47	87.1	12.9	.0	.0	.0
St. Anthony	8,993	1,526.9	951	-	-	-	773.84	74.8	22.6	1.6	.0	1.1
St. Louis Park	50,457	6,949.4	18,169	-	-	-	756.22	67.6	21.9	10.0	.0	0.5

Appendix B (Continued)

	1968 estimated population[a]	Area in acres[b]	1965 industrial & commercial employment	Distribution of tax levy			Per capita tax base 1967[d]	Percent of total real taxable value				
				City	School	County		Residential	Commercial	Industrial	Farm	Public utility
Shorewood	3,990	8,294.8	395	10.9	69.5	18.8	690.79	92.2	3.5	.0	0.6	1.4
Wayzata	4,255	1,969.9	1,795	11.3	66.9	20.9	977.71	72.0	27.5	.0	.0	0.4
Ramsey County												
Arden Hills	5,001	6,140.4	4,525	11.0	64.7	24.1	880.81	67.8	6.1	20.9	1.5	2.1
Falcon Heights	6,859	1,442.8	2,167	10.5	64.7	24.6	527.17	78.9	20.3	.0	0.1	0.1
Little Canada	3,584	2,843.0	431	4.8	68.8	26.2	425.78	90.5	4.5	.0	3.3	0.5
Maplewood	24,135	11,448.3	6,449	12.3	65.8	21.7	770.88	57.1	4.6	34.6	1.3	1.3
Mounds View	8,730	2,647.5	437	5.7	68.1	25.3	309.43	90.4	4.8	.0	0.4	.0
New Brighton	16,343	4,524.2	1,947	11.3	64.5	24.0	513.11	79.8	10.6	5.7	0.6	.0
North St. Paul	11,807	4,863.2	1,168	12.6	67.1	20.1	435.26	80.8	8.9	6.1	0.2	.0
Roseville	33,731	8,895.9	9,275	13.5	62.5	23.7	809.71	68.8	14.5	12.9	0.2	0.1
Shoreview	9,468	8,154.9	365	11.8	64.0	24.0	470.43	92.4	2.3	0.3	3.3	.0
Vadnais Heights	3,053	5,151.3	113	-	-	-	340.58	86.0	1.2	.0	12.3	.0
White Bear Lake	20,996	3,922.7	2,075	11.1	67.2	21.5	529.17	92.7	5.8	0.2	0.2	0.2
Scott County												
Belle Plaine	2,535	2,523.2	-	-	-	-	358.80	71.0	16.4	8.5	3.5	0.6
Shakopee	6,665	2,154.8	1,305	9.4	60.8	29.6	431.78	78.2	8.5	12.3	0.5	.4
Washington County												
Bayport	3,347	1,289.0	1,510	11.8	65.2	23.0	647.82	56.1	6.0	38.0	.0	.0
Cottage Grove	11,577	23,217.9	1,766	12.2	63.4	24.2	634.96	68.9	3.7	18.6	6.6	2.1
Forest Lake	3,173	1,410.1	599	30.5	50.4	17.7	530.56	70.6	21.6	0.2	0.4	1.5
Newport	2,727	2,546.9	639	-	-	-	700.57	60.5	12.9	9.2	1.0	16.2
St. Paul Park	5,471	1,588.7	581	21.7	56.7	21.5	455.02	74.5	4.3	20.6	.0	0.6
Stillwater	9,641	2,874.5	2,027	29.8	51.9	18.2	474.64	80.7	16.5	1.6	0.1	0.8

Appendix B (Continued)

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[a] Metropolitan Council, Data-log-1968 Population Estimates, No. 2, October 1968.

[b] The Joint Program-Information Bulletin. 1962 Land Use, No. 8, August 1964, and update information.

[c] Office of Employment Security, Standard Industrial Classification, 1965.

[d] Minnesota Department of Taxation, Board of Equalization.

Appendix C. School districts within municipalities and percent of real taxable value of municipality in school district, 1967.

Municipality	School district	Percent	School district	Percent	School district	Percent	School district	Percent
Anoka County								
Anoka	11	100.						
Blaine	11	64.14	12	5.82	16	29.88	621	0.14
Circle Pines	12	100.						
Columbia Heights	13	100.						
Coon Rapids	11	100.						
Fridley	11	4.63	13	23.68	14	59.4	16	12.2
Lino Lakes	12	52.7	624	8.1	831	39.1		
Spring Lake Park	16	99.3	621	0.7				
Carver County								
Chanhassen	109	7.8	112	51.2	276	40.9	272	
Chaska	112	100.						
Dakota County								
Burnsville	191	93.6	194	2.3	196	4.1		
Farmington	192	100.						
Hastings	200	100.						
Inver Grove Heights	199	84.8	196	13.7	197	1.5		
Lakeville	192	23.1	194	68.9	196	8.0		
Mendota Heights	197	100.						
South St. Paul	6	99.7	199	0.3				
West St. Paul	197	100.						
Hennepin County								
Bloomington	271	99.5	272	0.4	273	0.1		
Brooklyn Center	11	9.71	279	36.75	281	29.24	286	24.3
Brooklyn Park	11	21.6	279	63.3	281	15.1		

Appendix C. (Continued)

Municipality	School district	Percent	School district	Percent	School district	Percent	School district	Percent
Crystal	281	100.						
Deephaven	276	100.						
Eden Prairie	272	87.4	274	9.7	276	2.9		
Edina	373	0.1	273	86.1	274	4.8	280	8.9
Golden Valley	274	16.2	275	30.7	281	53.2		
Hopkins	274	99.0	283	1.0				
Maple Grove	279	97.7	284	2.3				
Medina	278	61.4	284	30.7	879	6.4	883	1.5
Minnetonka	274	56.4	276	33.5	284	10.1		
Minnetrista	110	6.4	111	12.8	277	80.3	879	0.4
Mound	277	100.						
New Hope	281	100.						
Orono	276	0.4	277	39.8	278	51.9	284	8.0
Osseo	279	100.						
Plymouth	274	5.7	279	2.8	281	14.3	284	77.2
Richfield	280	100.						
Robbinsdale	281	100.						
St. Anthony	282	100.						
St. Louis Park	273	0.1	274	2.2	283	97.8		
Shorewood	276	96.3	277	3.7				
Wayzata	278	1.6	284	98.4				
Ramsey County								
Arden Hills	621	95.3	623	4.7				
Falcon Heights	623	100.						
Little Canada	623	97.5	624	2.5				
Maplewood	622	85.5	623	14.5				
Mounds View	621	100.						
New Brighton	282	7.78	621	92.2				
North St. Paul	622	100.						
Roseville	621	15.0	623	85.0				
Shoreview	621	75.5	623	24.5				
Vadnais Heights	621	17.0	624	83.0				
White Bear Lake	624	100.						

Appendix C (Continued)

Municipality	School district	Percent	School district	Percent	School district	Percent	School district	Percent
Scott County								
Belle Paline	716	100.						
Shakopee	720	100.						
Washington County								
Bayport	834	100.						
Cottage Grove	833	98.9	200	1.1				
Forest Lake	831	100.						
Newport	833	100.						
St. Paul Park	833	100.						
Stillwater	834	100.						

Appendix D

The value of homes, the types of employment, and the incomes of families vary considerably from community to community across the metropolitan region. From an examination of community attributes, it appeared there were sufficient variations among the communities to provide reliable estimates in an empirical test of the effects of these attributes on the level of public financial support for local governmental services. Under this assumption, cross sectional data can be utilized in making a regression analysis to analyze the variations in tax base and expenditures among communities.

The following variables were defined:

U_1 = per capita tax base times 10^{+2} (the assessed value of all real and personal taxable property, assessed and taxes levied in 1967 for 1968 collection. The number 10^{+2} is an arbitrary constant which makes maintaining a significant number of integers during the empirical testing easier).

U_2 = city tax revenue per capita times 10^{+2} (property tax revenue collected 1967).

U_3 = school tax revenue per capita by municipality multiplied by 10^{+2} (collected 1967).

U_4 = county tax revenue per capita by municipality multiplied by 10^{+2} (collected 1967).

U_5 = city current expenditures per capita times 10^{+2} (This includes expenditures for general government, public safety, health and sanitation, streets and highways maintained by the city, etc., 1967).

U_6 = school current expenditures per capita by municipality times 10^{+2} (This does not include expenditures for capital outlays or bond redemption).

U_7 = county current expenditures per capita by municipality times 10^{+2}

(Health, Welfare, highways, parks and open space are normally the largest current expenditure items for county government).

X_1 = Median value of home by municipality, 1959.

X_2 = Percent of population over 17 years of age employed in industrial or manufacturing firms, 1965.

X_3 = Percent of community's dwelling units classified as multiple dwelling units, 1967. (Units in structures containing three or more housing units).

X_4 = Percent of community's dwelling units that are single family owner occupied, 1967.

X_5 = Population per acre (the land area in acres of the community divided into the population of the community, 1967).

X_6 = Population under 18 years of age, 1967.

It seemed that the most realistic model should record any interactions between the independent variables. For this reason, the model used in a power function of the form $Z=\alpha W_1^{B1}, W_2^{B2}, \ldots, W_n^{B}n_e$ where Z and the W_i's are the dependent and explanatory variables respectively, α and B_i's are parameters, and e is a stocastic disturbance term. The regression results are shown in the following tables.

Table D-1. Regression coefficients (elastics) and related statistics of city and school tax revenues with fiscal and social factors, Twin Cities metropolitan area, 1967.

Dependent variable - U_2 = City tax revenue per capita	Regression coefficient (elasticity)	t-value	Partial correlation coefficient (r)
Explanatory variables			
U_1 Tax base per capita	0.963	3.14*	.384
U_3 School tax revenue per capita	-.1604	1.13	-.148
U_4 County tax revenue per capita	-.0620	0.25	-.033
Coefficient of determination (R^2)	.221		
F statistic	5.40*		

Dependent variable - U_3 = School tax revenue per capita	Regression coefficient (elasticity)	t-value	Partial correlation coefficient (r)
Explanatory variables			
U_1 Tax base per capita	0.6911	2.32*	.296
U_2 City tax revenue per capita	-.1308	1.08	-.143
U_4 County tax revenue per capita	0.4390	1.94	.251
X6 Population under 18 yrs.	0.0497	0.73	.103
Coefficient of determination (R^2)	.401		
F statistics	9.36*		

* Denotes significance of the t and F statistics at $\alpha = 0.05$.

Table D-2. Regression coefficients (elasticities) and related statistics of communities tax base and local expenditures with five explanatory variables, Twin Cities metropolitan area, 1967.

Explanatory variables	Dependent variable			
	U_1 Tax base per capita	U_2 City expenditure per capita	U_3 School expenditure per capita	U_4 County expenditure per capita
X_1 Median value of home (1959)	1.056[1]	0.0871	0.6396	0.5410
	(7.85)*	(0.29)	(0.78)	(1.64)
	.727	.039	.104	.216
X_2 Percent of population over 18 yrs. employed by industrial & manufacturing firms	0.1424	0.1653	0.0647	0.1101
	(4.03)*	(2.19)*	(0.78)	(1.33)
	.477	.283	.104	.177
X_3 Percent multiple dwelling units	0.0063	-.0079	0.0075	-.0509
	(0.33)	(.194)	(0.17)	(1.14)
	.045	-.026	.023	-.153
X_4 Percent single-family, owner-occupied dwelling units	0.0225	-.0122	-.0089	0.0079
	(0.86)	(.217)	(.14)	(0.13)
	.115	-.029	-.019	.017
X_5 Population per acre	-.0822	0.1941	-.0796	0.0957
	(2.76)*	(3.06)	(1.14)	(1.38)
	-.349	.381	-.015	.182
Coefficient of determination (R^2)	.637	.380	.091	.528
F Statistic	19.30*	6.74*	1.10	12.30*

1. Top number is regression coefficient (elasticity): the number below in parentheses is the t-value of the regression coefficient; the third number is the partial correlation coefficient.

* Denotes significance of the t and F statistics at $\alpha = 0.05$.

Regression Equation: Median Value of Home and Median Family Income

1. $Y = -3450.67 + 2.613X$, (11.80)* .838 — Y = Median Value of Home, X = Median family Income

$R^2 = .702$

1. Top number is regression coefficient (elasticity); the number below in parentheses is the t-value of the regression coefficient; the third number is the partial correlation coefficient.

* Denotes significance of the t and F statistics at $\alpha = 0.05$.