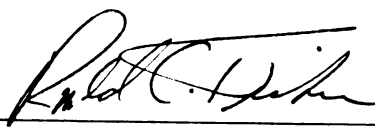This is to certify that the

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THE INCIDENCE AND HOUSING MARKET EFFECTS OF MICHIGAN'S 1994 SCHOOL FINANCE REFORMS

By

Jeffrey Paul Guilfoyle

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ABSTRACT

THE INCIDENCE AND HOUSING MARKET EFFECTS OF MICHIGAN'S 1994 SCHOOL FINANCE REFORMS

By

Jeffrey Paul Guilfoyle

Michigan's 1994 school finance reforms dramatically changed the way public schools in Michigan are financed. As part of these reforms, reliance on local property taxes as a funding mechanism was greatly reduced. Lost revenues were replaced by increasing a variety of state taxes, including a state property tax. The reforms also shifted control over school funding decisions from the local school districts to the State government.

This dissertation examines two aspects of the recent reforms. The major concern of this dissertation is to determine the effects of inter-community property tax and school spending differentials on house prices. House sales occurring before and after the reforms are examined to see how differences in school property tax rates and school spending amounts between communities are reflected in the price of housing. The nature of the reforms and the availability of good sales data allow this study to avoid many of the difficulties encountered by other studies.

This dissertation also examines the overall tax incidence of Michigan's recent school finance reforms. The incidence of the reforms is measured for three types of households: a senior citizen couple; a family of four; and a single resident. For each of these groups the incidence is measured under several different housing and community

assumptions. The measured groups should represent the experiences of a large portion of

Michigan's taxpayers.

To Wendy

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INTRODUCTION

In 1993 and 1994, the State of Michigan dramatically overhauled the way it finances public schools. The reforms changed several of Michigan's taxes and the local property tax rates of many school districts. The reforms also changed the way in which revenues are allocated to Michigan's public school districts. In this dissertation, I examine two aspects of the reforms in detail. First, I measure the effects of the property tax and school spending changes on house prices in Michigan. Second, I estimate the overall incidence of Michigan's reforms.

I measure the effects of the property tax and school spending changes on house prices in Michigan, using data on house sales from Oakland County. I generate two measurements of the capitalization effect, using two different samples. The first sample consists of observations of the average sales price, tax rate, and level of school spending for a number of communities in Michigan's Oakland County. With this sample, I find that a \$1.00 property tax differential between communities results in a \$9.93 difference in the average sales price of houses. This finding is consistent with the results of two similar studies (Gabriel 1981 and Rosen 1982) that examine property tax capitalization in the context of California's Proposition 13. Gabriel finds that a \$1.00 property tax differential leads to a \$12.00 difference in the average sales price of houses, while Rosen finds that a \$1.00 property tax differential leads to a \$7.30 price differential With this

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sample, I do not find evidence that differences in per-pupil school spending across communities are reflected in house prices.

The second sample consists of observations of over 700 houses that sold once before and once after Michigan's reforms. I argue that this sample is superior to the average-sales-price sample for a number of reasons. Using this sample, I find that a $1 property tax differential between communities leads to a $4.25 difference in house prices. I also find that an increase in school spending by one community of $100 per pupil will increase house prices in that community by 0.5 percent, all other things held constant. The results of this sample are substantially different than the results found using the average sales price of houses. I argue that the dual-sales sample is superior, and that the results found using the average sales prices of houses may be biased.

I then use these findings, along with a number of other estimates, to estimate the incidence of Michigan's school finance reforms. I find that non-smokers who owned a house at the time of the reforms generally received a large tax cut. Non-smoking individuals who purchased their houses subsequent to the reforms generally saw their overall tax burden increase as a result of the reforms. For non-smoking renters, the results are mixed. If property tax savings received by landlords are reflected in lower rents, renters generally came out ahead as a result of the reforms. If property tax savings received by landlords are not reflected in lower rents, renters generally came out behind. There is little evidence yet as to the effects of the reforms on rents in Michigan.

For Michigan residents who are smokers, the cost of Michigan's reforms were much higher. As part of the school finance reforms, the state excise tax on cigarettes was raised from $0.25 to $0.75 per pack. This amounted to a relatively large additional tax

cost for smokers. For low-income households with heavy smokers, the increased cigarette tax is a large burden.

This dissertation is composed of five chapters and an appendix. Chapter 1 contains a detailed description of Michigan's recent reforms. Chapter 2 contains a review of the theoretical property tax literature. Chapter 3 examines the empirical capitalization literature. Chapter 4 contains estimates of the differential effects of Michigan's property-tax cuts and school spending changes on the prices of owner-occupied housing. Chapter 5 contains estimates of the overall incidence of Michigan's tax and spending changes. The appendix contains a subset of the data that were used to generate the estimates in this dissertation.

Chapter 1

MICHIGAN'S CHANGES

I. Overview

This chapter contains a detailed description of Michigan's school finance reforms. The information contained in this chapter was gathered from four main sources: Courant (1982), which describes Michigan's property tax system prior to the reforms; Brazer, Laren, and Sung (1982), which describes K-12 public school funding in Michigan prior to the reforms; Addonizio, Kearney, and Prince (1995), which contains the history of Michigan's recent reforms and a description of the tax changes; and finally, Kearney (1994), which describes school funding after the reforms and also details the new property tax system.

II. Michigan's School Funding History

Prior to 1973, Michigan allocated aid to school districts in the form of a lump sum (as long as a minimum property tax millage was levied). Because aid was in the form of a lump-sum grant, it created only income effects and not price effects, with respect to local revenue decisions.[1] The gain to a school district from raising its property tax rate was directly proportional to the property wealth of the community.

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[1] See Fisher (1996) for a discussion of the advantages and disadvantages of different forms of grants.

In 1973, Michigan passed the Bursley Act and began using what is known as a district power equalization (DPE) method for allocating aid to school districts. DPE funding methods seek to equalize the amount of revenue that school districts can raise with a given tax rate. The aid given to a school district is based on the property tax base of the district and on the tax rate levied. There were several reasons for Michigan's switch to a DPE format. In 1970, a popular book, *Private Wealth and Public Education,* advocating the DPE method was published by Coons, Clune, and Sugarman. In 1971, the California Supreme Court ruled in *Serrano v. Priest* that California's reliance on local property taxes for school funding violated the state and federal constitutions. This ruling raised concerns as to whether Michigan's school finance system was constitutional.

The Michigan state government had been trying to reform school spending prior to the Bursley Act. A ballot initiative that would have limited the use of local property taxes for school funding was rejected by the state's voters in 1972. In December of 1972, the Michigan Supreme Court declared Michigan's school financing program to be unconstitutional. Although this decision was later reversed, the reversal did not come until after the Bursley Act was passed.[2]

The passage of the Bursley Act did not result in equalized spending for Michigan's school districts. Feldstein (1975) showed that DPE aid allocation methods generally do not result in equalized spending, because voters in different school districts will generally choose different spending amounts for their district. In general, richer school districts choose higher spending levels, even if a DPE system is fully

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[2] The source for the pre-Bursley Act history is Brazer, Laren, and Sung (1982).

implemented. By the time Michigan's reforms were implemented, Michigan's DPE system was no longer working correctly; districts with high tax rates did not always have high spending levels.[3] Roughly one-third of Michigan's school districts were "out of formula" meaning they received no funding aid from the state. Spending in the out-of-formula districts was highly correlated with wealth. In addition, because out-of-formula districts received no aid from the state, they had little incentive to support funding increases for the in-formula districts.

By 1993-94, per-pupil spending in Michigan's school districts was highly correlated with the districts' property tax wealth (see Courant, Gramlich, and Loeb 1982). Additionally, the variance in property tax rates for school operations was high, ranging in 1993-94 from 8 mills to 47 mills.[4]

Michiganders were clearly unhappy with their school finance system. The system's high reliance on the property tax and the inequitable school funding that resulted prompted many efforts for reform. However, Michigan citizens did not approve of any of the alternatives offered them, either. Between 1972 and 1993, Michigan voters rejected all 12 of the reform initiatives presented to them.[5]

In 1990, John Engler, then a candidate for Governor of Michigan, promised property tax relief. Three years into his term, despite three different ballot initiatives, Michigan's system remained intact, and Engler's promise remained unfulfilled. In July

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[3] Source: Addonizio, Kearney, and Prince (1995).

[4] A mill is a tax rate of $1 per $1000 of taxable property. In Michigan property is assessed at 50 percent of its cash value so that a 1 mill tax should produce $0.50 per $1000 of property.

[5] Source: Addonizio, Kearney, and Prince (1995).

of 1993, State Senator Debbie Stabenow proposed eliminating the property tax as a method of funding schools. The bill Stabenow introduced did not provide for the replacement of lost revenues -- approximately $6.5 billion. The bill was quickly passed and the governor and legislature began work on replacing the lost revenues. Governor Engler saw this as an opportunity to revise the method by which revenues were allocated to the local school districts. The ballot initiative that was eventually enacted did change the method of allocating revenue. It also restored some of the property taxes that had been eliminated, and changed several other Michigan taxes.[6]

III. Tax Changes

Prior to 1994, the property tax consisted of taxes levied by 264 cities, approximately 270 villages, over 1200 townships, 83 counties, and about 600 school districts. The property tax in Michigan was used to fund a variety of state and local services. Prior to Michigan's reforms, however, the majority of property tax revenues went towards funding public schools. In 1980, 68.2 percent of all property taxes in Michigan went to school districts.[7]

School property taxes fall into three categories: operation; building and site; and debt retirement. The operation tax was used to fund the operation of schools. In 1991, the operations millage ranged from 8.37 mills to 46.25 mills. The building and site millage accounted for a far smaller percent of taxes, ranging from zero, for 474 of

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[6] *Ibid.*

[7] Source: Courant (1982).

Michigan's school districts, to a high of 7.27. The debt retirement millage ranged from zero, for 96 of Michigan's school districts, to a high of 9.0.[8]

Prior to 1994, taxing units at the county level could levy a fixed number of mills (up to 18 in some cases) without obtaining voter approval. Usually school districts were granted between 6 and 11 mills of this taxing authority. This amount was known as the district's "allocated" millage. School districts could raise additional funds by asking the voters of their districts to approve additional "voted millages."[9]

Michigan's property tax is calculated using a property's assessed value. Michigan law requires property to be assessed at 50 percent of its cash value.[10] Because certain state policies are based on a county's or district's assessed property wealth, the state monitors the accuracy of local assessment practices. Each city, township, or village assesses the property in its jurisdiction. The county and state then each check to ensure that the *total* assessed value of property in the community is equal to 50 percent of its cash value. Courant (1982) argues that Michigan's assessment quality is among the best in the nation in terms of assessment accuracy.

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[8] Michigan State Board of Education *Bulletin 1014.*

[9] Source: Kearney (1994).

[10] As part of the 1994 reforms, a distinction was made between assessed value and taxable value. Property is still assessed at 50 percent of cash value. In 1994, taxable value and assessed value were the same for all properties. Increases in the taxable value of property are capped at 5 percent a year or the rate of inflation, whichever is less. The taxable value is set back to 50 percent of the cash value upon the sale of the property.

In August 1993, Michigan passed Public Act 145. This act eliminated the use of local property taxes for school operations. These property taxes had accounted for 66 percent of K-12 school revenues in the 1993-94 school year (approximately $6.5 billion).[11] Replacing the lost revenues was made more difficult by two provisions of the Michigan Constitution. First, the state was limited in the share of total state personal income that can be collected as a tax. In 1993-94, Michigan was approximately $4.2 billion under the cap. Second, raising the state sales tax, the preferred alternative, required voter approval.[12]

In December, 1993, the state proposed its new tax system. First, to come in under the State's constitutional tax limit, a portion of the local property tax was restored. Second, the legislature produced a proposal that contained two funding alternatives. The preferred alternative raised the needed revenues primarily through an increase in the state's sales tax. As noted above, raising the state's sales tax required the approval of the voters. Wary of the history of school finance ballot initiatives in Michigan, the legislature also proposed a fall-back plan in case the sales tax increase was not approved. This plan relied on raising the state income tax -- something that did not require voter approval. Table 1.1 outlines the competing proposals.

In March of 1994, Michigan voters approved the ballot proposal by a large margin. Several aspects of the ballot plan should be noted. First, in addition to raising the state's sales tax, the cigarette tax was also increased from 25 to 75 cents per pack, the

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[11] Source: Kearney (1994).

[12] Source: Addonizio, Kearney, and Prince (1995).

Michigan lottery was slightly expanded, and the state's income tax rate was reduced from 4.6 to 4.4 percent. In addition, the property tax credit available to renters was slightly increased.[13]

Although the use of the property tax in Michigan for school funding was greatly reduced, it was not eliminated. Owner-occupied houses, known as "homesteads" in Michigan, are taxed at a rate of 6 mills for school operations. Non-homestead property, which is all taxable property other than owner-occupied housing, is taxed at a rate of 18 mills. Although taxed at a higher rate than homestead property, the property tax rate for non-homestead property in most communities was reduced. In addition, school districts remain responsible for their own debts and can levy millages to pay for them. School districts that were spending more than $6500 per pupil in 1993-94 were required to levy additional "hold harmless" millages, if they wished to maintain their high spending levels. An assessment cap has been imposed that limits annual assessment increases on property to the lesser of inflation or five percent. The cap is reset upon the sale of the property. Although the property tax for school operations is relatively uniform now, prior to the reforms it varied widely by district. Therefore, the size of the property tax cut varied by district as well.[14]

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[13] *Ibid.*

[14] Source: Kearney (1994).

IV. Changes in Revenue Allocation

In 1994, Michigan fundamentally changed its school funding methods. Funding decisions were, for the most part, removed from the local districts. These decisions are now made primarily at the state level. As part of these changes, Michigan replaced its old DPE system with a *foundation grant* approach. Under a foundation grant approach, each school district is guaranteed a minimum funding level.

The state of Michigan now guarantees that each district will receive a minimum level of funds known as the district's *foundation grant allowance*. Technically, the foundation allowance for 1995 was $5,000. However, due to the large cost of moving all districts up to the foundation grant at once, the state decided to implement the changes gradually.[15]

Districts that were spending below $4,200 per pupil in the 1993-94 school year, were moved up to $4,200 in 1994-95, or by $250, whichever was greater. Districts spending above $4,200 and below $6,500 were increased from the 1993-94 funding levels according to a sliding scale. The formula for this scale is:

93-94 Revenue per pupil + ($250 - ($90*((93-94 rev per pupil - $4200)/$2300)))

For example, a district spending $5,000 per pupil in the 1993-94 school year would see their per-pupil revenue increase by approximately $219, a 4.4 percent increase. The effect of this formula was that districts closer to $4,200 received larger percentage

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[15] *Ibid.*

increases than districts closer to $6,500. All districts with 1993-94 spending below

$6,500 were taxed at the same millage for school operations.[16]

Districts spending above $6,500 in 1993-94 were allowed to maintain their high

spending levels, but were required to levy an additional "hold harmless" property tax.

These districts were allowed to increase their funding by $160 per pupil in the 1994-95

year.[17]

The basic foundation allowance is expected to increase annually. The changes in

funding for school districts will be based on changes in the basic allowance. The dollar

increase in the foundation allowance is calculated by taking the previous year's

foundation allowance and multiplying it by a number known as the *final index*. The final

index is based on changes in the School Aid Fund and the changes in pupil head count.

The School Aid Fund is composed of a number of taxes earmarked for school spending.

Districts still spending below the foundation allowance after 1994-95 will be

moved up according to a sliding scale. This scale is used to ensure that districts below

the basic allowance are increased at a rate higher than the rate for districts already above

the foundation allowance. For districts already above the allowance, revenue is increased

by the same number of *dollars* that the basic foundation grant is increased. Thus, all of

these districts are increased by the same dollar amount. However, this dollar amount

represents a larger percentage change for lower-spending districts. Essentially, some of

the difference in dollars spent by districts is being held constant. However, as the

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[16] *Ibid.*

[17] *Ibid.*

foundation allowance rises, this difference will represent a shrinking percentage of spending.[18]

The State School Aid Act also provides for special and categorical grants. These grants finance a number of programs, including special education, gifted and talented programs, bi-lingual education, and at-risk education programs. In 1994, the State specifically allocated $230 million in funds for districts with a high level of poverty. These funds will help offset any differences in per-pupil costs faced by the districts. To what extent these funds match up with costs is a subject for further research. Finally, no attempt is made by the state to adjust the foundation grant for cost differences due to factors such as climate, wages, or other "non-student" factors.[19]

Michigan's reforms centralize much of the decision making for local public schools. Increased educational equity is gained at the expense of local choice. Courant, Gramlich, and Loeb (1995) refer to this potential problem in noting that many more of Michigan's citizens will be off their demand curve with respect to educational spending. Many poor school districts will have access to far more school revenues than their citizens would have chosen. Many rich districts will have access to less revenues than their citizens would have chosen. This effect could lead to pressure to change the system in the future.

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[18] *Ibid.*

[19] *Ibid.*

Table 1.1 Revenue Replacement Alternatives

Tax	1993-94 (Pre-Reform)	1994-95 Ballot Proposal (Approved April, 1994)	1994-95 Statutory Alternative
Local Property Tax	All property: 34 mill average	Homesteads: 0 Non-homesteads: 18 mills	All property: 12 mills
State Property Tax	None	All property: 6 mills	Homesteads: 0 Non-homesteads: 12 mills
State Sales Tax	4%	6%	4%
State Income Tax	4.6%	4.4%	6%
Income Tax Personal Exemption	$2,100	$2,100	$3,000
State Real Estate Transfer Tax	None	2.0%[a]	1.0%
State Cigarette Tax (per pack)	25 cents	75 cents	40 cents
Single Business Tax	2.35%	2.35%	2.75%
Interstate Telephone Tax	None	6%	4%
Keno Lottery	None	Planned[b]	Not Included

Note: The ballot proposal was the one eventually enacted.
a. The tax was subsequently lowered to 0.75%.
b. After enactment of the ballot proposal, Governor Engler indicated that he did not intend to implement a Keno lottery but would instead seek Michigan inclusion in a multi-state lottery.
Source: Addonizio, Kearney and Prince (1995).

Chapter 2

REVIEW OF PROPERTY TAX THEORY

I. Introduction

In this chapter, I review the theoretical economic literature of the property tax on residential housing. The effects of a non-residential property tax are not examined. Because empirically estimating the degree to which interjurisdictional tax differences are capitalized into property values is the primary focus of my research, special emphasis is given to the capitalization effects predicted by the various theories. If property tax differentials are reflected in the prices of otherwise identical properties, the tax differential is said to be capitalized. Full capitalization occurs when the prices of otherwise identical properties differ by the full present value of the property tax differential.

The degree to which property taxes are capitalized is an important element in examining property tax policies for several reasons. First, the degree to which the tax is capitalized has an effect on the incidence of the property tax. If a property tax change is fully capitalized, the selling value of the asset is reduced by the present discounted value of the tax. Under full capitalization, the owners of property at the time of a tax change bear the full burden of the tax. They are unable to escape the tax by selling their property, because the property's value has been reduced by the full amount of the future tax stream. Second, capitalization is important for determining the efficiency of the

property tax. The degree to which the property tax is a distorting tax on capital is to some extent determined by the degree of capitalization. The ability of local governments to provide local public goods efficiently, and the amount of redistribution that occurs through local public good provision, are also in part determined by the degree of property tax capitalization.[1] Finally, different economic theories of property taxes have somewhat different predictions concerning the extent to which property taxes are capitalized. Examining the degree to which a property tax change is capitalized can help in the evaluation of these theories.

This chapter is divided as follows. The next section discusses the "benefit" view of the property tax. The third section discusses the "new" and "classic" views of the property tax. The fourth section discusses the contributions to capitalization theory made by John Yinger. The final section discusses the implications of these theories for Michigan's tax changes.

II. The Benefit View

Although a decentralized market system has many advantages, it generally will not produce the optimal level of public goods. In his classic article, Samuelson (1954) argues that "no decentralized pricing system can serve to determine optimally these levels

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[1] Many models examining the efficiency of the property tax assume that the local public service level is selected by voters who must use the property tax to finance expenditures. These models are no longer valid for Michigan, at least with respect to school finance, due to Michigan's centralization of local school spending decisions. Information on the degree to which property taxes are capitalized is still useful, however, in determining whether local decision making will lead to an efficient outcome.

of collective consumption." (p. 388). Writing in response to Samuelson, Charles Tiebout (1956) argues that while this may be true for public goods provided at the federal level, it is not necessarily true for local public goods. Tiebout develops a list of assumptions under which it was possible for local public goods to be provided at an efficient level. Tiebout's model consists of a large number of local governments that finance expenditures via a head tax. Consumers reveal their preferences for local goods through their choice of residence. Consumers preferring a high level of public services live in a locality with high taxes and services. Consumers preferring a low level of services live in a locality with low taxes and services.

Tiebout's model contains a number of highly restrictive assumptions. One of these assumptions is that local expenditures could be financed via a head tax. [2] Subsequent authors have examined the implications of replacing Tiebout's head tax with the more commonly observed property tax. This modeling change has led to the "benefit" view of the property tax. In this section, I discuss the benefit view of the property tax. This view argues that the property tax does not necessarily lead to inefficiencies.

Hamilton (1976) argues for the benefit view of property taxation. He first notes that, in a system of communities that are homogeneous with respect to house values, the

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[2] Other assumptions in Tiebout's model include: consumers are fully mobile; consumers have perfect knowledge concerning local revenues and expenditures; a large number of communities exists for consumers to choose among; there are no community based employment restrictions; there are no externalities associated with local public service provision; and communities are sized so that they can produce services at the minimum of their average cost curve.

property tax can be seen as a system of average cost pricing for public services. Hamilton assumes in his analysis that all households in a community consume the same level of public services and place the same value on these services. Homogeneous communities can be achieved through a binding zoning requirement. That is, all households in a community are required to consume a minimum amount of housing services, the tax on which is exactly equal to the cost of providing public services to each household. No household has any incentive to consume more than the minimum level of housing services, because they would then be paying for more services than they receive (and would be better off in another community). If the zoning requirement is in fact binding and communities are homogeneous, public services are provided efficiently and the property tax is non-distortionary (the zoning requirement keeps households from adjusting their housing consumption in response to the tax).

The binding zoning requirement has been strongly criticized by Zodrow and Mieszkowski (1983). They argue that these assumptions would turn any tax into a non-distortionary tax. The choice of tax instrument at the local level would become irrelevant with the appropriate zoning restrictions, as all taxes would become a non-distortionary fee for public service.

Hamilton, however, extends his argument to communities that are not homogeneous. He argues that capitalization effects can lead to average-cost pricing for public services in non-homogeneous communities. In a neighborhood with inexpensive and expensive houses and no capitalization, residents of the inexpensive houses enjoy public services at a lower cost than their neighbors in the expensive housing. This makes living in a relatively inexpensive house desirable. Therefore, people will compete to live

in fiscally advantaged housing, driving up the price of such housing. Thus, inexpensive houses, although they have lower property taxes, sell for more due to the capitalization of the fiscal benefits. Likewise, housing that is relatively luxurious compared to other houses in the same community will sell at a discount.

If differences in fiscal surpluses are fully capitalized, then there is no advantage to buying an inexpensive house in a rich neighborhood. The price of the inexpensive house is increased by the present discounted value of the difference between its taxes and service cost. This has potentially important implications. First, it means that property taxes do not lead to horizontal inequity. Everyone gets exactly the services that they pay for. Second, because people pay for exactly the services that they receive, they demand an efficient level of public services.

For the property tax to be non-distortionary, however, it must also not distort housing decisions. Hamilton (1983) argues that the property tax can be converted into an efficient price for public services, if capitalization causes the following relationship to hold.

1) $V + T = C(H) + C(LPS)$

The above equation states that efficiency requires that house value, V, plus taxes, T, must equal the cost of providing housing, C(H), plus the cost of providing local public services, C(LPS).

If the above relationship is to hold, then fiscally advantaged housing, which has a higher value, must somehow cost more to produce. In Hamilton's model (1976), fiscally

advantaged housing costs more to produce because its fiscal advantage is capitalized into land values. Inexpensive housing is built on land zoned for that purpose. This land, because it can be used for houses that will sell at a premium, sells for a higher price than other land in the community. Hamilton implicitly assumes that property taxes are fully capitalized into land values. He assumes that land is in fixed supply; therefore, the tax is not distortionary.

This analysis would imply that land zoned for inexpensive housing in a heterogeneous community would sell for more than land zoned for more luxurious housing. Zoning ordinances are required to keep this land price differential in place. Otherwise, the amount of land used for inexpensive housing will increase and the land devoted to relatively expensive housing will decrease. If inexpensive housing is allowed to expand until the land for inexpensive housing and the land for relatively more expensive housing sells at the same price, households owning cheaper houses will pay less for their public services than households owning relatively expensive houses. Redistribution would occur through the provision of public services. Residents no longer get only what they pay for, and the outcome can no longer be expected to be efficient.

Based on his analysis, Hamilton draws the following conclusions. First, with full capitalization, there is no horizontal inequity. Consumers get the services that they pay for. Second, efficient supplies of housing and public services exist when: land value is the same in all homogeneous (with respect to house value) communities; in mixed-value communities, land-value differentials exactly reflect the present value of fiscal surplus differentials; the mean value of land (per acre) is the same in all communities, regardless of their housing or service mix. Finally, the property tax generates an incentive for the

production of an inefficient amount of low-income housing. This incentive must be held in check through zoning restrictions for efficiency to be maintained.

Hamilton cites some evidence that the above conditions may in fact hold. He argues (1976) that empirical studies have shown that land zoned for low-income housing does indeed sell at a premium. He also cites empirical studies (1983) that find a large degree of property tax capitalization.

III. The New and Classical Views

An alternative to the benefit view of property taxes is the "new" view. The new view of the property tax was developed by Procter Thomson (1965), Peter Mieszkowski (1972), and Henry Aaron (1975). The discussion of the new view of the property tax presented here is taken primarily from a review of the property tax literature by Mieszkowski and Zodrow (1989) and a discussion of the new view in Zodrow and Mieszkowski (1983).

The new view of the property tax generally examines the property tax in a standard capital taxation framework. These models follow the Harberger (1962) approach to examining the taxation of capital. Harberger models generally assume perfect competition and that the overall capital stock in the nation is fixed. Additionally, the capital stock is assumed to be perfectly mobile within the nation, so that the after-tax return to capital in all sectors of the economy is the same.

Housing is viewed as the output of a production process that combines land and capital in the production of housing services. These models examine the effects of a property tax in one or more sectors. Although the results vary somewhat depending on

the model specifications, they often produce the result that the capital portion of a uniform national property tax reduces the after-tax rate of return to *all* capital in the nation by the amount of the property tax. The property tax impacts other sectors in the economy because capital is perfectly mobile. When the property tax is imposed, it reduces the return to capital in the housing sector. Capital flows from the housing sector, increasing its pre-tax rate of return, into other sectors, reducing their rate of return. This continues until all sectors have the same after-tax return to capital. Capital generally bears the full brunt of taxation in these models, because it is assumed that the total capital stock is supplied inelastically.

If the property tax were the only tax in the economy, it would have two effects. First, the property tax would result in an inefficiently low allocation of capital to the housing sector. Second, the overall rate of return to capital in the economy would be reduced. This rate reduction would have an effect on the long-run capital formation in the economy. This long-run effect is the subject of much debate in the literature and is beyond the scope of this analysis.

Of course, there are other taxes on capital, most notably the corporate income tax. Gravelle (1994) argues that housing, especially owner-occupied housing, is taxed at a very low rate compared to other forms of capital. She cites studies that find that the preferential treatment of housing accounts for about half of the distortions arising from the misallocation of capital. Because of this, the property tax may actually help to correct the misallocation of resources resulting from the corporate income tax.

The new view also has implications for the redistributional effects of the property tax. The property tax finances local public expenditures by reducing the rate of return of

capital in all sectors of the economy. This means that, for a uniform national property tax, capital owners bear the full burden of the tax on the capital portion of housing. Because capital tends to be concentrated in the hands of relatively wealthy individuals, the capital portion of the property tax is progressive. This result directly conflicts with Hamilton's findings that no redistribution occurs through the property tax.

The property tax, of course, is not uniform throughout the nation. Under the new view, tax differentials between communities (that is, differences between local tax rates and the national average tax rate) give rise to "excise" effects. A tax rate higher than the average will be either shifted forward into higher housing prices, or shifted backward to a relatively immobile factor. Different models have different predictions as to the degree to which this will occur. The predictions of these models generally depend on the elasticity of substitution between land and capital in the production of housing, and assumptions concerning the mobility of consumers and the degree to which land is in fixed supply.

For example, consider property that rents for $100 per year. If the discount rate is 10 percent, and we assume the asset is infinitely lived, the present discounted value of this property, in the absence of taxation, is $1000. If we impose a property tax of $10 per year and residents are completely immobile, we might see the tax fully forward shifted to renters. This means that the cost of renting this property would rise to $110 and the value of the property would remain unchanged. If renters are fully mobile, however, we might see the tax fully backward shifted into the property's price. Backward shifting means that the property still rents for $100, but now the owner must pay $10 in tax. The net return is $90 per year reducing the present discounted value of the property to $900. In the case of full backward shifting of the tax, we say that the tax has been *fully capitalized*.

The predictions of the new view models are based on the assumptions made concerning various parameter values. For example, Hobson (1986) finds that the degree of property tax shifting depends in part on the relative sizes of the elasticity of substitution between housing and other consumption goods, and elasticity of substitution in housing production, as well as the mobility of the resident population.[3]

In their review of the property tax literature, Mieszkowski and Zodrow (1989) argue that the new view is a more general case of the "classical" view of the property tax. The classical view (Simon 1943, Netzer 1966) examines the property tax in a single jurisdiction. This view argues that, since capital is perfectly mobile, it bears none of the burden of the property tax. The capital portion of the property tax is assumed to be entirely forward shifted in the form of higher housing prices, and the land portion is assumed to be borne entirely by landowners because land is assumed to be inelastic in supply. Under this view, the property tax is much more regressive than under the new view, because a much higher proportion is borne by renters.

Mieszkowski and Zodrow argue that the classical view focuses exclusively on the excise effects portion of the property tax. This arises because the classical view uses a partial rather than a general equilibrium model. The full forward shifting found in the classical view is just a special case of the possible results predicted by the new view. Although the overall rate of return on capital appears unchanged in the classical view, Mieszkowski and Zodrow argue that it is in fact reduced by an infinitesimal amount. This reduction occurs because the higher property tax rate in the metropolitan region

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[3] The description of Hobson's results are taken from Mieszkowski and Zodrow (1989).

reduces the national average by a small amount. This infinitesimal change multiplied by the entire capital stock of the nation is in fact large relative to the revenue raised by the tax.

Mieszkowski and Zodrow argue that, under the new view, there is a tendency towards under-provision of local public services. This occurs because local jurisdictions are reluctant to tax mobile capital. Additionally, local jurisdictions do not take into account the possible externalities associated with taxing mobile capital. Capital that flees a jurisdiction to escape a local property tax benefits other jurisdictions. This reduces the overall cost of taxing mobile capital in a way not taken into account by the taxing jurisdiction. Again, they find that these results are sensitive to model specification.

IV. Yinger's Theory of Capitalization

Yinger (1982) develops a model in which he derives a household's bid for housing. He argues that the amount a household is willing to pay for a unit of housing services, in a particular jurisdiction, is based on the jurisdiction's level of services and taxes. Therefore, a household's bid for housing services can be written as $P = P(E,t)$, where E is the level of local public services per household and t is the effective property tax rate. The value of a house to a given household can be written as

2) $V(E, t) = P(E,t)H/r$

where H is the total amount of housing units consumed and r is the discount rate.[4]

Household utility is assumed to be a function of housing services, the level of local public services, and a composite private good, Z. The household is assumed to maximize this utility function subject to its budget constraint. In deriving the first-order conditions, Yinger assumes that the household is choosing Z, H, E, and t. The amount a household is willing to bid for housing, P(E,t), is derived by solving for P from the first-order conditions of the utility maximization problem. Solving for P(E,t) requires solving two first-order differential equations, and requires the assumption of a specific utility function. Additionally, the solution to P(E,t) contains a constant of integration. I discuss the method of solving for this constant shortly.

If a Cobb Douglas utility function of the form, $U = c_1 \ln(Z) + c_2 \ln(H) + c_3 \ln(E)$, is assumed, and if housing services are assumed to be a multiplicative function of housing characteristics, X_1 to X_M, the value of housing can be expressed in the following form:[5]

3) $\ln(V) = \ln(v) + (c_3/c_2)\ln(E) - \ln(r + t) + \Sigma a_i \ln(X_i)$

Based on this derivation, Yinger draws a number of conclusions. First, differences in service levels between jurisdictions will be inexactly capitalized. The

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[4] Note that this formula implicitly assumes an infinite lifetime for housing. Given the long expected lifetime of housing, Yinger argues that this should be a close approximation to the actual present discounted value.

[5] Yinger (1982) derives equation (3) in part by solving a differential equation. The v term represents the constant of integration.

degree of capitalization will be based on taste parameters in the utility function. Second, because there are no taste parameters on the tax term in the value equation, differences in tax rates between communities will be exactly capitalized-- regardless of the tastes of consumers.

Interestingly, Yinger also claims that his results imply that homogeneous communities can be formed without zoning barriers. If P_E, the derivative of the bid for housing with respect to services, increases with income, Yinger argues that high-income households will outbid low-income households for housing in high-service jurisdictions, so that zoning barriers are not required to sustain the mean property tax base.

This conclusion, however, does not follow from Yinger's model. If the amount of housing required to enter a community were fixed, as in a zoning requirement, then it is true that rich households would outbid poor households. Yinger's model does not impose this restriction, however. Households are free to choose the level of housing they consume. Rich and poor households would probably select very different levels of housing, given a tax and service package. The assertion that the rich will bid more for one unit of housing is not relevant, since households will consume different amounts of housing. Yinger's model does not prevent the conclusion that poor families will try to consume a small amount of housing in a high-service jurisdiction.

Yinger recognizes that if the price for housing is different in different jurisdictions, suppliers will have an incentive to supply houses to jurisdictions with high house values. But Yinger concludes:

> "...the supply of land within a jurisdiction is fixed, so the conversion of nonresidential land into residential land cannot continue indefinitely. Once all profitable conversion has occurred--that is, in long-run equilibrium--

local fiscal variables will be capitalized into house values."
(1982, p. 935).

Developers will not simply continue to add new jurisdictions, because there are other factors affecting house values besides the service/tax package. Expanding further from the city center will cause the price households are willing to pay for housing services to fall, *ceteris paribus*. This is due to the increase in commuting costs for residents in more distantly located suburbs. Profits for housing developers will fall as they continue to develop further and further from the city center.[6]

Yinger specifies an equilibrium condition for determining the furthest point of community expansion. At the furthest point of expansion, the price of housing is exactly equal to the opportunity cost of resources used in production. The price of housing in this jurisdiction, along with the tax and service level, can be used to solve for the constant of integration in Yinger's housing bid model. Yinger (1985) argues that the property tax in this base jurisdiction is distortionary with respect to housing consumption decisions. Variations from this base tax rate, however, are not. These variations will be perfectly capitalized into housing values. Therefore, relatively high property tax rates in one jurisdiction will not repel capital, since the rate will be fully capitalized into immobile factors.

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[6] Yinger notes that some models of capitalization use flexible boundaries for communities, leading to communities with the most favorable tax and service packages expanding into the territories of less favorable communities. However, he argues that in practice community annexation is relatively rare and community boundaries seldom change.

Yinger's conclusions differ from those of the new view in that, in Yinger's model, it is the average tax rate in the metropolitan area that is distortionary. In the new view, it is the average tax rate on capital in the nation that variations are measured against. Mieszkowski and Zodrow (1983) have argued that Yinger's model is in fact consistent with the new view. Unlike the new view models, Yinger does not explicitly model housing production. Agents are choosing a level of housing services that are presumably made up of land and capital; but he does not explicitly model this. The baseline tax rate distorts the housing decision; since the capital/land components are not explicitly modeled, there is no prediction as to the effect on the overall return to capital. Yinger does argue that deviations from the baseline tax rate (equivalent to the excise effects of the new view) are completely capitalized. The new view writers are more agnostic about the excise effects. In the new view, these effects generally depend on the model parameters--especially assumptions concerning resident mobility.

V. Predictions for Michigan

The economic theory of property taxes does not have clear implications for the effects of Michigan's property tax cuts. Different theories of the property tax reach very different conclusions. For example, the benefit view sees the property tax as a non-distortionary fee for public services; the new view sees the property tax as a distortionary tax on capital that is somewhat progressive; and the classical view sees the property tax as being somewhat regressive.

The new view focuses on the average rate of property (or capital) taxation in the nation. Courant (1982) has argued that, because Michigan only represents about four

percent of the U.S. economy, the general equilibrium effects can safely be ignored when examining Michigan's property tax. Therefore, the relevant effects of the Michigan property tax cuts depend on the partial equilibrium or "excise" effects. Yinger argues that only a "base" community's tax rate will lead to a distortion, and all deviations from the base in a metropolitan area will be capitalized. The new view argues that the national average tax rate on capital is the comparison base, and is somewhat more agnostic in predicting the effects of deviations from this average rate. The effect of Michigan's property tax cut under the new view depends in part on the elasticities in the production and consumption of housing.

The property tax theories do not have clear predictions for the effects of Michigan's school reforms. Residents who live in owner-occupied housing will clearly receive a benefit in the form of lower annual taxes. What is less clear is the extent to which the reduced taxes will be capitalized into the values of their houses. If the benefits of reduced taxes are capitalized into house values, house owners will receive a capital gain on their houses. Future buyers will receive a smaller benefit from the lower taxes, because they will have to pay higher prices for their houses.

For renters, the incidence is harder to predict theoretically. With mobile capital, renters were bearing the portion of the property tax that was shifted forward. A property tax cut should relieve them of this burden. Land owners will benefit from a reduction in the tax, if part of the tax had been shifted into the value of land. Renters may also benefit from a reduction in the price of owner-occupied housing. Renters who were on the margin between renting and buying a house, or who planned to buy a house in the future,

will benefit from any reduction in the annual cost of owning a home. The extent of these benefits cannot be determined by theory and needs to be investigated empirically.

Chapter 3

EMPIRICAL CAPITALIZATION LITERATURE

I. Introduction

This chapter reviews the empirical literature on capitalization. The approaches taken by other authors, their major findings, and some criticisms of the earlier studies are all discussed in this chapter. This chapter draws heavily on Bloom, Ladd, and Yinger (1983), and Yinger *et al.* (1988). These works provide an excellent review of the large number of empirical studies in this area. They also discuss some of the major obstacles associated with estimating the degree of property tax capitalization.

This chapter is divided into three sections. The next section discusses the methodology and results of some of the major capitalization studies. Rather than trying to list all of the studies that have been done on capitalization, this section focuses on listing some of the more important works in this area. The final section discusses opportunities for estimating the degree of property tax capitalization in Michigan.

II. Previous Empirical Work[1]

This section discusses some of the findings of previous authors. The authors

discussed in this section are primarily interested in discovering the degree to which

property tax differentials are capitalized into the price of houses. As discussed in the

chapter on property tax theory, the property tax has two effects. First, the average level

of property taxes in a metropolitan area (or a nation, depending on the theory) is expected

to distort the housing decision. This average level of taxation may change the amount of

capital or land used in housing, and in addition, some portion of the tax may be

capitalized into the price of houses. The second effect results from differences in the

property tax rates on houses within a metropolitan area. These differences can either be

interjurisdictional, resulting from different tax rates levied in neighboring communities,

or intrajurisdictional, resulting from different tax rates levied on houses within a

community as a result of assessment practices.

As discussed in the previous chapter, the property tax theories are not in

agreement as to the degree to which property taxes are capitalized. The new view

approach generally models property taxation in a general equilibrium framework similar

to the one used by Harberger (1962). The degree of capitalization predicted by the new

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[1] Note that many of the problems with the studies noted here have also been identified and discussed by
Yinger *et al.* (1988).

view depends on assumptions concerning factor mobility, and the elasticities of substitution between capital and land.[2]

An alternative approach is the one followed by Yinger (1982, 1985). Yinger uses an urban model with a central business district. This model predicts that tax differentials between communities will be fully capitalized. The model also predicts the full capitalization of tax differences resulting from assessment errors.

These models generally assume complete information. That is, the models assume that agents have complete knowledge of both the current tax rates and of what the future path of tax rates will be. Of course in practice, complete information is unlikely. In their study of intrajurisdictional capitalization in Massachusetts, Yinger *et al.* (1988) find substantially less than full capitalization. They argue that uncertainty surrounding the likely persistence of tax differentials in the communities they study reduces the degree of capitalization.

The studies discussed in this chapter focus on estimating the capitalization of tax differentials between communities, rather than estimating the effect of the average tax rate on property values. There is generally little or no sample variation in the average tax rate, making it difficult to measure the effect of the average tax rate on housing prices.[3]

Capitalization studies are generally interested in measuring the degree to which property tax differences are capitalized. A property tax differential is said to be fully capitalized, if the difference in price between two otherwise identical properties is equal

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[2] These theories are discussed in the previous chapter. For a more in depth discussion see Mieszkowski and Zodrow (1989).

[3] For an exception that does focus on the average tax rate see Wassmer (1993).

to the present discounted value (PDV) of the tax differential. The price differential between two properties can usually be observed. Measurements of the PDV of this differential, however, cannot. The PDV is calculated from the price differential using two parameters, the discount rate and the time horizon. The discount rate and the time horizon must be chosen by the researcher and the choices have varied greatly.[4]

Assumptions concerning the discount rate and time horizon can have a large effect on the interpretation of the capitalization results. For example, King (1977) assumes a discount rate of 5 percent and a time horizon of 40 years and states that 67 percent of property tax differentials are capitalized. Yinger *et al.* (1988) recalculate the degree of capitalization in King's study using their preferred parameters of a 3 percent discount rate and an infinite housing life, and find the degree of capitalization to be just 36 percent. Therefore, any estimates of the degree of capitalization will be sensitive to the parameter choices.

Yinger *et al.* (1988) recalculate the capitalization findings for many of the studies discussed below assuming a 3 percent real discount rate and an infinite housing life. This convention is followed for the remainder of this chapter so that the results of the different authors can be easily compared. The assumption of a 3 percent discount rate and infinite housing life are rather conservative. The effect of varying these parameters on the capitalization estimates is discussed in greater detail in the next chapter.

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[4] An exception to this approach is the one taken by Do and Sirmans (1994). They begin by assuming full capitalization and a 25 year time horizon and then estimate the discount rate to be 4 percent. Of course, their estimate of the discount rate relies on the strong assumption of full capitalization.

The capitalization studies can be divided into three broad categories. First, there are "aggregate studies" which use aggregated house price and tax figures such as the median house price and tax rate for a community. This aggregate figure is often used in cases where more detailed housing information is not available. Second, there are "micro" studies that use individual houses as observations. These two types of studies reflect a trade-off in the types of data that are available. The aggregate studies generally contain a large number of communities, so that there is a large amount of sample variation in the tax rate. However, these studies use an aggregated house value measure that is of lower quality for estimating purposes than individual house observations. Micro studies tend to have a higher quality dependent variable--the actual sales price of individual houses. These studies, however, tend to involve fewer communities so there is less variation in the tax rate. Many micro studies look at only one community and focus on intrajurisdictional capitalization.

Finally, there are studies that take advantage of large scale policy changes, which often serve as "natural" capitalization experiments. These studies have been performed using both aggregated data and individual house observations.

Aggregate Studies

Perhaps the seminal capitalization is study is Oates (1969). Oates uses 1960 census data to study 53 municipalities in northeastern New Jersey. Oates regresses the median value of owner-occupied houses in each community on the effective property tax rate, the annual expenditure per student in the public schools, and a number of additional control variables including: the median number of rooms per house; a proxy for the age of the housing stock; the distance of the community's center from Manhattan; and the

number of poor families in the community. He finds that a higher tax rate depresses house prices and that increased school spending increases the price of housing. Using a discount rate of 5 percent and a 40 year time horizon, Oates finds that tax differentials are fully capitalized. Under a 3 percent discount rate and an infinite house life, the capitalization percentage is 61 percent.

Oates recognizes that the tax rate term in his regression may be endogenous. Capitalization theory assumes that higher tax rates lead to lower housing prices. However, a community with relatively low housing values needs a relatively high tax rate to fund a given service level. Therefore, it is difficult to determine the direction of causation between tax rates and housing values. This problem is fundamental to this literature. For a study to credibly state that it has measured the effect of higher taxes on property values, it must first convincingly show that it is measuring capitalization and not the fact that property poor communities need high tax rates to fund services. The same problem is present in reverse when measuring the effects of public expenditures.

To correct for the endogeneity of the tax and expenditure terms, Oates uses two-stage least squares (2SLS). To correctly perform 2SLS, Oates needs variables that are correlated with the tax and expenditure terms, but do not in part determine house prices. Some of the instruments Oates uses include: the median years of school completed by adult males; the population density; the percentage change in population between 1950 and 1960; the percentage of the population enrolled in K-12 schooling; and the value of commercial property per resident. It is possible that the value of all of these instruments has some impact on the price of housing in a neighborhood. Therefore, they might not be suitable instruments. In fact, the coefficient on the tax term in Oates's 2SLS

regression is the same as the coefficient on the tax term in the ordinary least squares regression, suggesting that if there is an endogeneity problem, the 2SLS estimation does not completely fix it.

Several subsequent authors attempt to improve upon Oates's work. King (1977) suggests that Oates mis-specifies the tax term in his regression. The dependent variable in Oates's study is the house price and the tax term used is the tax rate. King argues that ——— if the house price is the dependent variable then the tax *payment* should be used as the independent variable; because for a given tax *rate* increase, the dollar effect will be larger on a higher priced house. Therefore, Oates's specification understates the capitalization for high value houses and overstates it for low value houses. King finds that correcting this specification error reduces the capitalization found with Oates sample. With a 3 percent discount rate and infinite house life, Kings capitalization estimate is 36 percent, an estimate 41 percent lower than Oates's finding.

Rosen and Fullerton argue that per-student spending is not a good control for service quality. They also use Oates's sample to estimate capitalization after replacing per-student spending with 4th grade student test scores. They find the capitalization rate to be slightly lower than Oates (58 percent with a 3 percent discount rate and infinite house life). However, their study contains the tax rate specification error identified by King.

Several authors have attempted to use simultaneous equation systems when estimating the degree of capitalization. Gronberg (1979) uses a six-equation model, with separate equations included for the tax rate and public service expenditure. Using a sample consisting of census data on 83 Chicago suburbs in 1970, Gronberg finds that

property tax differentials are not capitalized into house values. Dusansky, Ingber, and Karatjas (1981) also use a simultaneous equation model. They examine 62 communities in Long Island, NY using census data. This study also attempts to model and measure the interaction between the rental price of apartments and housing prices. Their estimate of the capitalization rate, assuming a 3 percent real discount rate and infinite house life, is 22 percent.

The studies using aggregated data all tend to have similar shortcomings. They often use some form of the median or mean house price as the dependent variable. It is not clear how well these average price figures predict the experience of individual houses. These studies generally rely on census data, where the house price reflects the house owner's guess as to what the property is worth. It is possible that owner house price predictions are not very accurate. These studies also run a large risk of omitted variable bias. The median house price in a community is a function of many variables, yet these studies often use only a handful of controls. Finally, these studies generally do not convincingly handle the endogeneity problem. It is difficult to find variables that are potentially correlated with the tax rate but not the price of housing. Therefore, with many of these studies, the possibility that the estimates of tax capitalization are inconsistent remains.

Micro Estimates

Krantz, Weaver, and Alter (1982) look at 243 single-family owner-occupied homes which were sold in 6 Pennsylvania cities and their surrounding suburbs in 1979. The data were gathered from Multiple Listing Service Records. They find the

capitalization rate to be 20 percent (using a 3 percent real discount rate and infinite housing life).

One important aspect of this study is that, unlike the other studies discussed in this chapter, Krantz, Weaver, and Alter do not attempt to correct for the simultaneity of the tax variable. They argue that property taxes will adjust slowly to changes in a community's property values. Therefore, property taxes and house values are not simultaneously determined and ordinary least squares can be used to estimate capitalization. However, the authors provide no evidence to suggest that they are looking at a long run equilibrium, where tax rates have fully adjusted to property values. Therefore, the results of this study should be viewed with some skepticism.

Lea (1982) uses a simultaneous equation model to estimate capitalization. Lea looks at 680 households from the Panel Study of Income Dynamics. Observations from the 1968 survey are merged with local tax and expenditure data for cities and counties in which the families are located. Lea finds the capitalization rate to be 26 percent. Unfortunately, for survey confidentiality reasons, Lea was unable to determine the actual municipality in which his households reside. Instead he only knows the county in which the houses are located. Therefore, he uses average tax and expenditure data for the county in which the household resides. Lea's study may be more appropriate for estimating the effects of the average tax rate in an area than for estimating the effects of tax rate differentials.

Richardson and Thalheimer (1981) examine 861 house sales in Fayette County, Kentucky in 1973 and 1974. These house sales occur in two bordering municipalities that share a school district but have different property tax rates. Richardson and

Thalheimer argue that there are few differences in other municipal services between the communities. They find the capitalization rate to be 15 percent (assuming a 3 percent real discount rate and infinite house life).

The micro studies are free from some of the problems of the aggregate studies. The observations are individual houses; therefore, the estimates are free from potential aggregation problems. These studies also tend to have more control variables for both housing and neighborhood characteristics. Therefore, omitted variable bias is less of a concern. Some of these studies use actual sales prices rather than owner estimates of the value, eliminating one more potential source of error. These studies, however, still must contend with the endogeneity issue and face many of the same challenges here as the aggregate studies.

Natural Experiments

As noted, the most difficult problem encountered by researchers studying capitalization is the potential simultaneity between tax rates and house values. Several authors have exploited particular policy changes to avoid this problem. State-wide property tax reforms can be treated as exogenous to the local communities. Therefore, by examining the change in property values that results from such a tax change, the degree of capitalization can be measured without the usual endogeneity problems.

Rosen (1982) examines the effects of California's Proposition 13 on house prices. Proposition 13 was approved by California voters in 1978. The proposition stated that the annual tax rate on real property could not exceed 1 percent of the cash value of the property. The cash value of the property was defined as the county assessor's evaluation of the property's value as stated on the 1975-76 tax bill. For property sold after this year,

the cash value was defined as the market price. Assessment increases were capped at 2 percent per year, with properties reassessed to market value upon sale. Rosen argues that because of initial state bailouts supporting local public expenditures, Proposition 13 had little effect on service levels in the short run.

Rosen regresses the change in a community's average house sales price on the change in a communities average tax payment and a number of other regressors. His sample consists of 64 communities in the San Francisco Bay Area in the years 1978-79. He finds the capitalization rate to be 22 percent (with a 3 percent real discount rate and infinite housing life).

Gabriel (1981) examines the effect of Proposition 13 on the average sales price of houses in the San Francisco Bay Area over the same time period as Rosen. He finds the capitalization rate to be somewhat higher than Rosen (36 percent). Given that Gabriel and Rosen examine the same geographic area over the same time period the large difference in their results is troubling. The divergence of the estimates is most likely due to a specification difference between the two studies. Gabriel suppresses the constant term in his regression, while Rosen does not. The regressions in both studies have the difference in average sales price of houses as the dependent variable, and the difference in annual tax payments as an independent variable. Including a constant term in the regression would capture any differences in the overall price level for housing in the estimating region. Because he suppresses the constant term, Gabriel's tax term is

probably capturing some of the effects of the change in the average tax rate.[5] Therefore, the two studies are not measuring the same thing.

A similar large scale tax change is exploited by Yinger *et al.* (1988). They examine the effects of court-ordered property revaluation in Massachusetts in the early 1970s. They examine individual home sales before and after revaluation. Their study focuses on the degree of intrajurisdictional property tax capitalization. Their preferred estimate is 21 percent in one community and 15.8 percent in another. They conclude that the degree of intrajurisdictional capitalization is likely to vary by community. However, their model predicts that intrajurisdictional capitalization should be complete. They argue that their estimates fall sharply below this level because of uncertainty surrounding the reforms. They note, however, that they do not have evidence to support this assertion.

Despite the large number of studies examining capitalization, there is no consensus as to the degree to which tax differentials are capitalized. It is possible that the degree of capitalization is not constant across geographic areas. Areas that are more fully developed may have a higher rate of capitalization, because the supply of housing (or land) is more inelastic. It is impossible to know if the differences in capitalization findings are due to different capitalization rates or flaws in the empirical work.

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[5] It does not appear that Gabriel is deliberately trying to measure the effects of the average tax rate change. In addition, the tax term in Gabriel's regressions may also be capturing any secular increase in the demand for housing that occurred over the sample period.

III. Opportunities in Michigan

The recent property tax reforms in Michigan present a unique opportunity to estimate property tax capitalization. As discussed in the chapter on Michigan's reforms, Michigan reduced its reliance on the local property tax as a means of funding K-12 public schools, replacing lost revenues with increases in other taxes. All Michigan school districts saw substantial property tax cuts on owner-occupied housing. However, the size of the reduction varied by district. The new property tax rate was set by the state government. Therefore, the change in property taxes was exogenous, with respect to the local communities.

Michigan also changed the amount of dollars available per pupil for each of its school districts. Again, the spending amount was set by the state government. Therefore, the school spending change was also exogenous, with respect to the local communities. The circumstances surrounding Michigan's reforms may have prevented most taxpayers from anticipating the change. Therefore, Michigan's reforms present an excellent opportunity to study capitalization.

Chapter 4

CAPITALIZATION ESTIMATES

I. Introduction

The effects of inter-community tax and spending differentials on house prices is of some importance in the study of local public finance. The capitalization rate has implications for the efficiency and redistributive aspects of using a local property tax to fund local public services. Michigan's recent school finance reforms created a natural experiment in that property tax rates and service levels were both changed substantially in a way that was exogenous to local communities. In this chapter, I use Michigan's experience to generate new estimates of the effects of interjurisdictional differences in property taxes and spending levels on house prices.

Property taxes can affect house prices in two ways. First, the average level of property taxation can depress house values in a metropolitan region.[1] Second, deviations from the average rate of taxation can be capitalized into house prices. If tax differentials between communities are capitalized, a community that taxes property at a higher rate will have lower property values, all others things constant. This type of capitalization is

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[1] Yinger (1982) argues that it is the tax rate of a base-line community, rather than the average tax rate that is important. Mieszkowski and Zodrow (1989) argue that it is the average level of property taxation in the nation that is important. These distinctions are unimportant for the discussion that follows.

known as interjurisdictional capitalization. Full capitalization of a property tax differential is defined as the case where the price of two otherwise identical properties differs by the present discounted value of the tax stream differential between the properties.

If a property tax change is fully capitalized, homeowners cannot move to escape the tax. Likewise, if fiscal differentials are not fully capitalized, residents may switch communities in an effort to benefit from a more desirable tax and service combination. Similarly, if fiscal differentials are not fully capitalized, people may try to construct relatively low cost housing in high service communities in order to benefit from the high service level without paying for the full cost of the services. Incomplete capitalization of fiscal differentials could be one factor contributing to suburban sprawl if richer residents continually move to escape service "free riders."

Michigan's reforms lowered the average tax rate and changed each community's difference from the average. Therefore, these reforms should have had two effects. First, the overall sales price of housing should have increased as a result of the reduction in the average tax rate (assuming, of course, that the average property tax rate does affect house values). Second, each community's property values should have changed differently, depending on the relative tax change and spending in the community. If tax differentials are capitalized, communities with larger tax changes should have seen their property values go up more than communities that received smaller tax changes. Likewise, communities with larger service increases will see their property values go up more than communities that received smaller service increases.

I estimate the effects of the policy change using two samples. One sample consists of individual houses that sold both before and after the reforms. The second sample consists of observations of the mean house sales price, tax rate, and amount of school spending for a number of communities within a metropolitan area. With the dual-sales sample, estimates of the effects of a $1.00 property tax differential on house prices range from $4.25 to $5.20. I find that a $100 increase in per-pupil school spending raises house prices by 0.4 to 0.5 percent on average. Using the mean-sales-price sample, I find that a $1.00 differential in the property tax payment on the average house causes a $9.93 difference in the average house price. For the mean-sales-price sample, the estimate of the effect of the change in school spending is not statistically significant. In addition, I find that the average house sales price increased greatly after Michigan's reforms. It is possible that this increase was due to the reduction in the average tax rate, although economic growth may also be factor. Much of the increase in the average sales price of houses in rural areas appears to be the result of the construction of relatively expensive houses in these areas.

The remainder of this chapter is divided into five sections: The next section briefly discusses Michigan's reforms; Section III contains the capitalization model used to generate the estimates; Section IV contains the estimates generated using the mean sales price data; Section V contains the estimates generated using the individual sales data; and section VI contains concluding remarks.

II. Michigan's Reforms

In 1994, Michigan profoundly changed the way it finances its public schools. The property tax share of school operating revenues was reduced from 66 percent in 1993-94

to 32 percent in 1994-95. The property tax revenues were replaced primarily with an increase in the state sales tax from 4 percent to 6 percent.[2] Michigan also changed the way it allocates revenues to school districts, switching from a district power-equalization method to a foundation grant approach.[3]

Prior to 1994-95, the variation in school district property tax rates was large, ranging in 1993-94 from 8 mills to 47 mills.[4] There was also a wide variance across districts in per-pupil spending, ranging from a high of $10,141 per-pupil to a low of $3,173 per-pupil. The higher school taxes were not always in the districts with the higher spending amounts. In fact, the average millage rate for the 10 lowest-spending districts (per pupil) in Michigan in 1993 was 30.14 mills, while the average millage rate for the 10 highest-spending districts was only 26.08 mills.[5]

As part of the 1994 reforms, Michigan removed much of the authority local districts previously had in making funding decisions. Funding decisions are now made primarily at the state level. The role of the local property tax as a revenue source was also greatly reduced, and lost revenues were replaced with an increase in the state sales tax and a conversion of part of the local property tax into a state property tax. Districts spending below $6500 per-pupil in 1993 had their owner-occupied housing property tax

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[2] See Kearney (1994) for a detailed description of the Michigan reforms.

[3] For a discussion of these two funding approaches, see Reschovsky (1994).

[4] A mill represents a $1.00 tax for every $1000 in taxable property value. Michigan property is assessed at 50 percent of its cash value so that a 1 mill tax on property with a cash value of $1000 would raise $0.50 in revenue (if the property were correctly assessed at $500).

[5] Source: Michigan State Board of Education *Bulletin 1014.*

rate for school operations reduced to 6 mills.[6] Districts spending above $6500 were allowed to maintain their higher spending levels if they levied an additional "hold harmless" millage.

School districts spending below $4200 per-pupil in the 1993-94 school year were moved up to $4200 in the 1994-95 school year. Districts spending above $4200 and below $6500 were increased from their 1993-94 levels according to a sliding scale, with higher-spending districts getting a smaller percentage increase. Districts spending above $6500 per-pupil were allowed to increase their school spending by $160 per pupil in the 1994-95 school year. Future increases in funding depend on the growth of state tax revenues, with previously low-spending districts expected to get a larger percentage increase each year than the previously high-spending districts.

Michigan's reforms provide an excellent opportunity to assess the effects of property taxes and school spending on home values. The tax and spending changes were large and exogenous (at least initially) to the local communities. The changes were most likely not anticipated by most homeowners. Governor Engler had campaigned in 1990 with a promise to reduce property taxes. However, Michigan voters had a long history of rejecting school finance reform proposals, rejecting all 12 that were presented to them between 1972 and 1994, including the first three presented during the Engler administration. Table 4.1 contains a summary of the events leading up to Michigan's reforms.

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[6] Actual school millages in some of these districts will be higher because school districts also levy taxes to make payments to retire debts. The school districts remained responsible for their own debts.

To measure the degree to which these tax and spending changes were capitalized, I examine home sales in Oakland County, Michigan. Oakland County covers 910 square miles immediately north of the city of Detroit. It has several characteristics that make it an attractive location for estimation purposes. First, it has a large population, consisting of just over one million people in 1990, divided among 410,000 households. Second, it is an area of relatively high incomes. Oakland County advertises itself as the "third most affluent county on the map." This affluence translates into a high degree of home-ownership, with 73 percent of households living in owner-occupied housing in 1990. Finally, it consists of a large number of municipalities (61), none of which had more than 75,000 people in 1990.[7]

Figure 4.1 shows the growth in the real average sales price of houses in Oakland County from 1990 through 1996.[8] Oakland County averaged 20,000 house sales per year during this period. Michigan's reforms took place at the end of 1993 and the beginning of 1994. Figure 4.1 shows substantial growth in sales prices after the reforms.

To get a more detailed picture of prices changes in Oakland County, I divide the county into three regions: urban; semi-urban; and rural. I define urban areas as those

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[7] Data from 1990 census and Oakland County promotional literature. Note the number of school districts is substantially less than the number of municipalities but the effective tax rate will depend on the assessment ratio which varies by local municipality as well as on the statutory millage rate.

[8] The houses used in this graph are houses that were zoned as either "residential improved" or "suburban improved." These two zoning categories are made up almost entirely of single family dwellings. Commercial properties, condominiums, and lakefront property have different zoning classifications and are not present in this sample.

communities with less than 20 percent of their land available for development. Semi-urban areas are defined as those communities with between 20 and 50 percent of their land available, and rural areas are those areas with more than 50 percent of their land available for development.[9] The urban and semi-urban areas account for approximately 40 percent of the sales each. The remaining 20 percent of the sales occurred in the rural areas.

The growth trend for all three regions is depicted in Figure 4.2. All three regions experienced little growth in prices before the reforms. After the reforms, all three regions show a substantial increase in average sales price, with rural areas experiencing the largest increase.

Of course, there is no way to be certain how much of this price growth occurred because of the reforms and how much was due to other factors, such as economic growth. The unemployment rate of the Detroit MSA, of which Oakland County is a part, fell dramatically over this period. From a high of 10.2 percent in the first quarter of 1991, the unemployment rate fell steadily to a low of 3.8 percent in the fourth quarter of 1996.[10]

While the economic expansion began in 1992, property values did not start to rise substantially in Oakland County until 1994. Although this rise in property values closely matches the implementation of Michigan's reforms, it is possible that the rise was a result

[9] The percentage of land available was calculated using data from the *Southeast Michigan Council of Governments (SEMCOG) Community Profiles*. Any land falling into the categories of agricultural, or woodland/grassland/wetland was considered available.

[10] Source: *Michigan's Labor Market News* various issues. (published by The Michigan Employment Security Agency)

of the continued economic expansion in the Detroit area. Therefore, while the data are suggestive they are inconclusive.

Figure 4.3 shows the changes in school spending between 1990 and 1995 for the three regions. Figure 4.4 shows the changes in the average school millage rate. These figures show that Oakland County residents saw an increase in school funding and a dramatic reduction in property taxes due to the reforms. Each school district in Oakland County experienced a different tax and spending change. I use the differential effect of these changes on the prices of houses in these school districts to estimate the degree of capitalization.

III. The Econometric Model

Capitalization of the property tax means that changes in the tax payment stream over time affect house prices. In this chapter, I follow the capitalization model as defined in Yinger (1982) and Yinger *et al.* (1988). These papers demonstrate that the capitalization equation can be derived from an asset pricing model or from a utility maximizing model. I follow the asset pricing approach here because the derivation is simpler.

$$(1) \qquad V = \sum_{n=1}^{N} \frac{R(\alpha, E)}{(1 + i)^n} - \sum_{n=1}^{N} \frac{T}{(1 + i)^n}$$

Following the notation of Yinger *et al.* (1988), equation (1) states that the value of a house, V, is equal the present value of the rental stream of service it generates, $R(\alpha, E)$,

where i is the real discount rate and N is the house life. T represents the annual tax

payment on the house. The annual rental price of the house, R, is a function of the

amenities of the house, α, and the level of government services in the community, E. The

house amenities are assumed to include both house and community features. House

features include characteristics such as the house size and square footage, and community

features include the house's distance from parks and highways, and such quality-of-life

issues as pollution and crime. In generating my estimates, I assume that α remains

constant over the period of estimation.[11]

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[11] To be more specific, the rental price of housing is a function of α, E, *and* the average tax rate, and

overall real housing price level in the community. Assuming an infinite house life, we can write equation

(1) as

(a) $iV = R(\alpha, E, P, r) - (T - r)$

where P is the real housing price level and r is the baseline or average tax level, T is the tax payment on the

individual house and all other variables are as defined in the text. Equation (a) indicates that differences in

house prices across communities are in part due to how the communities tax rate differs from the average

tax rate. I can then rewrite equation (a) as

(b) $iV = (R(\alpha, E, P, r) - r) - T$

and then

(c) $iV = R'(\alpha, E, P, r) - T$

where R has been redefined to include the additional baseline tax term. P and r are omitted from equation

(1) in the text because they are constant across all housing observations in my samples. Therefore, they are

not individually estimated; but, are instead subsumed into the year dummy variables in the regressions.

Equation (1) assumes that home values are reduced by the full present value of the stream of future tax payments. Equation (2) shows the formulation if tax capitalization is less than full.

$$(2) \qquad V = \sum_{n=1}^{N} \frac{R(\alpha, E)}{(1 + i)^n} - \sum_{n=1}^{N} \frac{\beta T}{(1 + i)^n}$$

A β of 0.5, for example, indicates that 50 percent of the tax differential is capitalized. Fifty-percent capitalization implies that a tax increase would reduce house values by 50 percent of the present value of the tax increase. Estimates of β are going to be highly dependent on assumptions concerning the relevant house life and discount rate. To make my results comparable with Yinger *et al.*, I follow their assumptions of an infinite home life and a 3 percent real discount rate. Under these assumptions, full capitalization implies that a permanent $1.00 change in annual property taxes in a district, holding taxes and spending in all other districts constant, would change house prices by $33.33.

Alternatively, Oates (1969) assumes a house life of 40 years and a 5 percent discount rate. A $1.00 tax change would be said to be fully capitalized under these assumptions if it changed the house price by $17.16. Therefore, the assumptions of a 3 percent discount rate and infinite house life represent will produce a more conservative estimate of the degree of capitalization.

Assumptions concerning the real discount rate and house life have little effect on the regression estimates other than scaling them. Of course, the dollar change in property

values that actually occurred does not depend on assumptions regarding the discount rate or housing life. What these assumptions do affect is the interpretation of the results. The dollar amount that represents full (100 percent) capitalization decreases with the assumed discount rate and increases with the assumed house life. A summary of the dollar totals representing full capitalization of a $1 tax change under varying discount rate and house life assumptions is presented in Table 4.2. To avoid confusion, I report the dollar changes resulting from the tax changes, as well as the capitalization rate.

The effective tax rate is defined as the annual tax payment divided by the sales price of the house. The annual tax payment is the assessed price of the house multiplied by the statutory millage rate. Therefore, the effective tax rate also can be stated as the assessment ratio multiplied by the statutory rate, where the assessment ratio is the assessed value of the house divided by the cash value of the house.

The effective tax rate is an endogenous variable since it is calculated using the house's price. The endogeneity problem is best illustrated by an example. Suppose that a house sells for a higher price than it normally would due to a random shock. This higher price will also be associated with a lower effective tax rate, since the house price is in the denominator of the effective tax rate. Therefore, the random element to house prices will make the effective tax rate seem low for houses that sell at a premium and high for houses that sell at a discount, resulting in an upwards capitalization bias.

To avoid this problem, I use the average assessment ratio for each community, rather than the actual ratio for each house when calculating the effective tax rate. I define the average assessment ratio as the average assessed value for the community divided by the average sales price for the community. By using the average ratio, I am ignoring the

possible capitalization of within-community assessment errors, which is known as

intrajurisdictional capitalization. Instead, by using the average ratio, I can look at the

effects of tax and spending differences across communities, which is known as

interjurisdictional capitalization.

I can, therefore, rewrite the tax term in equation (2) as

(3) $T = tV$

where t is the average effective tax rate.[12] Based on equation (3) and under the

assumptions of an infinite house life, I can rewrite the capitalization equation as

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[12] Another issue with the tax rate is the deductibility of property taxes from the federal income tax. The

following argument is based on Yinger *et al.* 1988. The basic capitalization equation I use is:

(a) $$V = \frac{R}{i} - \frac{\beta t V}{i}$$

Assume that the marginal tax rate faced by the homeowner is s. After the property tax deduction, the net

tax payment is $(1 - s)tV$. Yinger *et al.* argue that it is also important to consider the effects of taxation on

the discount rate. The opportunity cost of housing is the return given up by the investor when he or she

invests in a house. The return that matters is the return after taxes. Let i' be the gross of tax return. Then

the net return is $(1-s)$ i'. I can rewrite equation (a) as

(b) $$V = \frac{R}{(1-s)i'} - \frac{\beta(1-s)tV}{(1-s)i'}$$

Simplifying equation (b) produces

(c) $$V = \frac{R}{(1-s)[i' + \beta t]}$$

$$(4) \quad V = \frac{R(\alpha, E)}{(i + \beta t)}$$

Taking the natural logs of both sides of equation (4), produces

$$(5) \quad \ln V = \ln R(\alpha, E) - \ln(i + \beta t)$$

For estimation purposes, I rewrite this model as

$$(6) \quad \ln V_{it} = \alpha_i + \beta_0 School_{it} - \ln(i + \beta_1 t_{it}) + \sum D_k \delta_k + \varepsilon_{it}$$

The annual rental rate of a house, R in equation (5), is assumed to be based on time-invariant house and neighborhood characteristics, α_i, and school spending, which does vary over the sample period. In all specifications, the α_i are assumed to be arbitrarily correlated with the other right-hand-side variables. The effect of school spending on home values is measured using per-pupil expenditures. Note that I am assuming an

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Taking logs we get

$$(d) \quad \ln V = \ln R - \ln(1 - s) - \ln(i' + \beta t)$$

The tax term is time constant and will be differenced out of the estimates.

exponential function for the effects of school spending on house prices.[13] Per-pupil school expenditures serve as a proxy for the real variable of interest, the amount and quality of schooling services available in the community.[14] In using this model, I have implicitly assumed that the effects of school spending are constant across communities. Therefore, the coefficient, β_0, should be interpreted as the average effect of school spending on house prices.

The D_k represent a set of year and quarter dummy variables. Year dummies are included to capture the overall price level in Oakland County and quarter dummies are included to capture any seasonal price differences. The year dummy variables will capture any overall rise in price level for Oakland County homes that resulted from the policy change, as well as any change in the price level that resulted from other county-wide economic factors, such as real construction cost increases or increased demand due to economic growth. Therefore, β_0 and β_1 measure the effects of tax and spending differences *across* communities. The coefficients should be interpreted as a measure of the effect of changing the tax or spending amount in one community, holding the tax and spending levels of all other communities constant.

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[13] The model was also estimated using the log of per pupil expenditures with similar results. I judged the semi-elasticity model to provide the better fit. The actual school spending variable used is the revenue per-student available to the district, from local, state, and federal sources. This figure was taken from *The Michigan Department of Education Bulletin 1014*. Figures for the 1996-97 school year are not yet available, so I have assumed that real spending remained constant between 1995-96 and 1996-97.

[14] Note that other public services can be safely omitted as long as they either remained constant over the relevant period or had changes that were not correlated with the other variables of interest.

The real discount rate, i, is assumed to be 3 percent. I have converted all dollar values into constant 1990 dollars using the national *Consumer Price Index (CPI-U)*.

Equation (6) is non-linear, so it cannot be estimated using ordinary least-squares (OLS). Assuming initial parameter values of zero for all parameters, the linear approximation to equation (6) can be written as

$$(7) \qquad \ln V_{it} = \alpha_i + \beta_0 \ln School_{it} - \frac{\beta_1 t_{it}}{i} + \sum D_k \delta_k + \varepsilon_{it}$$

If the α_i were known, equation (7) could be estimated using OLS. The α_i are not known, however, so they must be removed prior to estimation. I estimate equation (7) after taking first-differences, equation (8), and by fixed-effects, equation (9).[15]

$$(8) \qquad \Delta \ln V_{it} = \beta_0 \Delta \ln School_{it} - \frac{\beta_1 \Delta t_{it}}{i} + \sum \Delta D_k \delta_k + \Delta \varepsilon_{it}$$

$$(9) \qquad \ln V_{it} - \ln \overline{V_i} = \beta_0 \left(\ln School_{it} - \overline{\ln School_i} \right) - \frac{\beta_1 \left(t_{it} - \overline{t_i} \right)}{i} +$$

$$\sum \left(D_k - \overline{D_k} \right) \delta_k + \varepsilon_{it} - \overline{\varepsilon_i}$$

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[15] Because there are only two time periods in the dual sales sample first differencing is equivalent to fixed effects.

IV. Mean Sales Price Estimates

In this section, I present estimates of the degree of interjurisdictional capitalization generated using the mean house sales price sample. I examine the effects of Michigan's reforms on the mean house sales price for each of Oakland County's municipalities. The 49 cities, townships, and villages that averaged more than 15 sales per quarter between 1990 and 1996 are included in this sample. The sample consists of quarterly data from 1990 through 1996. Observations from the last quarter of 1993 and the first three quarters of 1994 have been dropped. This period represents a time when there was a great deal of uncertainty surrounding Michigan's reforms. Including these quarters in the regressions reduces the capitalization estimates and the overall fit of the model.

This sample is attractive for several reasons. First, the number of sales used to generate the average figures is large. Oakland County averaged approximately 20,000 home sales per year between 1990 and 1996. Second, the sample covers a relatively long time period with observations several periods before and after the policy reforms. This sample uses all home sales in Oakland County, rather than a subset of the houses that sold.[16] The two studies that use Proposition 13 data (Gabriel 1981 and Rosen 1982) also use the average community sales price as the dependent variable. Therefore, the

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[16] To be specific the sample includes all properties that were zoned as "residential improved" or "suburban improved." Houses with special zoning classifications such as lakefront homes were not included.

estimates generated with this sample can be compared easily to the results of these studies.

Using aggregated data has some severe drawbacks, however. The capitalization model I use for estimation is defined at the house level. The aggregate version of this model should have the average of the log of the individual home prices as the dependent variable. I use the log of the average house price as the dependent variable instead. The size and direction of the effect of this difference is unknown.

Michigan's policy change affected taxes and spending by school district. In Michigan, school districts are a separate level of government from municipalities. Oakland County's school districts do not line up exactly with the borders of the municipalities. The property tax assessed on a house in Michigan is the combination of all state, county, municipality, and school district taxes. I assume that municipalities that lie mostly within one school district were entirely within the school district. For municipalities more or less split evenly by two school districts, I use the average values of the school tax and spending figures.

There is also no way to be certain that the policy change did not affect the composition of the homes that sold. An increase in the mean sales price of a community may correspond to a situation in which more expensive houses are being sold rather than an increase in house price. The policy changes may also have affected the mean price by influencing the type and location of new construction. This is a problem for all studies that rely on aggregate data.

Table 4.3 presents summary statistics for the mean-sales-price sample. The regression results for the mean-sales-price sample are presented in Table 4.4. The

estimates are generated using the linear approximation described in equation (7). The

OLS estimate of equation (7) is presented in column I of Table 4.4. Recall that the α_i are

unobserved and so are not estimated. The effective tax rate has been divided by the

assumed discount rate of 3 percent prior to estimation. Therefore, the coefficient on the

tax term is interpreted as the capitalization rate under a 3 percent discount rate and

infinite house life. The OLS estimate for the capitalization rate is 140 percent. The

school spending coefficient represents the percentage change in housing prices resulting

from a $100 per pupil increase in school spending. The OLS estimate predicts that such

an increase would raise house prices by 0.9 percent.

Recall that the α_i may reflect time constant characteristics of a community that are

correlated with both the tax rate and price of housing in a community. If so, the α_i must

be removed prior to estimation or the regression results will be inconsistent. I estimate

equation (7) using both first differences and fixed effects.[17] The results of both of these

estimation techniques are reported in Table 4.4. The coefficients on the tax and spending

terms decrease substantially suggesting that the OLS estimates are indeed inconsistent. I

test for serial correlation using the residuals of the differenced equation. The coefficient

on the lagged residuals is -0.52 suggesting there is no serial correlation in the

undifferenced model. Therefore, the fixed effects estimator is the more efficient. The

reported standard errors are robust to first-order serial correlation and heteroskedasticity.

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[17] The fixed effects estimates are generated by time-demeaning the observations for each municipality prior

to estimation.

I use robust errors to account for any heteroskedasticity that might result from the use of grouped data.

The coefficient on the normalized tax rate in the fixed-effects estimate is -0.2978, indicating a 29.78 percent capitalization rate. With the maintained assumptions of a 3 percent discount rate and infinite house life, full capitalization occurs if a $1.00 tax differential results in a $33.33 price differential. The fixed-effects estimates indicate that a $1.00 tax differential between two communities would result in a $9.93 property value differential (29.78 percent of $33.33), on otherwise identical properties. Rosen (1982) finds that a $1.00 tax differential leads to a $7.30 property value differential, while Gabriel (1981) finds a value of $12.00. Therefore, this estimate falls between the two.

Both the fixed-effects and first-differences estimates of the effects of school spending are not statistically different from zero. There are several factors that may be contributing to this. First, recall that school spending is a proxy for the real variable of interest, which is the quality and amount of schooling services provided. Second, there may be a great deal of uncertainty in the communities themselves as to the effects of the additional school spending. As discussed in Wassmer and Fisher (1996), there are a number of ways Michigan's schools can spend their new revenues and not all of them (new school buses, for example) will improve student learning and performance. There is also a great deal of uncertainty surrounding the future funding levels of Michigan's school districts (again, see Wassmer and Fisher (1996)). As the impact of the spending changes on school quality becomes clearer, the effect on property values is likely to become more pronounced.

To test the robustness of these estimates, I also estimate the effects of the policy change using a "random growth model" (Heckman and Hotz 1989). Under this model, each community is allowed to grow at a separate rate. This growth rate is assumed to be potentially correlated with the other right-hand-side variables. For example, districts that received the largest tax cuts could have been growing at a slower rate than the districts that received smaller tax cuts. The random growth model is presented in equation (10), where p represents the time period and γ_i represents the growth coefficients for the individual townships.

$$(10) \qquad \ln V_{it} = \alpha_i + \gamma_i p + \beta_0 \ln School_{it} - \frac{\beta_1 t_{it}}{i} + \sum D_k \delta_k + \varepsilon_{it}$$

I am still including the year dummies in equation (8), so that the γ_i's represent deviations of the individual communities from the overall price growth in Oakland County. Equation (8) is first differenced to eliminate the time-constant unobservable component. The γ_i are then removed from the differenced equation using standard fixed-effects techniques. The results of this estimation are presented in column IV of Table 4.4. As can be seen by comparing columns III and IV of Table 4.4, the random growth model produces results almost identical to the results found by first-differencing the first model. Therefore, with the mean-sales-price sample, deviations from the overall price trend in Oakland County seem to be unimportant for estimation purposes.

V. Dual Sales Estimates

There are three drawbacks to attempting to estimate capitalization with the mean-sales-price sample. First, the capitalization model does not aggregate well. The dependent variable should be the average of the log of the sales prices, but I am forced use the log of the average sales price. Second, the school district boundaries do not line up exactly with the municipal boundaries, so using municipalities represents an approximation. Third, there is no way to be certain that the policy change did not affect the composition of the houses that were sold. It is possible that the tax change affected both the houses that sold and the location and type of new construction.

In this section, I present estimates that correct these three problems. I examine a set of individual houses sold once in 1992 and then again in 1996. These sales straddle Michigan's policy reforms. By looking at individual houses, I avoid the aggregation problem that is present in the mean-sales-price estimates. Many factors that affect house prices, such as the distance of the house from parks or the urban center, can be assumed to be constant over such a short time period. I attempt to eliminate the small number of houses that underwent major additions or renovations between the sales from the sample, by using building permit data obtained from the local municipal governments.[18] Houses

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[18] Building permit data is mostly kept by the individual cities, townships, and villages and the availability and quality of the data varied by municipality. Therefore, it is possible that some houses that underwent major renovations remained in the sample. As long as these houses are few in number or the renovations are not correlated with the tax change they should not bias the estimates.

that were not owner-occupied or that were not the homeowner's primary residence are also removed from the sample.[19] In total 74 houses (9 percent of the total matched sales) are removed prior to estimation. The problem of school district boundaries not being coterminous with municipal boundaries is also eliminated, since each house's school district is known.

A potential drawback of the dual-sales data is that these homes represent houses that sold twice in four years. I identify approximately 700 houses that sold both in 1992 and then again in 1996. Only the first three quarters of these two years were compared, and the 700 houses represent approximately 5 percent of the total number of houses that sell in any three quarter period.[20] Houses that sell twice in such a short period may be systematically different in some way from the housing stock at large. For example, it is possible that the consumers of such houses anticipate selling them soon after purchase and thus have a shorter time horizon than the average home purchaser. The purchasers of such homes might have different preferences for services than the population at large. For example, they might be more likely to have small children and prefer a larger amount of school spending. Therefore, it is possible that the effects of the policy changes on these houses are different from the effects on the overall population of houses.

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[19] Homeowners primary residences in Michigan are known as "homesteads" for taxation purposes and after the reforms they were taxed at a lower rate than rental properties and secondary residences. Each house used in the dual sales estimates is a homestead.

[20] Only the first three quarters of the years were compared due to the expense of the data collection.

Table 4.5 contains summary statistics for the dual sales sample. The growth variable is the percentage change in the average house sales price for a house's community between 1990 and 1992. It is included in the regressions after differencing to help reduce the noise in the estimates. The improvement dummy variable is equal to one for those houses that had improvements done to them, where the improvements were not substantial enough to warrant removing the house from the sample. A variable representing the percentage change in the number of households in a house's community between 1990 and 1996 is included as a measure of housing construction between 1990 and 1996.

Recall that the capitalization equation (7) contained an unobserved vector of components, α_i. The dual-sales sample consists of two time periods and the unobserved component is removed by first-differencing. To account for the fact that each community may have its own price growth trend, I include the percentage change in the average sales price of houses in the regression. This variable represents a somewhat crude measure of price growth for existing houses, since its value may be influenced by new construction. The results of this regression are reported in Table 4.6 column I. The coefficient on the normalized tax rate represents the percentage of the tax differential that is capitalized, in this case 6 percent. Note that coefficient is not statistically different from zero.

Column II contains the regression results with the inclusion of the percentage change in households in a house's community between 1990 and 1996. The inclusion of this variable makes the equation more structural. Column II is essentially the inverse demand curve for housing, with the percentage change in households representing the change in quantity. The inclusion of the quantity variable improves the regression results

substantially. The estimated capitalization rate is now 11 percent, implying that a $1.00 tax differential leads to a $3.73 price differential between houses. This estimate is statistically significant at a 5 percent level (p=0.029). The estimate of the effect of school spending implies that a $100 per-pupil increase in spending increases house prices by 0.56 percent. This estimate is significant at a 1 percent level (p=0.001).

Including a quantity variable in the regression, however, raises the possibility of an endogeneity problem, since the price of housing may be in part determining the quantity. Testing for endogeneity and correcting the problem if it exists requires a supply shifter. I use the percentage of land available in a community for development as the supply shifter. A Hausman test for endogeneity indicates that the quantity variable is in fact endogenous (p=0.028).

Column III contains the two-stage least squares (2SLS) estimates using the percentage of land available as an instrument. These estimates indicate a capitalization rate of 12.7 percent, implying a $1.00 tax differential results in a $4.23 price differential. A $100 increase in per-pupil spending, holding spending in all other districts constant, is estimated to raise house prices by 0.51 percent. Both variable are significant at a 1 percent level (p=0.014 and 0.003 respectively).

The percentage change in households between 1990 and 1992 was largely determined by the availability of land. The simple correlation between the change in households and percentage of land available is 0.8. Urban communities, those with between 0 and 20 percent of their land available, saw a 1.3 percent increase in households between 1990 and 1996. Semi-urban communities, those with between 20 and 50 percent

of their land available, saw an average increase of 10.8 percent, and rural communities, those with more than 50 percent of their land available, saw an increase of 22.8 percent.

Figure 4.2 shows the increase in the average house sales price for each of these regions. Rural areas have the largest increase in average price. Column IV of Table 4.6 shows the dual-sales estimates where the price growth for each of the three regions is estimated holding all other factors fixed. The growth rate is estimated by including a dummy variable indicating whether the house's community is semi-rural or rural. With this specification, the constant term represents the growth rate of urban areas and the dummy variables capture differences from this growth rate. These coefficients reveal that for existing houses, urban areas actually experienced the largest price growth on average, almost three times the price growth of rural areas. This suggests that the price growth in Figure 4.2 is biased by the effects of relatively expensive new construction.

VI. Conclusion

In this chapter, I have used home sales data from Oakland County, Michigan, to examine the effects of Michigan's school funding reforms on house values. I estimate the capitalization of interjurisdictional differences in property tax and school spending using two samples. A summary of the capitalization estimates is presented in Table 4.7. With the first sample, I examine the effects of the policy changes on the mean sales price of houses in the different communities. Using this sample, I find that a $1.00 tax differential would cause a $9.93 property value differential. This estimate falls between the estimates of Rosen (1982) and Gabriel (1981) who find values of $7.30 and $12.00 respectively. These studies use mean-sales-price data to study interjurisdictional

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capitalization, in the context of California's Proposition 13. My estimate of the effect of school spending differences on house values was not significant for this sample.

Using a second sample, consisting of houses that sold twice, straddling the policy changes, I find a much lower rate of property-tax capitalization. The high estimate of the effects of a $1.00 tax change is $5.20. I also find the effects of school spending to be significantly different from zero, with estimates showing that a $100 increase in per-pupil spending would raise house values 0.4 to 0.6 percent.

The large difference in the estimates provided by the two samples is troubling. One possibility is that the new construction that occurred in Oakland County, which I have argued had a large effect on the average sales price, is biasing the tax capitalization estimates for the aggregate data upwards. A second possibility is that tax capitalization is smaller for the dual-sales data than for the housing stock at large. It is possible that the purchasers of such houses have shorter time horizons than the purchasers of the housing stock at large.

An additional question of interest concerns the relative strengths of the price decrease caused by additional taxation and the price increase caused by increased school spending. For this purpose, consider the following, admittedly crude, experiment. Suppose that a hypothetical district in Oakland County wished to raise school spending by $100 per-pupil in the 1990-91 school year. Assume that this district had the county's 1990-91 median state equalized value (SEV) of property wealth per-pupil of $115,897. This district would have needed to increase tax rates by 0.863 mills in order to finance the increase in spending. In 1990, the median price of an owner-occupied house in Oakland County was $95,400. If the median-priced house was assessed at 50 percent of its cash

value, as the law in Michigan requires, the tax on it would be $41.17 a year. At a capitalization rate of 15.6 percent, the high dual sales result, this tax would reduce the median house's price by $214.08. At a capitalization rate of 29.8 percent, this tax would reduce the median house's price by $410.47. Assuming that a $100 increase in per-pupil spending increases house prices by 0.4 percent, the increase in school spending would raise the median house price by $381.60. Although this calculation contains some rough approximations, it does suggest that the effects of higher property taxes on house values may be offset to a large degree by the effect of increased school expenditure on property values.[21]

In the case of Michigan's reforms, windfall gains were experienced by existing home owners. It appears that homeowners experienced an increase in the value of their houses as a result of the reduction in the overall property tax rate, although this increase might be in part due to Michigan's recent economic expansion. Rural areas experienced the largest increase in average sales price, although this seems to be due largely to the value of new construction. For existing housing, urban areas experienced the largest price increase.

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[21] The median house value for Oakland County is taken from the 1990 census. The SEV figure used in the calculation is the median of the SEV values for each of Oakland County's school districts for the 1990-91 school year. This figure was taken from *Bulletin 1014* published by the Michigan State Board of Education. The majority of Oakland County's school districts were "out of formula" in 1990-91, meaning that state aid did not lower the price of an additional dollar of schooling for those districts. I assume that this hypothetical district is also out of formula.

Interjurisdictional differences in the tax cuts were capitalized as well. Because the tax differentials were not fully capitalized, residents have an incentive to move to the communities that received the largest tax cuts. Incomplete capitalization implies that future buyers can receive some of the benefits of the tax cuts.

Residents of previously low-spending school districts also received a benefit from the increase in school spending. The higher spending levels increased house values and will probably result in more schooling services being provided to residents of these districts. The extent to which the increased spending increases schooling services is a topic that needs to be investigated further. Residents of the school districts that spent the most prior to the reforms did not fare as well. These residents are likely to see decreases in their real school funding levels as time passes (see Wassmer and Fisher 1996). This will likely decrease school service levels, as well as property values, in those communities. The effects of the school spending changes on property values are likely to become more pronounced, as the uncertainty regarding future funding levels and the effects of these funding levels becomes resolved. Residents of these high-spending communities also received smaller tax cuts, since they were required to levy an additional millage to maintain their spending levels.

Finally, it should be noted that this analysis ignores the effects of the increase in other taxes in Michigan, especially the state's sales tax, that occurred to as part of Michigan's reforms. Also, further research is needed to investigate the effects of the property tax cuts on renters, a group that was not included in this study.

All of Oakland County
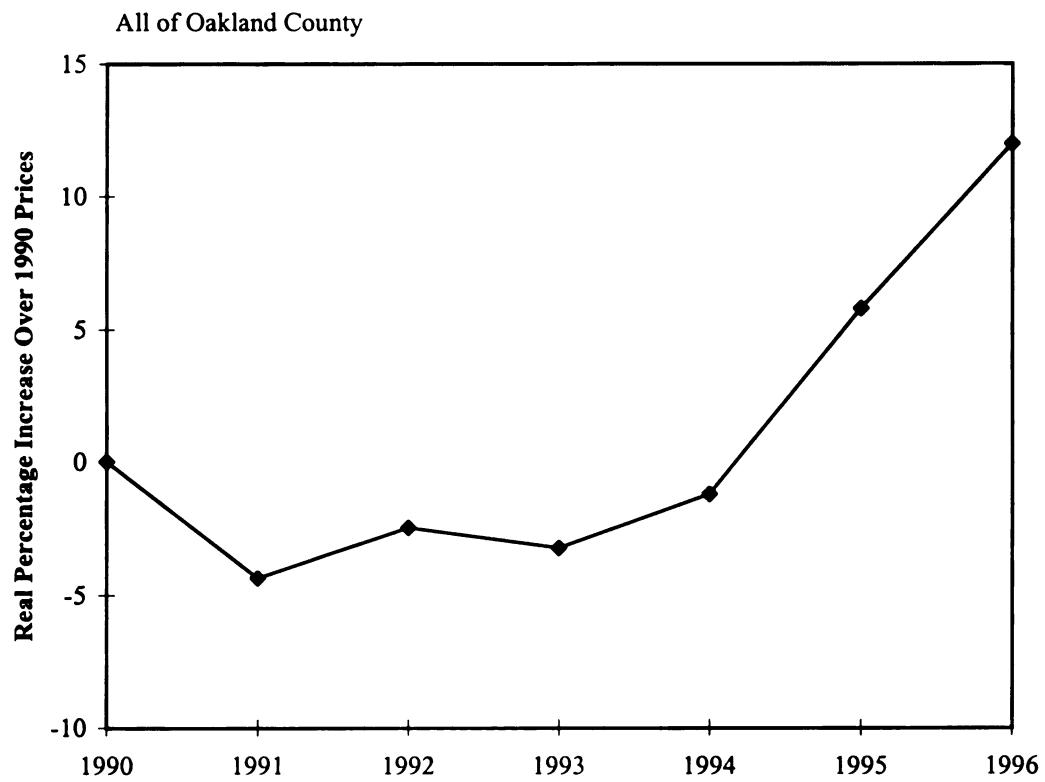
Figure 4.1 - Property Value Growth 1990 - 1996
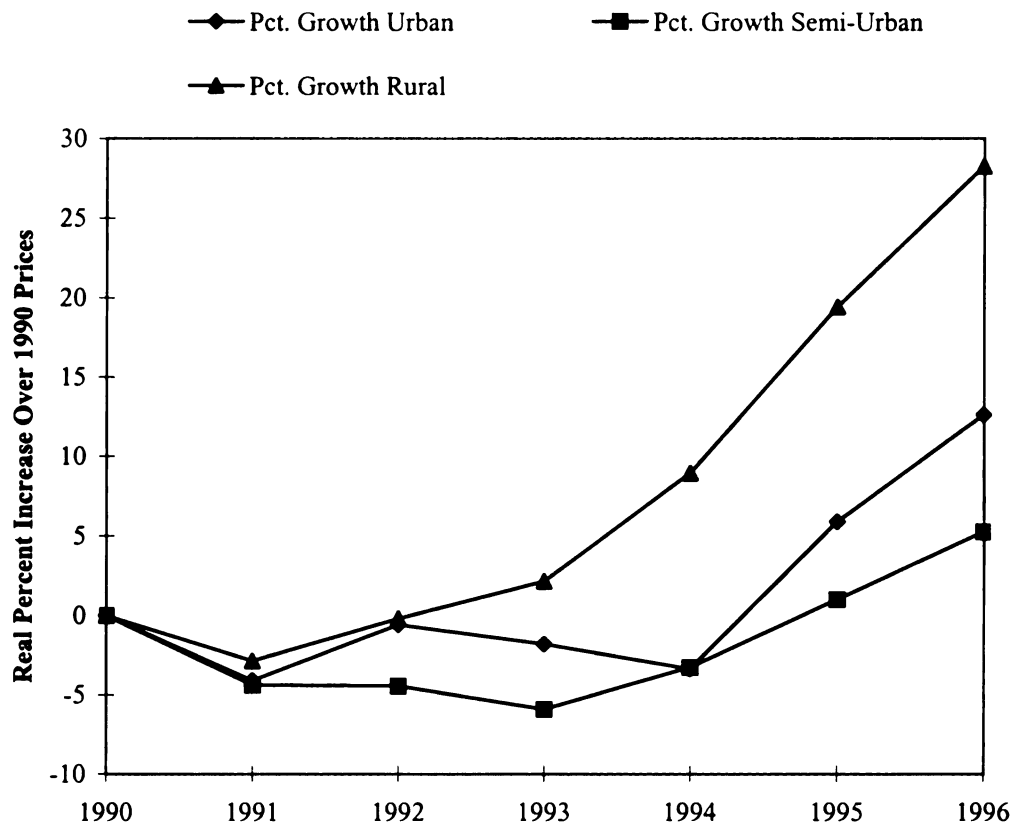
Figure 4.2 - Property Value Growth 1990 - 1996
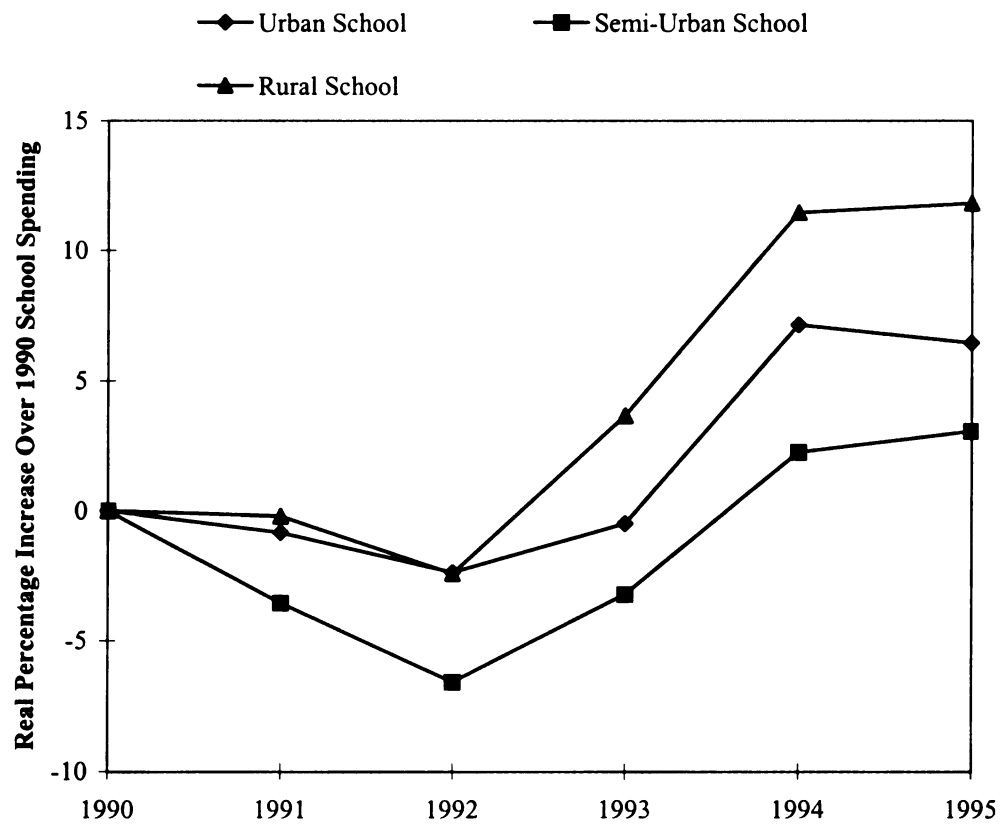
Figure 4.3 - School Spending Changes 1990 - 1995
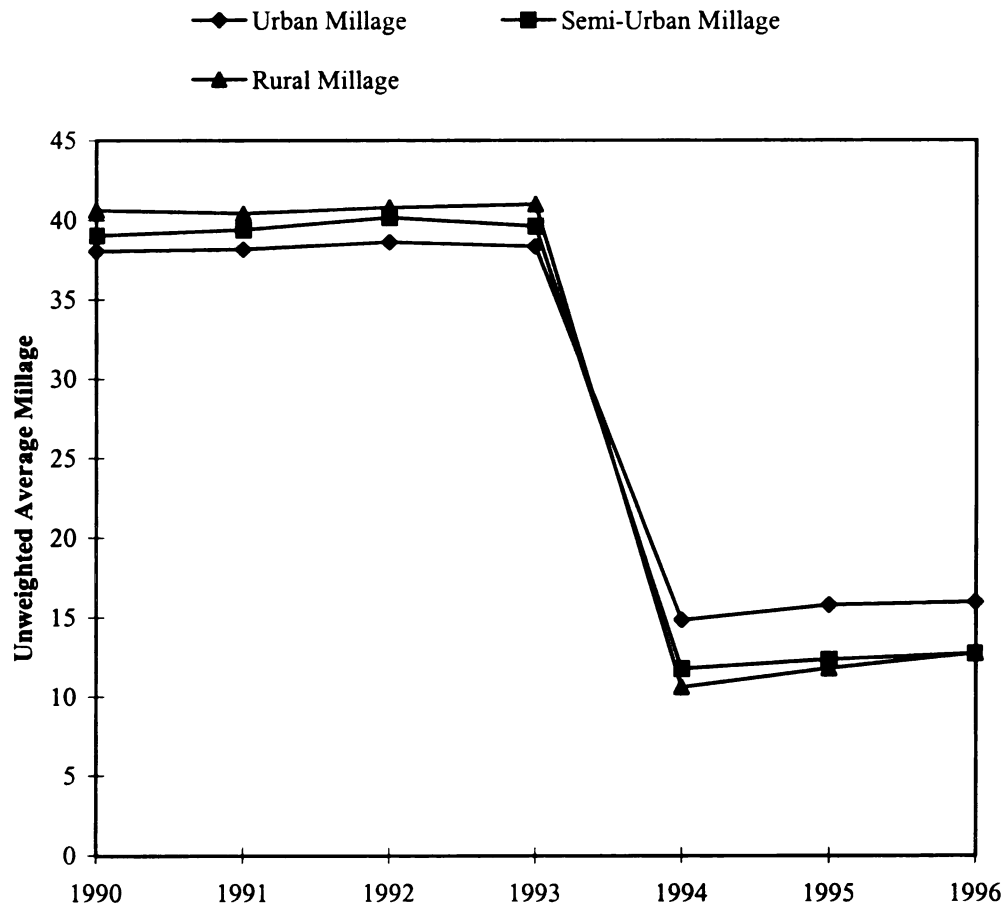
Figure 4.4 - Average Millage Rates 1990 - 1996

Table 4.1 Events Leading up to Michigan's 1994 School Reforms

Date	Event
1972 to 1989	Nine ballot proposals to either reduce property taxes and/or reform school funding presented to Michigan voters. All are defeated.
1990	Gubernatorial candidate John Engler promises to cut property taxes if elected.
November 1992	Two ballot initiatives are presented to voters • Governor Engler's "Proposal C" that would have reduced property taxes and capped assessments • The legislature's "Proposal A" that would have limited assessment growth. Both initiatives are defeated
June 1993	Governor Engler and the legislature agree to a new ballot proposal that links school finance reform and property tax cuts. "Proposal A" on the 1993 ballot is defeated.
July 1993	State Senator Debbie Stabenow introduces legislation to entirely eliminate the use of the property tax for school funding.
August 1993	Governor Engler signs Public Act 145. $6.5 billion in property taxes are eliminated.
December 1993	The governor and legislature present their plans for replacing the lost revenue, including a limited role for the property tax, and restructuring school finance.
March 1994	Voters approve "Proposal A" on the 1994 ballot.

Source: Addonizio, Kearney, and Prince 1995.

Table 4.2 Full Capitalization of $1 per Year Under Differing Assumptions

House Life	Real Discount Rate			
	1%	3%	5%	7%
10 Years	$9.47	$8.53	$7.21	$7.02
40 Years	$32.84	$23.11	$17.16	$13.33
100 Years	$63.03	$31.60	$19.85	$14.27
Infinite	$100.00	$33.33	$20.00	$14.29

This table shows the dollar amount representing the full capitalization of a $1.00 tax differential between communities under varying discount rate and house life assumptions.

Table 4.3 Summary Statistics for Average Sales Price Sample

	Mean	Std. Dev.	Min	Max
Avg. House Price	$94,765.00	$38,837.00	$14,983.00	$251,947.00
Log(Avg. House Price)	11.37	0.44	9.61	12.44
Per-pupil School Spending	$5,789.00	$1,393.00	$3,897.00	$10,489.00
Effective School Tax Rate	1.36%	0.62%	0.28%	2.39%

Note: All dollar totals are reported in constant 1990 dollars. Sample observations are from the 49 Oakland County municipalities that averaged over 15 sales a quarter between 1990 and 1996. Observations from the last quarter of 1993 and the first 3 quarters of 1994 have been dropped. This time period reflects a period of uncertainty over Michigan's reforms. Total observations used in estimation: 1176.

Table 4.4 Estimates Using Mean Sales Price for Each Community

	OLS	Fixed Effects	First Differences	Random Growth
Normalized Tax Rate[†]	-1.4348 (0.4153)	-0.2978 (0.0820)	-0.2513 (0.1238)	-0.2451 (0.1259)
School Spending Per Pupil (100's of dollars)	0.0094 (0.0028)	0.0000 (0.0016)	0.0028 (0.0034)	0.0030 (0.0035)
Y91	-0.0284 (0.0142)	-0.0368 (0.0131)		
Y92	0.0216 (0.0156)	-0.0069 (0.0155)	0.0620 (0.0497)	0.0620 (0.0497)
Y93	0.0211 (0.0173)	0.0145 (0.0151)	0.1395 (0.0907)	0.1393 (0.0906)
Y94	-0.5573 (0.1819)	-0.0549 (0.0363)	0.0845 (0.1109)	0.0866 (0.1108)
Y95	-0.4714 (0.1790)	0.0149 (0.0358)	0.1719 (0.1464)	0.1738 (0.1461)
Y96	-0.3825 (0.1745)	0.0948 (0.0320)	0.3014 (0.1877)	0.3032 (0.1873)
Constant	11.5771 (0.3037)		-0.0110 (0.0087)	
Obs.	1176	1176	1127	1127

Note: The dependent variable is the log of the mean sales price for homes, for each city/town/village in Oakland County that averaged more than 15 sales per quarter between the first quarter of 1990 and the fourth quarter of 1996. Robust standard errors are used to allow for heteroskedasticity and first-order serial correlation. Dummy variables indicating the quarter of the year are included in the regression but are not reported. [†]The effective tax rate is divided by the discount rate (3 percent) prior to estimation.

Table 4.5 Summary Statistics Dual Sales Data

	Mean	Std. Dev.	Min	Max
Avg. Price 1992	$103,296.20	$60,580.63	$13,901.76	$389,249.30
Log(Avg. Price 92)	11.39	0.55	9.54	12.87
Per Pupil Spending 1992	$6,101.12	$1,523.36	$3,897.13	$9,909.18
Effective Tax Rate 1992	1.76%	0.28%	0.99%	2.69%
Avg Price 1996	$119,242.30	$63,455.85	$15,754.56	$447,761.20
Log(Avg. Price 96)	11.56	0.50	9.66	13.01
Per Pupil Spending 1996	$6,682.06	$1,296.92	$4,741.91	$9,659.28
Effective Tax Rate 1996	0.63%	0.25%	0.29%	1.33%
% Chng Hshlds 90-96	9.22%	9.10%	0.3%	35.3%
Price Growth 90-92	-1.68%	6.34%	-18.00%	20.00%

Note: All dollar totals are reported in constant 1990 dollars. Total number of observations used in estimation: 709.

Table 4.6 Dual Sales Estimates

	I (OLS)	II (OLS)	III (2SLS)	IV (OLS)
Normalized Tax Rate[†]	-0.0604 (0.0504)	-0.1120 (0.0513)	-0.1274 (0.0519)	-0.1561 (0.0522)
Spending Per Pupil (100's of $)	0.0073 (0.0017)	0.0056 (0.0017)	0.0051 (0.0017)	0.0040 (0.0017)
Community Price Growth 90 - 92	0.3326 (0.0902)	0.3642 (0.0895)	0.3736 (0.0897)	0.3285 (0.0913)
Improvements	0.0499 (0.0183)	0.0475 (0.0181)	0.0467 (0.0181)	0.0418 (0.0179)
Pct. Chng. Households 90-96		-0.2635 (0.0632)	-0.3420 (0.0727)	
Semi-Urban				-0.0620 (0.0132)
Rural				-0.0774 (0.0160)
Constant	0.1010 (0.0202)	0.1154 (0.0202)	0.1196 (0.0203)	0.1229 (0.0203)
Obs.	709	709	709	709
R^2	0.1154	0.137	0.147	0.1544

Note: Standard errors are in parentheses. The dependent variable is the log of the house's sales price. Dummies indicating the quarter of the houses sale in each year are included in the regression but are not reported above. The number of observations represents the number after differencing. [†]The tax term in the OLS estimates is divided by the discount rate (3 percent) prior to estimation. The percentage of land available for development in the community is the instrument for the 2SLS estimate.

Table 4.7 Summary of Effects of Tax and Spending Changes

	Dual Sales				Aggregate Data		
	I	II	III	IV	Fixed Effect	First Difference	Random Growth
Effect of a $1 Tax Differential	$2.00	$3.73*	$4.25**	$5.20**	$9.93**	$8.837*	$8.17
Tax Capitalization rate[t]	6.0%	11.2%	12.7%	15.6%	29.8%	25.1%	24.55%
% Effect of additional $100 per pupil	0.7%**	0.6%**	0.5%**	0.4%*	0.0%	0.3%	0.3%

Notes: * Indicates the estimate was significantly different from zero at the 5% level, ** at a 1% level.
[t]Assumes 3 percent discount rate and infinite house life.

Chapter 5

THE INCIDENCE OF MICHIGAN'S SCHOOL REFORMS

I. Introduction

In 1994, Michigan reformed its method of funding public schools. Michigan greatly reduced its reliance on local property taxes and lowered the state's income tax by a small percentage. The lost revenues were replaced by increasing the state's sales tax from 4 to 6 percent, by increasing the cigarette tax from $.025 to $0.75 per pack, and by small increases in various other taxes. Michigan also changed the way revenues are allocated to its public school districts. Although the reforms were, for the most part, revenue neutral, they did not affect all state residents equally. The tax changes impacted state residents by changing both the tax payments that citizens had to make and by changing the prices of certain goods, most notably housing. This chapter presents an estimate of how these reforms impacted Michigan's taxpayers.[1]

Michigan's reforms did not affect all communities equally. Rural school districts, which tended to have relatively low per-pupil spending amounts prior to the reforms, in general experienced large property tax cuts and large spending increases. Urban areas, which tended to spend more per pupil than the rural areas, also experienced large property tax cuts. Real per-pupil spending in urban districts generally increased, but the amount of

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[1] Michigan's school finance reforms are described in Addonzio, Kearney and Prince (1995).

the increase varied. Urban areas that had relatively high spending prior to the reforms saw much smaller increases than those urban areas that had relatively low spending. Semi-rural or suburban areas were often the highest spending school districts prior to the reforms. These districts received smaller tax cuts in percentage terms, as they were required to levy "hold harmless" millages to maintain their higher spending amounts. Many of these previously high spending districts experienced real spending decreases after the reforms.

To measure the incidence of Michigan's reforms, the tax and spending changes experienced by four communities in Oakland County are examined. Brandon Township is used as an example of a rural district, the City of Pontiac as an example of an urban district with relatively high pre-reform school spending, the City of Ferndale as an example of an urban district with relatively low pre-reform spending, and Bloomfield Township as an example of a suburban district.[2]

Within each of these communities, the effects of the tax and spending changes on three hypothetical household types are considered: a senior citizen couple; a family with two adults and two children, and a single person living alone. For each of these groups, the effects of the changes under three housing assumptions are examined: that the household rents; that the household owns a house and purchased it prior to the school

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[2] Michigan's reforms affected school districts rather than municipalities. However, in most cases the school district and community boundaries are similar. The school districts assumed for the communities outlined are as follows: for Brandon Township the Brandon School District; for Bloomfield Township the Bloomfield Hills School District; for Ferndale the Ferndale School District; and for Pontiac the Pontiac School District.

reforms, and that the household owns a house, but purchased it subsequent to the school reforms. These different groups should represent the experiences of a large portion of Michigan's residents.

II. Incidence Definition

In measuring the incidence of Michigan's tax changes, it is important to distinguish between the statutory incidence and the economic incidence. The statutory incidence refers to who is required by law to pay the tax. In the case of Michigan's sales tax, the statutory incidence is on retailers. They are the ones who must write the check to the state government. The economic incidence refers to who actually pays for a tax. In the case of Michigan's sales tax, retailers may pass some or all of the tax onto consumers by charging higher prices. If consumers face higher prices as a result of a sales tax increase, they are in essence paying part of the tax, even if the law states that the tax is on retailers.

To measure the incidence of Michigan's reforms, the tax payments made by individuals in 1996 are compared with the tax payments they would have made, had the reforms not been implemented. The economic incidence of the tax is used as opposed to the statutory incidence. That is, when calculating tax payments, an attempt is made to account for any shifting of the taxes that may have occurred.

There are some important aspects of the tax changes that are not examined. First, the change in the excess burdens of the various taxes is not considered. The excess burden is the cost of taxes to consumers over and above the tax payments. Taxes change the relative prices of goods causing consumers to substitute away from taxed goods. This

substitution effect is what causes the excess burden of the taxes. Changes in taxes may lead to changes in employment, capital allocation, and wages. These "general equilibrium" effects are not considered. Finally, the tax incidence measurements represent a single point in time. No attempt is made to measure the lifetime incidence of Michigan's tax changes.

III. Tax Incidence Estimates

Estimating the tax incidence of Michigan's reforms requires numerous assumptions and calculations, as well as data on income, tax rates, expenditure patterns, and housing costs. The tax and spending incidence is calculated for four communities: Brandon Township, Bloomfield Township, the City of Ferndale, and the City of Pontiac. For each of these communities, three household types are considered: a senior citizen couple; a family with two adults and two children; and a single person living alone. For each of these groups the effects of the changes are examined under three housing assumptions: that the household rents; that the household owns a house and purchased it prior to the school reforms; and that the household owns a house but purchased it after the school reforms were implemented.

To calculate the tax incidence, an estimate of the income and housing costs for each of these groups is needed. Based on these data, the effects of the policy changes on each of these groups are calculated.

Income Assumptions

To estimate the incomes of the various demographic groups, data from the *1990 U.S. Census of Population and Housing* are used. For each of the three communities, six

measures of income are needed: the income of the three household types assuming they lived in owner-occupied housing, and the income of the three household types assuming they were renters.

The following procedure is used to estimate the income of these groups. First, for each community the median incomes for households headed by a senior, family households, and non-family households are used as a base. I assume these figures represent the median 1990 incomes for the three household types: a senior citizen couple; a family with two adults and two children, and a single person living alone, respectively. From the census data, the median income of renters, homeowners, and the overall median income for each community is determined. I then assume that the ratio of income for renters to the overall median is the same for all three household types and that the ratio of income for homeowners to the overall median is the same for all three household types. The 1990 incomes for all demographic groups are then calculated based on these assumptions.

The income calculations are best illustrated with an example. In 1990, the median income for family households in Brandon Township was $47,434. The median income for households in owner-occupied housing in Brandon Township was $46,871, and the overall median income in Brandon Township was $45,139. Therefore, the ratio of house-owner income to the overall median income in Brandon Township was 1.038 to 1. To calculate the income for families living in owner-occupied housing in Brandon Township in 1990, multiply $47,434, the overall median income for families living in Brandon Township, by 1.038 to get an income estimate of $49,236.

After calculating the 1990 incomes, the next step is to estimate the income of these groups for 1996. The *Current Population Survey (CPS)* is used to calculate the real percentage growth in mean income for each income quintile between 1990 and 1996. The *CPS* shows that the income growth experienced by each quintile of the overall income distribution was not the same over this time period. Higher income individuals experienced much higher income growth between 1990 and 1996 than did lower income individuals. Between 1990 and 1996, the lowest earning quintile in the U.S. experienced a 3.5 percent reduction in real income, while the highest quintile experienced a 10.8 percent increase in average real earnings.

These data are not directly applicable to Michigan, however. The real median income in the U.S. declined by 1.2 percent between 1990 and 1996. The real median income in Michigan increased by 9.14 percent over the same period, and per capita income increased by 11.5 percent. To adjust the U.S. income quintiles to match the Michigan experience, I add 10 percentage points to each of the percentage changes for the U.S. income quintiles. This percentage is used to calculate the 1996 income for each group in 1990 dollars. The figures are converted to 1996 dollars using the *CPI-U*. The income estimates for each group are presented in Table 5.1.

Sales Tax Estimates

As part of its school finance reforms, Michigan increased its sales tax from 4 to 6 percent. Michigan's sales tax, known in Michigan as the "Sales and Use Tax," is not comprehensive in coverage. Michigan exempts most services, grocery foods, prescription drugs, and many other items from its sales tax. The Michigan Office of Revenue and Tax Analysis estimates that sales tax exemptions reduced state revenues by

over $2.5 billion dollars in 1993. Total sales tax collections in 1993 amounted to just over $3.5 billion. The Michigan sales tax is assessed on retailers; it is safe to assume, however, that some or all of the tax is passed on to consumers.[3]

The sales tax can be divided into two components: the part assessed on goods purchased by Michigan consumers, and the part assessed on goods purchased by producers and non-residents. Generally, tax incidence studies assume that the part of the sales tax assessed on goods purchased by consumers is borne fully by consumers (see Pechman 1985 or Blume 1982 for an example using the Michigan Sales and Use Tax). A recent empirical study by Poterba (1996) supports the validity of this assumption.[4]

The effect of the sales tax assessed on goods purchased by producers is less clear. Using the *Consumer Expenditure Survey*, Ring Jr. (1989) estimates the amount that Michigan residents spent on taxable goods in 1979.[5] He estimates that total consumer spending on taxable goods by Michigan residents accounted for approximately 59 percent of Michigan's sales tax revenues. He speculates that the remainder of sales tax revenues were generated through purchases by producers and non-residents.

The incidence of the remaining 41 percent of taxed expenditures is much more difficult to measure. Presumably, much of the sales tax on goods purchased by non-residents is exported. The sales tax paid by producers may be partly exported to non-resident shareholders. Some fraction, however, may also be reflected in lower wages for

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[3] Source: *Michigan's Sales and Use Tax,* Office of Revenue and Tax Analysis, Michigan Department of Treasury 1994.

[4] Poterba (1996) finds that retail prices rise by approximately the amount of a sales tax increase.

[5] Ring Jr. (1989) performs this analysis for all 50 states.

Michigan's workers, a lower return on capital invested in Michigan, or in higher prices for some goods.

To estimate the incidence of the sales tax change, I assume that my demographic groups bear the full burden of the tax assessed on the goods that they purchase, and none of the burden of the tax assessed on producers. Assuming that the demographic groups bear none of the burden of the producer portion of the sales tax is, admittedly, somewhat unrealistic. There is, however, insufficient evidence to support any other assumption. However, it should be noted, that this assumption may cause the estimated tax share of some groups to be underestimated.

The share of income that different income classes in Michigan spent on taxable goods is calculated in *Michigan's Sales and Use Taxes: 1994*. These calculations are derived from the Bureau of Labor Statistic's *Consumer Expenditure Survey*. The income figures are adjusted for inflation and then used to predict how much the various demographic groups used in this chapter spent on taxable items in 1996. I assume that consumers do not substitute away from taxed goods as a result of the sales tax increase. The sales tax estimates are presented in Table 5.2.

Effects of Property Tax Changes on Renters

Michigan's recent school finance reforms affected renters in several ways. In Michigan, renters are allowed to apply for the state's property tax credit, which is a refundable credit on the state's income tax. Residents are allowed to receive the credit if their property tax payments exceed a certain percentage of their income. As part of the school financing reforms, the fraction of rent that is considered to go towards property taxes for the purpose of calculating the credit was increased from 17 to 20 percent.

The reforms also affected school property tax rates. Prior to the reforms no distinction was made between the various classes of property. As part of the 1994 reforms, a distinction was made between owner-occupied residences, known as "homesteads," and all other forms of taxable property, which became known as "non-homestead" property. The property tax rate was reduced on both types of property. The reduction, however, was generally larger for homestead property than for non-homestead property.

The reduction in the property tax rate on non-homestead property reduced the tax payments that landlords needed to make. Some of this tax decrease may have been shifted onto renters in the form of lower rents. If renters did experience a decrease in rent as a result of the reforms, the decrease would also affect their eligibility for Michigan's property tax credit. For renters, the size of the tax credit they might be eligible for is based in part on their annual rent. Finally, the change in service levels may also be reflected in rental prices.

There is no consensus in the economic literature as to the extent to which

landlords are able to shift property taxes onto renters in the form of higher rent.[6] If

renters are fully mobile, landlords cannot pass tax increases onto renters, because the

renters would simply move to a community with lower rents.[7] Carroll and Yinger (1994)

have argued that property taxes could lead to higher rents if they were used to finance

service increases. Residents may be willing to pay more in rent for better services.

Carroll and Yinger estimate that landlords are able to shift $0.11 of a one dollar property

tax increase onto tenants. However, these results are not directly applicable to the

Michigan example, because in Michigan the property tax changes were not directly tied

to service changes.

Because the literature does not offer a clear conclusion as to the effects of

property tax changes on rents, and because I do not have data describing what actually

happened to rents in Michigan, I estimate the effect of Michigan's property tax cuts under

a variety of assumptions: that the property tax changes were fully passed onto renters;

that none of the property tax changes were passed onto renters; that half of the property

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[6] See Carroll and Yinger (1994) for a review of the literature and a discussion of the arguments

surrounding tax shifting in the case of rental housing.

[7] If capital is full mobile, the capital portion of Michigan's property tax will reduce the return to capital in

all sectors. A tax on Michigan property is negligible when compared to the overall capital stock in the U.S.

(see Courant 1982). Therefore, the capital portion would not be shifted onto renters; it would instead be

borne by all capital owners. The land portion of the property tax could either be shifted into rents or borne

by landlords.

tax changes were passed onto renters; and following Carroll and Yinger (1994), that $0.11 per $1.00 dollar in property tax changes was passed onto renters.

Carroll and Yinger's results suggest that very little of the property tax decrease would have been shifted onto renters. Estimates of the change in rent prices for the Detroit-Ann Arbor MSA, taken from the *CPI Detailed Report*, show that real-rent prices declined slightly between 1992 and 1996, decreasing approximately 3.1 percent. This is a slightly larger decrease than was seen by other midwestern cities. Rents decreased by approximately 2 percent in real terms in the Cincinnati-Hamilton area, increased by approximately 1/2 percent in the Cleveland-Akron-Lorain area, and increased by approximately 1.5 percent in the Chicago-Gary-Lake Co. area, over the same period.[8] These findings suggest that rents may have decreased as a result of Proposal A; but if they did, the decrease was fairly small.[9]

To calculate the rent for each of the demographic groups, the percentage of income that went towards rent for the household's income type and location is used. For example, the estimate of the household income for a renter family in Brandon Township, in 1990, is $25,614 (see Table 5.1 for income estimates). An average of 22.4 percent of income went towards rent, for renter households with an income of $25,614, in Brandon Township, in 1990. Therefore, the estimate for the annual rent for this household is

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[8] The real percentage change in rent prices is calculated by comparing the change in rent and the change in the overall price level for the specified geographic area.

[9] It should be noted that even if tax savings are fully shifted they would reduce rents by only a small percentage. For instance, for Brandon Township, the assumption of full shifting leads to an estimate of a 4 percent reduction in annual rents (the largest effect of the three municipalities).

$5,738 and the estimate of monthly rent is $478. The rent prices are adjusted to 1996

dollars using the *CPI-U*.

Michigan allows renters to qualify for its property tax credit. The property tax

credit is a refundable credit on the state's income tax that residents are eligible for, if their

property tax payments exceed a certain percentage of their income. For the purposes of

the credit, renters were allowed to assume that 17 percent of their rent payments went to

cover the property tax prior to the reforms, and 20 percent subsequent to the reforms. I

assume that 20 percent of the rent price went to pay the landlord's property tax on the

apartment prior to the reforms.[10] I assume that the property tax payment that landlords

paid for apartments decreased by the same percentage as the percentage decrease in the

non-homestead total property tax rate. Based on the estimated dollar total of the property

tax reduction, the new rent and the new property tax credit that renters are eligible for is

calculated under the different shifting assumptions outlined above.

I also assume that the increase in services did not result in higher rents. The

empirical literature has little to say about how a change in per-pupil school spending

would affect apartment rents. For the case of apartments marketed towards seniors and

single people, it is probable that increases in school spending have little or no effect on

rents. For families, services may have an effect, but is not clear how large the effect

would be. Therefore, I assume that the service changes were not shifted into apartment

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[10] Rubinfeld and Vishny (1982) speculate that the 17 percent figure used to calculate the percent of rent

that went towards property taxes was taken from Netzer (1966). Netzer cites a survey of over 29,000

apartments. This survey estimates that in the northeastern U.S., real estate taxes represent approximately

20 - 25 percent of rent. In the Midwest, taxes generally represented between 15 and 20 percent of rent.

rents. The effects of the property tax changes on rents and on income tax credits are presented in Tables 5.3 and 5.4.

Effects of Property Tax and School Spending Changes on Existing Homeowners

Michigan's reforms substantially benefited individuals who owned a house at the time of the reforms. The reduction in local property tax rates reduced the annual tax payments that homeowners needed to make, generating a large tax savings. The reduction in property tax rates reduced the annual cost of owning a home, making owning a house or buying a bigger house more attractive. This caused an increase in the demand for owner-occupied housing, resulting in capital gains for existing homeowners. The changes in school spending levels also affected housing prices. Houses in school districts that received spending increases, increased in price relative to houses in communities that did not receive spending increases.

To calculate the pre-reform house price for each demographic group, I assume that the ratio of the income of the demographic group to the median income of homeowners was the same as the ratio of the house price of the demographic group to the median house price.[11] For example, the median house price, in 1990, for Brandon Township was $94,700. The median income of households residing in owner-occupied housing in Brandon Township was $46,871. The estimate of the household income of families residing in owner-occupied housing in Brandon Township is $49,236. Therefore, the ratio of family income to the median income for house owners is 1.05046

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[11] This assumption implies that the income elasticity of housing is 1.0. Harmon (1988) finds the long-run income elasticity of housing to be 1.0 using data from the *Panel Study of Income Dynamics*.

to 1. To calculate the house price for families in Brandon, the median house price is multiplied by this ratio to get $99,478. The *CPI-U* is used to adjust this figure to 1996 prices.

To calculate the change in property tax payments, I use the effective school tax rate in 1992 as the pre-reform rate and the effective tax rate in 1996 as the post reform rate.[12] I use the same house price for both cases. Although Michigan's reforms increased the price of many houses, the reforms also included an assessment cap which limited the rate of assessment growth to 5 percent or the rate of inflation, whichever was less. Because of this, house assessments could not be increased to account for any real capital gains which resulted from Michigan's reforms.

The tax payment calculations are complicated by two factors. First, for taxpayers who claim itemized deductions on their federal income taxes, property tax payments are deductible. Second, Michigan's income tax allows taxpayers to receive a property tax credit, if a filer's property tax payments exceed a certain percentage of their income. Both of these factors must be considered when calculating the effects of a property tax change.

To calculate the effects of the federal income tax deduction, I assume that all of my household types that owned houses claimed itemized deductions on their income tax. I assume that the total income tax deductions for the household were equal to the average

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[12] The effective tax rate is the annual tax payment divided by the price of the house. This differs from the statutory tax rate if house assessments are not perfect. I use the average effective tax rate for the community. See Guilfoyle (1997) for an explanation of how these tax rates are calculated.

deductions for their income bracket.[13] Using information on the household's income,

deductions, and exemptions, the marginal federal income tax rate the household faced in

1996 is calculated. The total property tax payment is multiplied by the marginal federal

income tax rate to estimate the property tax savings resulting from the itemized

deduction. The amount of property tax credits on the Michigan income tax, is calculated

using the *Homestead Property Tax Claim Form* for the 1996 Michigan income tax.

The appreciation in house prices that resulted from Michigan's reforms, is

calculated using Guilfoyle (1997). This study uses a sample of 700 individual houses in

Oakland County that sold once before and once after Michigan's reforms. The study

estimates the effects of the tax and spending differentials between communities on house

prices. This study can be used to predict the total real price change for houses between

1992 and 1996.[14] Estimates of the effects of Michigan's school financing reforms are

presented in Tables 5.5 and 5.6.

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[13] Source: *Statistical Abstract of the United States 1995* -- Table No. 535 "Individual Income Tax Returns--Itemized Deductions and Statutory Adjustments, by Size of Adjusted Gross Income: 1992."

[14] Guilfoyle (1997) focuses on estimating the effects of tax and service differentials between communities. The estimates do not distinguish between changes in house prices due to Michigan's economic expansion and changes due to the reduction of the average tax rate. For the purposes of predicting the effects of Michigan's reforms, I assume that house prices in Michigan would have grown at the same rate as house prices in the Midwest had the reforms not been implemented. Once this assumption is made, Guilfoyle (1997) can be used to estimate the effects of Michigan's reforms on house prices. The median sales price of one family houses, in the midwest, increased by 9.23 percent (Source: *Statistical Abstract of the U.S.* -- *1997* Table No. 1191. "Existing One-Family Houses Sold and Price, by Region: 1970 to 1996") over the period examined by Guilfoyle (1997).

The estimates in Table 5.6 show that existing homeowners experienced large capital gains as a result of Michigan's reforms. Houses in Bloomfield Township saw a real gain in price of approximately 3.5 percent, houses in Brandon Township and the City of Pontiac saw real gains of approximately 14 percent, and houses in the City of Ferndale saw gains of approximately 17 percent.[15] These capital gains estimates are not estimates of the total change in the price of houses in these communities; rather, they are estimates of the capital gains due to Michigan's reforms. House prices in Michigan also changed due to construction, economic growth, and other demand factors for the community. When all factors are included, prices in Brandon Township are predicted to have increased by approximately 15.5 percent in real terms between 1992 and 1996; houses in the City of Pontiac saw an increase of approximately 20 percent; houses in Bloomfield Township saw an increase of approximately 6.57 percent, and houses in Ferndale saw an increase of approximately 29 percent.[16]

Michigan's reforms resulted in a large one-time capital gain for homeowners. The tax incidence estimates presented in this chapter compare actual tax costs in 1996 with what they would have been had the reforms not been implemented. Including the entire capital gain as a tax benefit for existing homeowners in 1996 would overstate the annual incidence of the reforms, while excluding the capital gains from the incidence

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[15] The exact predicted capital gain rate used in later calculations is 13.72 percent for Brandon Township, 3.46 percent for Bloomfield Township, 13.51 percent for the City of Pontiac, and 17.10 percent for the City of Ferndale. These calculations include the effect of school spending changes on house prices.

[16] The total percentage change in price was also calculated using the results from Guilfoyle (1997).

estimates would understate the benefit to existing homeowners. Therefore, an estimate of the annual value of the one-time capital gain is needed.

I assume that the capital gain is traded in for a 30 year annuity with an annual interest rate of 7.5 percent per year. The annuity is assumed to have 12 payments per year. The annual benefit of the capital gain is calculated as the sum of the 12 annual annuity payments. This annuity is essentially a reverse mortgage, where the homeowner receives payments instead of making them.

The annuity term and interest rate are consistent with the mortgage assumptions used to calculate the tax incidence for households purchasing their houses subsequent to the reforms. These households must pay a higher price for their homes as a result of the reforms. The higher house price results in a higher annual mortgage payment for these households. By assuming existing homeowners trade their capital gains for an annuity, the annual cost to new homeowners due to housing appreciation is comparable to the annual benefit received by existing homeowners.[17]

Effects of Property Tax and School Spending Changes on New Homeowners

The effects of Michigan's reforms on homeowners who purchased their homes after the reforms were implemented were somewhat different than the effects on homeowners who owned their home prior to the reforms. Michigan's reforms led to a real increase in the price of housing, with an increase in price of 3.5 percent in

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[17] The cost and benefit are not exactly the same because new homeowners can deduct mortgage interest from their federal income taxes, making their cost somewhat lower. Note, that I am also assuming that homeowners do not pay income taxes on their annuity. Most homeowners will probably leave the capital gain as equity in their house. Therefore, they will not have to pay federal income taxes as a result of it.

Bloomfield Township, an increase in price approximately 14 percent in Brandon

Township and the City of Pontiac and an increase in price of approximately 17 percent in

the City of Ferndale. Because of these price increases, individuals who purchased their

homes subsequent to the reforms had to pay higher prices for them, and as a result will

see smaller savings from the reforms.

New homeowners pay property taxes on the full value of their house, because

houses are reassessed upon sale. This differs from the tax treatment of homeowners who

owned their house at the time of the reforms. For these homeowners, assessment

increases were restricted to the rate of inflation, so that increases in home prices due to

the reforms could not be taxed. As part of Michigan's reforms, a real estate transfer tax

was created. House sales are taxed at 0.75 percent of the value of the house being

transferred.

In calculating the incidence of Michigan's reforms, the expenses and savings

individuals experienced in 1996 are compared with what they would have experienced,

had the reforms not been passed. The experience of new homeowners in the absence of

the reforms would be the same as the experience of existing homeowners in the absence

of reforms. Therefore, the data in Table 5.5 describe the estimates for new homeowners

in the absence of the reforms, as well as the experience of existing homeowners.

The annual property tax payments are still lower for new homeowners after the

reforms; but, the reduction is smaller than the reduction for existing homeowners. The

reason is that for new homeowners, the entire house price is subject to taxation. To

calculate the new house price, the estimates of the capital gains from Table 5.6 are added

to the base house price. The annual tax payment is the effective tax rate multiplied by the

new house price. The federal property tax deduction and the Michigan property tax credit are also calculated.

The higher housing prices also result in higher annual mortgage payments for new homeowners. The additional annual mortgage payment is calculated assuming a thirty year mortgage at a mortgage interest rate of 7.5 percent.[18] I assume that sellers bear the full burden of the real estate transfer tax. The real estate transfer tax is relatively small (0.75 percent of the sales price) and assumptions concerning who bears the burden of this tax do not have a large effect on the estimates.

Mortgage interest is deductible from the federal income tax. Since the portion of a mortgage payment that goes towards interest decreases annually, the federal income tax deduction will decrease as well. The mortgage deduction is calculated assuming that the loan repayment is in the first year. Estimates of the effects of Michigan's reforms on new homeowners are presented in Table 5.7.

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[18] The average interest rate for fixed rate mortgages in the U.S., in 1993, was 7.3 percent; in 1994 it was 7.9 percent. (Source: *Statistical Abstract of the U.S. -- 1995*. Table No. 805 "Characteristics of Conventional First Mortgage Loans for Purchase of Single-Family Homes: 1980 to 1994.")

Changes in the Income Tax

As part of Michigan's school reforms, the state's income tax was reduced from 4.6 percent to 4.4 percent. Calculating Michigan's income tax is straightforward. In 1996, income tax filers were allowed to deduct an exemption of $2,500 per household member. Family households are assumed to have four members, senior households two, and households with a single occupant one. After deducting exemptions, the household's income is multiplied by the tax rate to calculate the income tax paid.

Calculating the taxable income is somewhat more complicated for seniors. Seniors are allowed an extra exemption of $900 per household member. Additionally, Social Security income is not taxed under Michigan's income tax. Finally, in 1996 seniors were allowed to deduct pension income of up to $31,920 for a single filer or $63,840 for a married filer, from their income when computing the tax.[19]

Seniors are assumed to earn all of their income from Social Security and pension earnings. I assume that seniors received the average payment for a married couple collecting Social Security. All remaining income is assumed to be from pension earnings.

Household types described as homeowners are assumed to claim itemized deductions on their federal income tax. For these individuals, state income tax payments qualify as a deduction. The federal deduction is calculated based on the household's estimated federal marginal tax rate. Individuals described as renters are assumed to claim

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[19] The amount of pension income that seniors were allowed to deduct was increased dramatically in 1994. In addition, beginning in 1994 seniors were allowed to deduct interest, dividend, and capital gains income (subject to a cap). These changes, however, were not part of Michigan's school reforms.

the standard deduction. Thus, they were unable to claim state income taxes as a deduction in their federal income tax calculations. The income tax calculations are presented in Table 5.8.

The Cigarette Tax

As part of Michigan's school reforms, the Michigan excise tax on cigarettes was raised from 25 to 75 cents per pack. The average retail price of a pack of cigarettes jumped by slightly more than 50 cents after the imposition of the tax (and has remained at this higher level) suggesting that the cigarette tax increase was essentially passed on to consumers in the form of higher prices.[20]

The effect of the increase in Michigan's cigarette tax on households depends primarily on the number of smokers in the household. In 1992-93, approximately 25 percent of the adult population in Michigan were smokers. The rate of smoking among Michigan residents declines with income (see Table 5.9). However, a substantial fraction of individuals were smokers in each income category.

The increase in the cigarette tax that resulted from Michigan's reforms was substantial. The 50 cent increase was equal to approximately 30 percent of the 1993 average retail price of a pack of cigarettes. Michigan smokers could reduce their tax liability in several ways. First, they could decrease the amount of cigarettes they smoke. Due to the addictive nature of smoking, however, the price elasticity of cigarettes is

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[20] Source: *Michigan's Cigarette and Tobacco Taxes 1996*, Office of Revenue and Tax Analysis, Department of Treasury.

relatively low at 0.5.[21] Michigan residents could also try to evade the tax by consuming

smuggled cigarettes. The cigarette excise tax rates are substantially lower in Indiana and

Ohio. Michigan's Department of Treasury estimates that approximately 4 percent of

cigarette tax revenues are lost due to smuggling.[22]

For the purpose of the incidence calculations, a fairly simplistic smoking

assumption is used. Smokers are assumed to smoke one pack of cigarettes per day, both

before and after the imposition of the tax. The annual cost of the increase in the cigarette

tax is $182.50 for a one pack per day smoker. When reporting the total tax incidence for

different household types, the incidence is reported assuming the household has no

smokers, and the incidence is reported assuming the household had one smoker who

smokes one pack per day. The tax effects for households with additional smokers, or

households with smokers who smoke more or less than a pack a day can be readily

calculated by multiplying $0.50 by the number of cigarette packs consumed.

IV. Total Tax Incidence

The total tax effects for each group are presented in Tables 5.10 - 5.12. The total

tax effect as a percentage of income is presented for all communities and demographic

groups in Figures 5.1 - 5.8. The largest beneficiaries of the tax changes were homeowners

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[21] Source: Sung, Hu, and Keeler (1994). The authors find that the short-run price elasticity of - 0.40 and a
long-run elasticity of -0.48.

[22] Source: *Michigan's Cigarette and Tobacco Taxes 1996*, Office of Revenue and Tax Analysis, Michigan
Department of Treasury.

who owned their homes at the time of the reforms. These homeowners benefited from a large reduction in their annual property taxes.

The lower property taxes had two effects for existing homeowners. First, the property tax cuts reduced the annual property tax payments existing homeowners needed to make. Second, a fraction of the property tax cuts were capitalized into house values. This resulted in a large one-time capital gain for many homeowners. To calculate the annual incidence of Michigan's reforms, this one-time capital gain has been converted into an annual annuity.

The size of the property tax cut varied by school district. Residents of previously high spending districts often saw smaller property tax cuts, since their districts were often required to levy hold-harmless millages. Among existing homeowners, all groups benefited from Michigan's reforms. Non-smoking households in Brandon Township, the City of Ferndale, and the City of Pontiac saw annual payment savings of 2 percent of personal income or more. Existing homeowners in Bloomfield Township also benefited, although the annual gains were somewhat smaller.

The large gains of existing homeowners came at the expense of new home purchasers. Because some of the property tax cuts are capitalized into house prices, existing homeowners are able to take some of the future benefit of the lower property taxes with them when they sell their house. The capital gains of existing homeowners represent higher housing prices faced by new homeowners. For most households, the annual cost of owning a house was still smaller after the reforms. However, the reduction in the annual cost of owning a house was substantially smaller than the reduction seen by existing homeowners. As a result, the reduction in the annual cost of owning a house was

not sufficient to offset the increased annual cost of the sales tax. All new homeowner household types paid more in taxes after the reforms were implemented.[23] The increase in annual payments for non-smoking new homeowners ranged between 0.30 and 0.60 percent of the household's annual income. For smoking households, the tax consequences were even worse, with some new homeowners seeing an increase in their annual payments greater than 1 percent of their income.

For renters, the picture is less clear. Renters tended to have lower incomes than homeowners, and lower income individuals spent a larger fraction of their incomes on taxable goods. Therefore, the increase in the sales tax hurt renters more in percentage terms. The effects of the property tax cut were not clear. There is little evidence on the effects of property taxes on rents. If the property tax cuts were fully shifted onto renters, non-smoking renter households come out ahead from a tax standpoint in Brandon Township and the Cities of Ferndale and Pontiac. Bloomfield Township saw very small decreases in the property taxes levied on apartments, so renters there would still come out behind.

If the property tax cuts were not shifted into rents, then virtually all renter households pay more after the reforms. Further, because of their relatively low income, renters who smoke were especially hard hit by the reforms. Renter households with one smoker saw an annual payment increase of over 1 percent of income in some cases.

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[23] Note that the term "tax" is used somewhat loosely here. The higher mortgage payments faced by new homeowners is included in this tax calculation.

V. Service Level Changes

Michigan's school reforms changed both how revenue for school districts was raised and how it was allocated to school districts. In this section, I briefly discuss the incidence of the school spending changes.

Prior to Michigan's reforms, revenues were allocated using a *district power equalization (DPE)* approach. DPE systems attempt to equalize the effective property tax base school districts have access to, by allocating aid to poorer districts. Districts are then allowed to choose their own level of funding.[24] The combination of district choice and a DPE system that did not fully correct for wealth differences caused a wide variance in the pre-reform spending levels in Michigan school districts, with wealthier districts generally spending more per pupil.

As part of the 1994 reforms, Michigan switched to a *foundation grant* approach to allocating revenue. Under Michigan's foundation grant system, all schools spending below the basic grant amount of $5000 per pupil, in 1993-94, were moved up to that level.[25] The base grant is increased yearly based on growth in the "school aid fund," the group of taxes allocated to school spending. Districts spending above the foundation grant were allowed to maintain their old spending amounts. Very high spending districts, those spending over $6500 per pupil in 1993-94, were required to levy additional "hold-harmless" millages to maintain their spending levels. Local choice was removed from the

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[24] See Reschovsky (1994) for a discussion of DPE and other school funding mechanisms.

[25] To ease the cost of switching to the new system, low spending districts were not immediately raised to the new higher spending amount. See Kearney (1994) for an in-depth explanation of the new system.

school spending process and school district spending amounts are now set by the state government.

As a result of these changes, rural districts, which tended to have per pupil spending amounts well below the foundation grant, often saw very large increases in their revenue available per pupil. The spending changes seen by urban districts had more variation. Low spending urban districts saw increases in funding; but, some higher spending urban districts saw little change in their funding levels. Many wealthy suburban school districts, which generally spent the most per pupil prior to the reforms, saw their real spending levels decrease.

There are obviously many school districts whose experiences do not neatly fit into one of the categories above. Despite this, I believe that this categorization is a useful way of examining the effects of Michigan's reforms. The districts chosen for this analysis were picked because they are representative of the types of districts described above. The Brandon School District, a rural district, saw a real spending per pupil increase by 18 percent, between 1992 and 1996. Pontiac Schools, an urban district, saw a real increase of 10 percent per pupil, Ferndale Schools, a low spending urban district prior to the reforms saw real spending increase by approximately 30 percent, and the Bloomfield Hills School District (the district for much of Bloomfield Twp, a suburban location) saw real spending fall by 2.5 percent per pupil.

Of course, to some extent, increased educational spending benefits everybody. To the extent that increased spending increases the output of public schools, that is increases the education of children, society is benefited with a more educated electorate, more skilled work force, reduced crime, and so forth. The most direct benefit, however, clearly

goes to households with school-aged children. Brandon schools were able to spend close to $900 more per pupil; Pontiac schools had approximately $650 more per pupil available to them; and Ferndale Schools had almost $1600 more per pupil. The Bloomfield Hills school district, on the other hand, saw a reduction of approximately $300 per pupil in resources. Michigan's new foundation grant system does not take into consideration cost differences between communities.[26] Therefore, the dollar increases have even more impact in rural districts, where costs are presumably lower.

There are two important caveats that need to be considered when examining the changes in school spending in Michigan. First, higher spending does not necessarily lead to better schools, much depends on how the money is spent.[27] Second, the residents of a community may not value the services fully. In previously low spending districts, spending was raised to a level significantly higher than the one chosen by the electorate. It is possible that these districts had lower spending because residents of the districts did not place a high value on educational spending. What the money is spent on may also effect the value residents place on it. For example, school districts may choose to spend their extra resources on trying to retain students who are at risk of becoming a drop-out. Parents with children who are not a high drop-out risk may place little value on such efforts.

To summarize, families in Brandon Township saw approximately $875 more per year, per pupil, spent on educating their children. Families in Pontiac saw approximately

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[26] The system does allocate more revenue to districts considered to have a large number of "at-risk" students. Again see Kearney (1994) for a description of special funds appropriations.

[27] See Wassmer and Fisher (1996) for a discussion of this.

$650 more per pupil and Ferndale saw roughly $1600 more per pupil. The dollar cost of these additional services is far in excess of the additional tax cost any of these families saw. Some families in these municipalities, most notably existing homeowners, saw large overall tax cuts.

Families in Bloomfield Township saw a reduction in their school spending of roughly $300 per pupil. Many residents of Bloomfield Township, therefore, saw an increase in their taxes and a cut in their service levels. It should be noted, however, that Bloomfield Township residents are, on average, far wealthier than the residents of the other communities. Even with the spending cuts, school spending in Bloomfield Township remains at one of the highest levels in the State of Michigan.

VI. Conclusion

Michigan's recent school reforms resulted in changes in a number of the state's taxes, including the sales, property, and income tax. School spending was also significantly changed in a number of districts. This chapter presents an estimate of the degree to which these changes effected various Michigan household types. The effects of the changes on seniors, families, and single individuals are examined. For each of these groups, the incidence of the changes on renters, homeowners at the time of the reforms, and homeowners who purchased their homes after the reforms were implemented is estimated. Finally, each of these groups is examined in two urban communities, a rural community, and a semi-urban community. These community types broadly represent the experiences of many Michigan households.

In general, in urban and rural communities, existing homeowners received large overall tax cuts. New homeowners often saw small increases in their taxes over what they would have been had the reforms not been implemented. The tax effect renters saw is largely dependent on the degree to which property taxes are shifted. These communities generally saw increases in the money per pupil available to their schools.

Semi-rural or suburban locations, often the highest spending prior to the reforms, saw slight tax decreases for existing homeowners. All other household types generally saw moderate tax increases. School spending in the communities that were spending the highest amount prior to the reforms, generally decreased in real terms.

It should be noted that although the analysis presented in this chapter applies to a large fraction of Michigan households, several important topics were not investigated. The effects of the tax reforms on landlords depends in part on the degree to which rents changed. The effects of the portion of the sales tax increase that effected producers was not measured in this chapter. Finally, the effect of Michigan's reforms on wages, capital allocation, the return to capital, and overall economic growth were not considered nor was the change in the overall excess burden resulting from Michigan's tax system.

Figure 5.1 - Tax Change as a Pct. of Income (Non-Smoker - Brandon Twp).

■ Existing Homeowners Senior	❑ Existing Homeowners Family
■ Existing Homeowners Single	■ New Homeowners Senior
▦ New Homeowners Family	▣ New Homeowners Single
▤ Renters (Full Shifting) Senior	▯ Renters (Full Shifting) Family
▨ Renters (Full Shifting) Single	▧ Renters (No Shifting) Senior
▨ Renters (No Shifting) Family	▨ Renters (No Shifting) Single
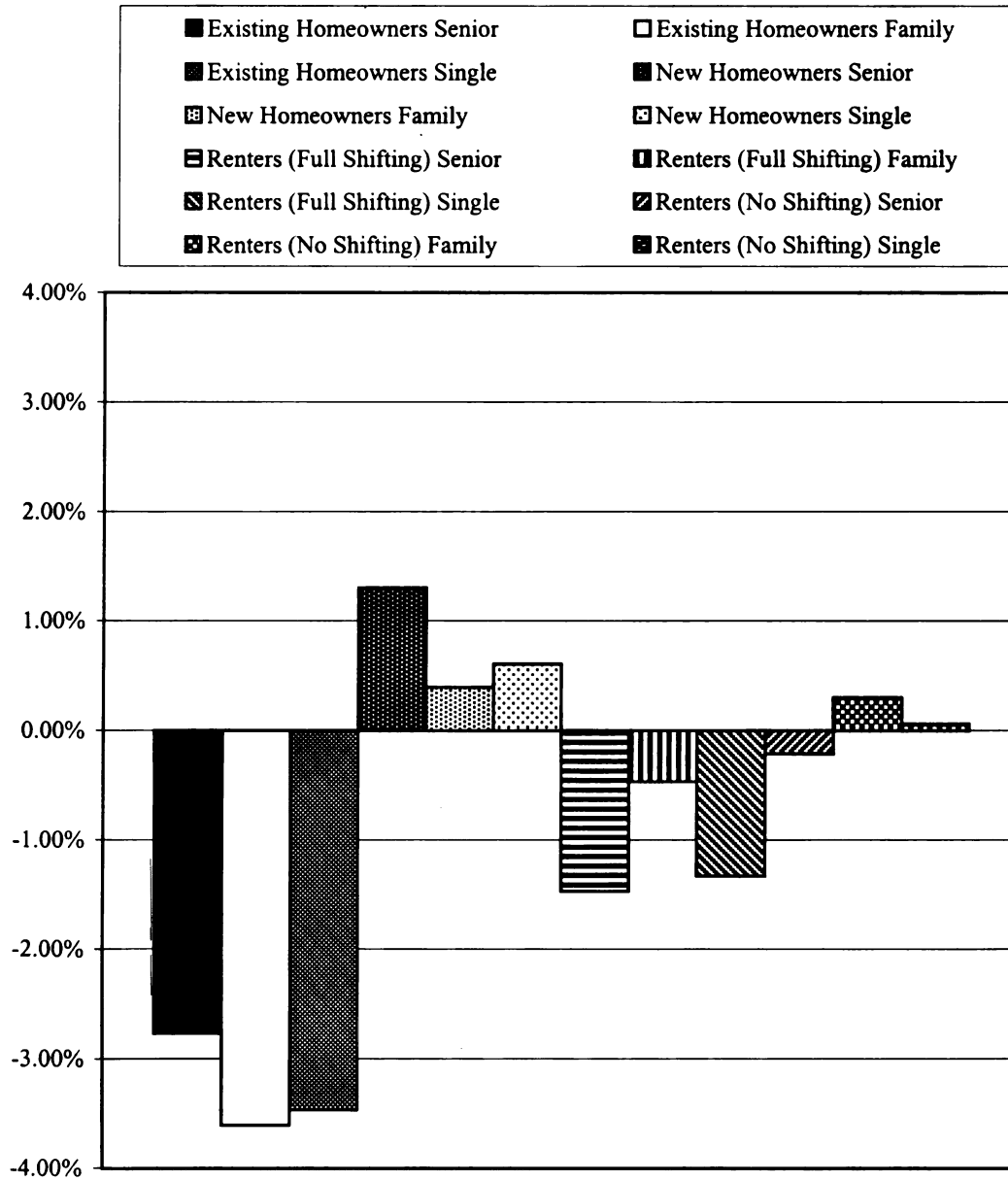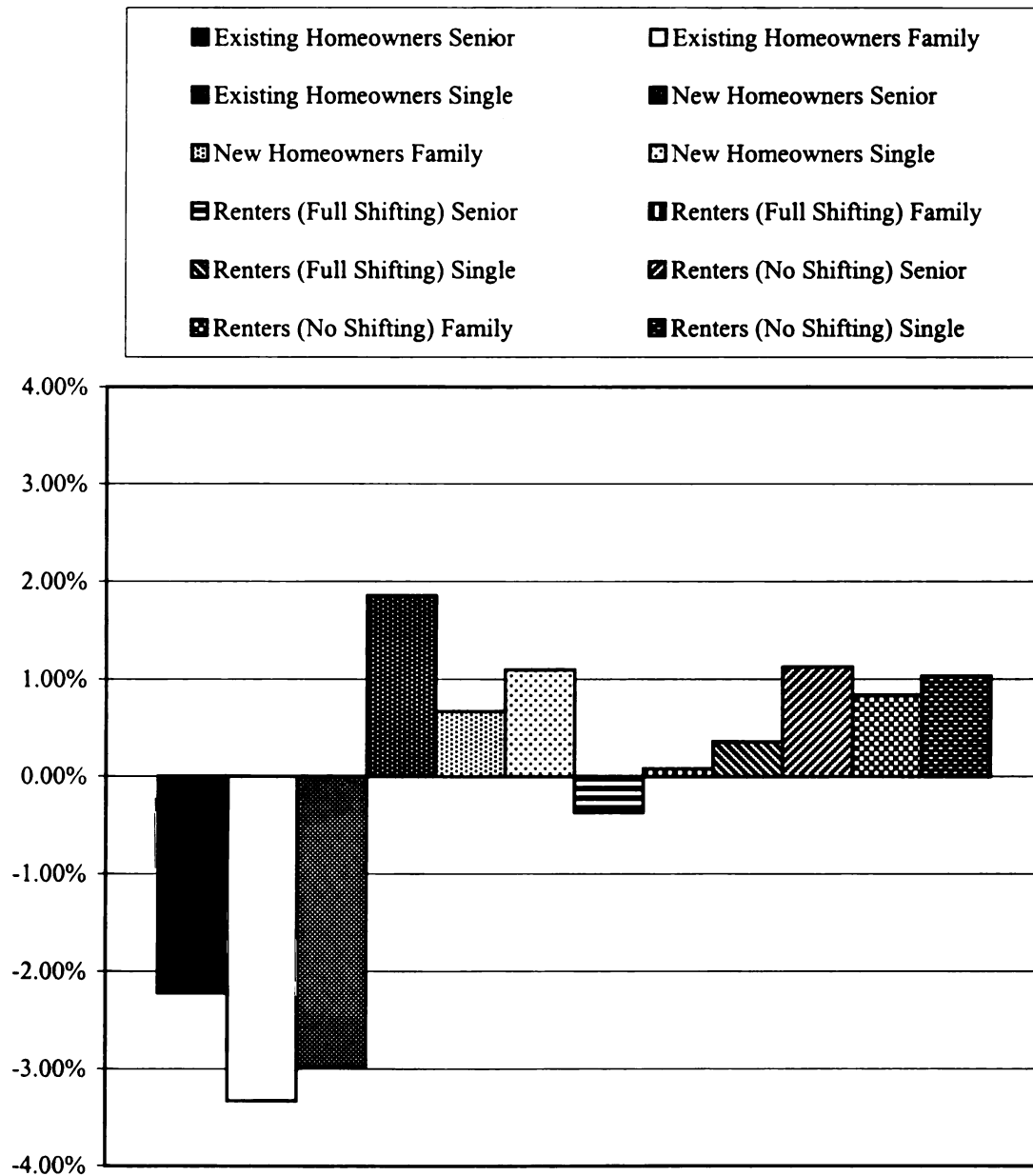
Figure 5.2 - Tax Change as a Pct. of Income (Smoker - Brandon Twp).

■ Existing Homeowners Senior	☐ Existing Homeowners Family
▩ Existing Homeowners Single	▣ New Homeowners Senior
▣ New Homeowners Family	▣ New Homeowners Single
▤ Renters (Full Shifting) Senior	▥ Renters (Full Shifting) Family
▨ Renters (Full Shifting) Single	▧ Renters (No Shifting) Senior
▩ Renters (No Shifting) Family	▨ Renters (No Shifting) Single
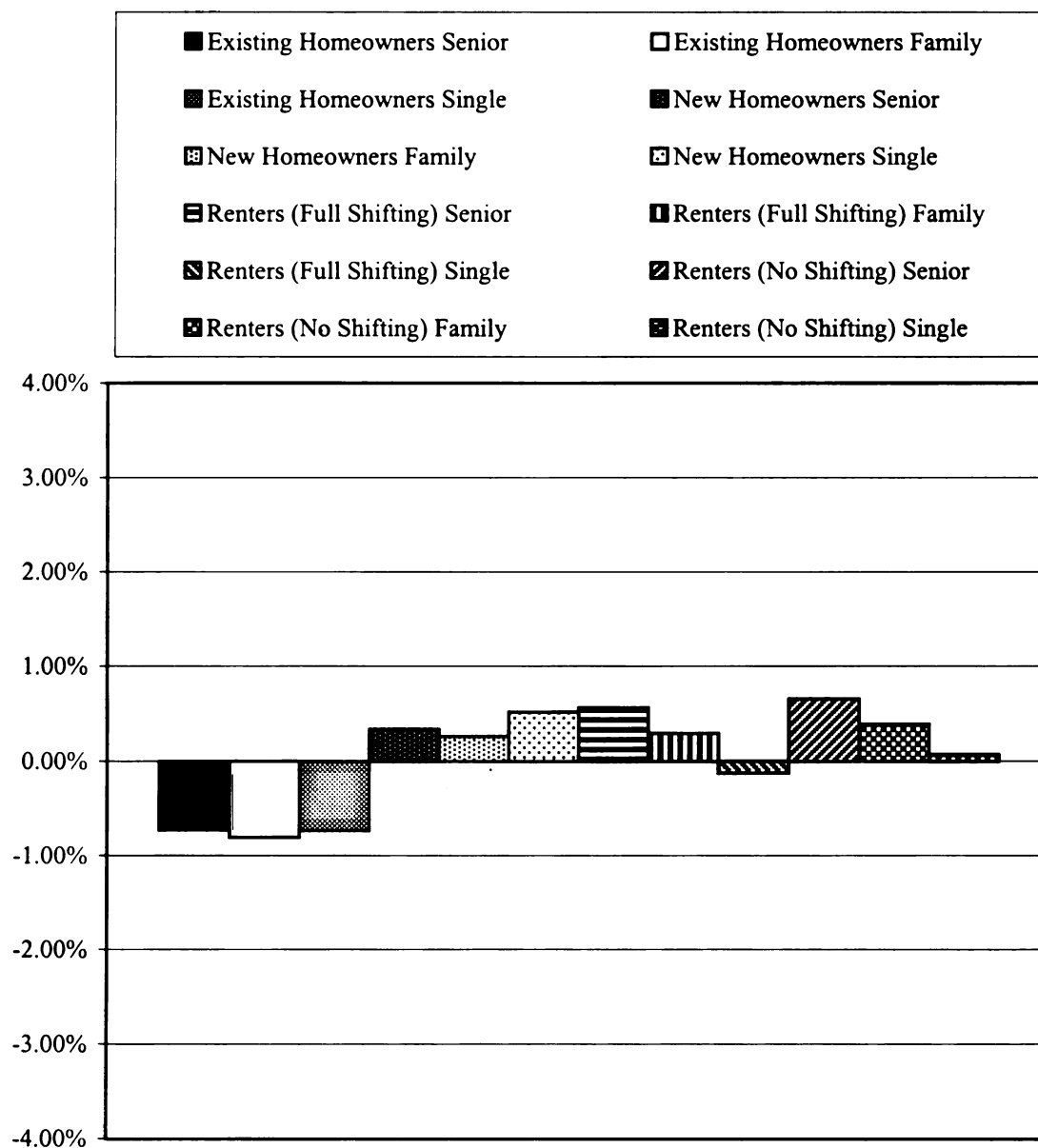
Figure 5.3 - Tax Change as a Pct. of Income (Non-Smoker - Bloomfield Twp).

■ Existing Homeowners Senior	□ Existing Homeowners Family
▓ Existing Homeowners Single	■ New Homeowners Senior
▦ New Homeowners Family	▣ New Homeowners Single
▤ Renters (Full Shifting) Senior	▯ Renters (Full Shifting) Family
◩ Renters (Full Shifting) Single	▨ Renters (No Shifting) Senior
▨ Renters (No Shifting) Family	▦ Renters (No Shifting) Single
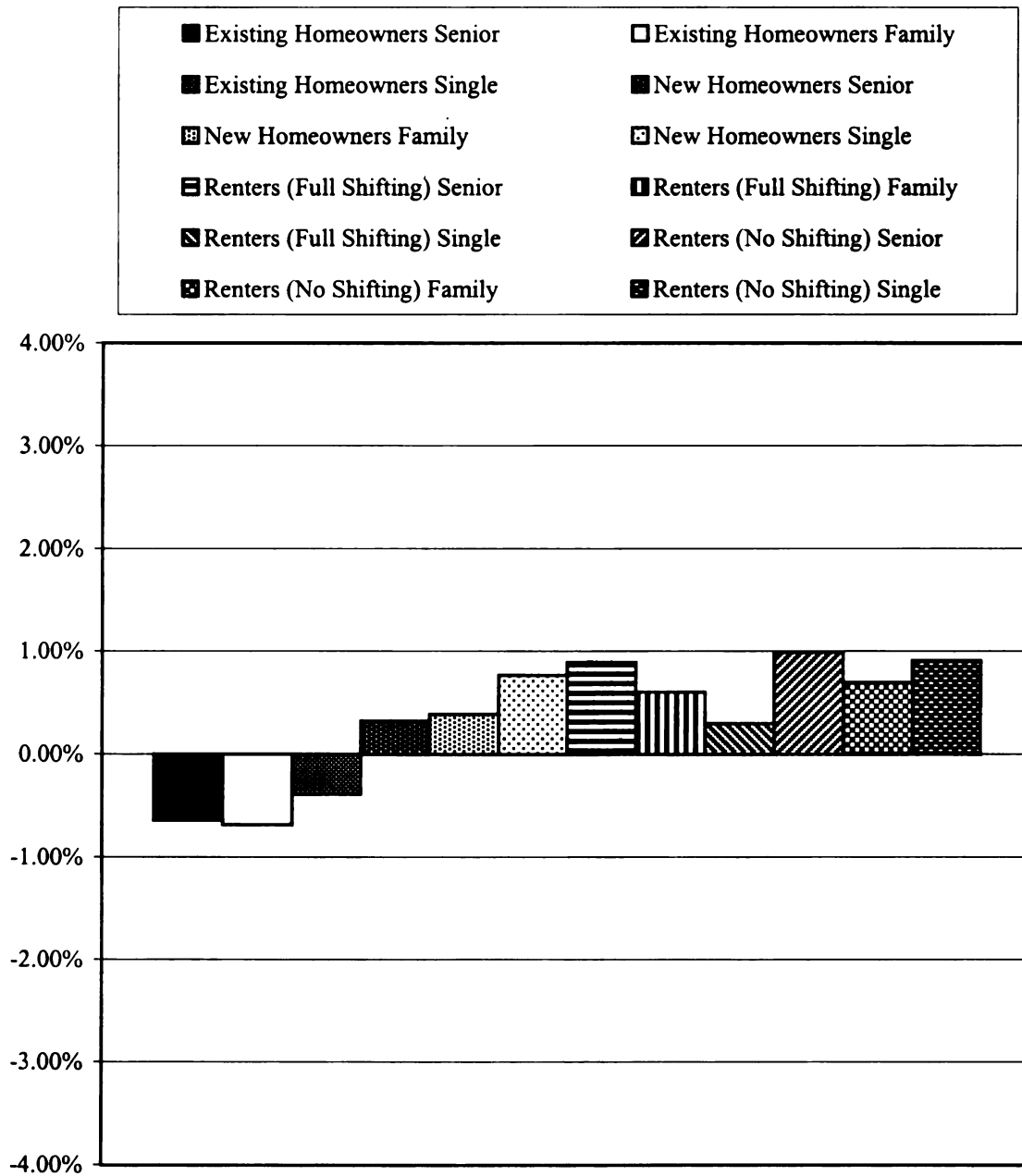
Figure 5.4 - Tax Change as a Pct. of Income (Smoker - Bloomfield Twp).

■ Existing Homeowners Senior	☐ Existing Homeowners Family
■ Existing Homeowners Single	▨ New Homeowners Senior
⊞ New Homeowners Family	⊡ New Homeowners Single
⊟ Renters (Full Shifting) Senior	◨ Renters (Full Shifting) Family
◪ Renters (Full Shifting) Single	▨ Renters (No Shifting) Senior
▨ Renters (No Shifting) Family	▨ Renters (No Shifting) Single
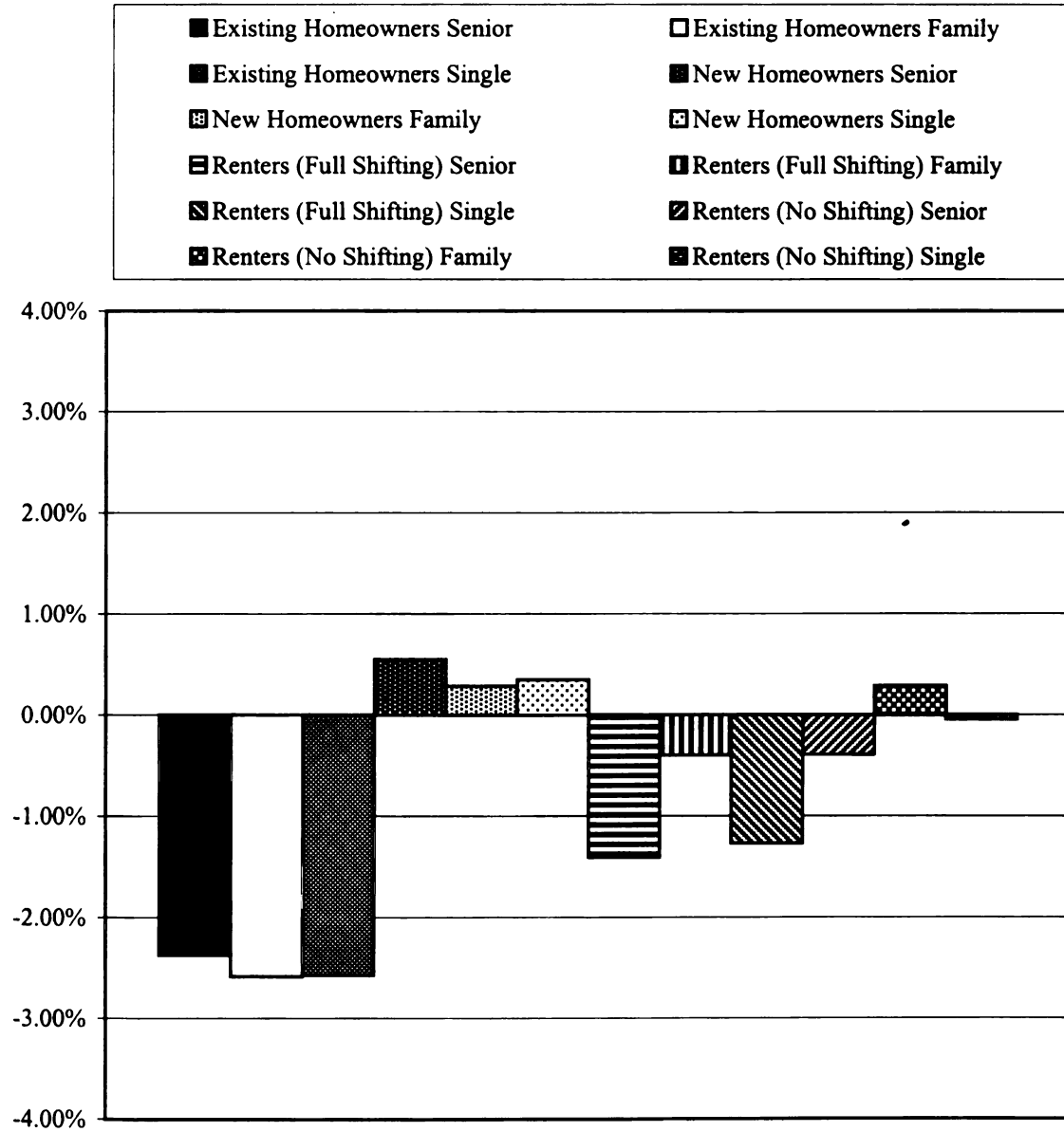
Figure 5.5 - Tax Change as a Pct. of Income (Non-Smoker - Ferndale)
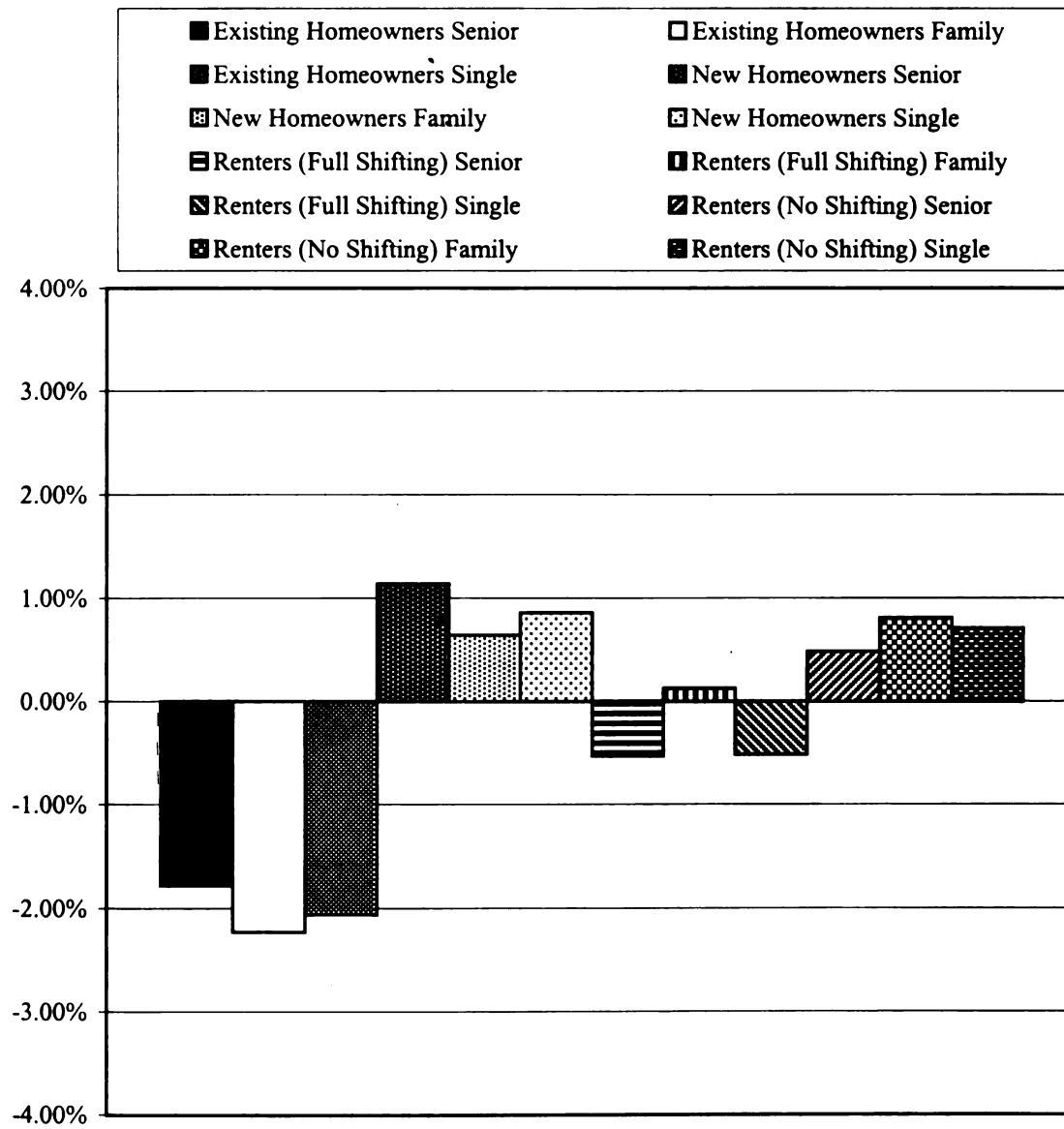
Figure 5.6 - Tax Change as a Pct. of Income (Smoker - Ferndale).

Legend	
■ Existing Homeowners Senior	□ Existing Homeowners Family
■ Existing Homeowners Single	■ New Homeowners Senior
⊞ New Homeowners Family	⊡ New Homeowners Single
⊟ Renters (Full Shifting) Senior	▯ Renters (Full Shifting) Family
◩ Renters (Full Shifting) Single	▨ Renters (No Shifting) Senior
▨ Renters (No Shifting) Family	▨ Renters (No Shifting) Single
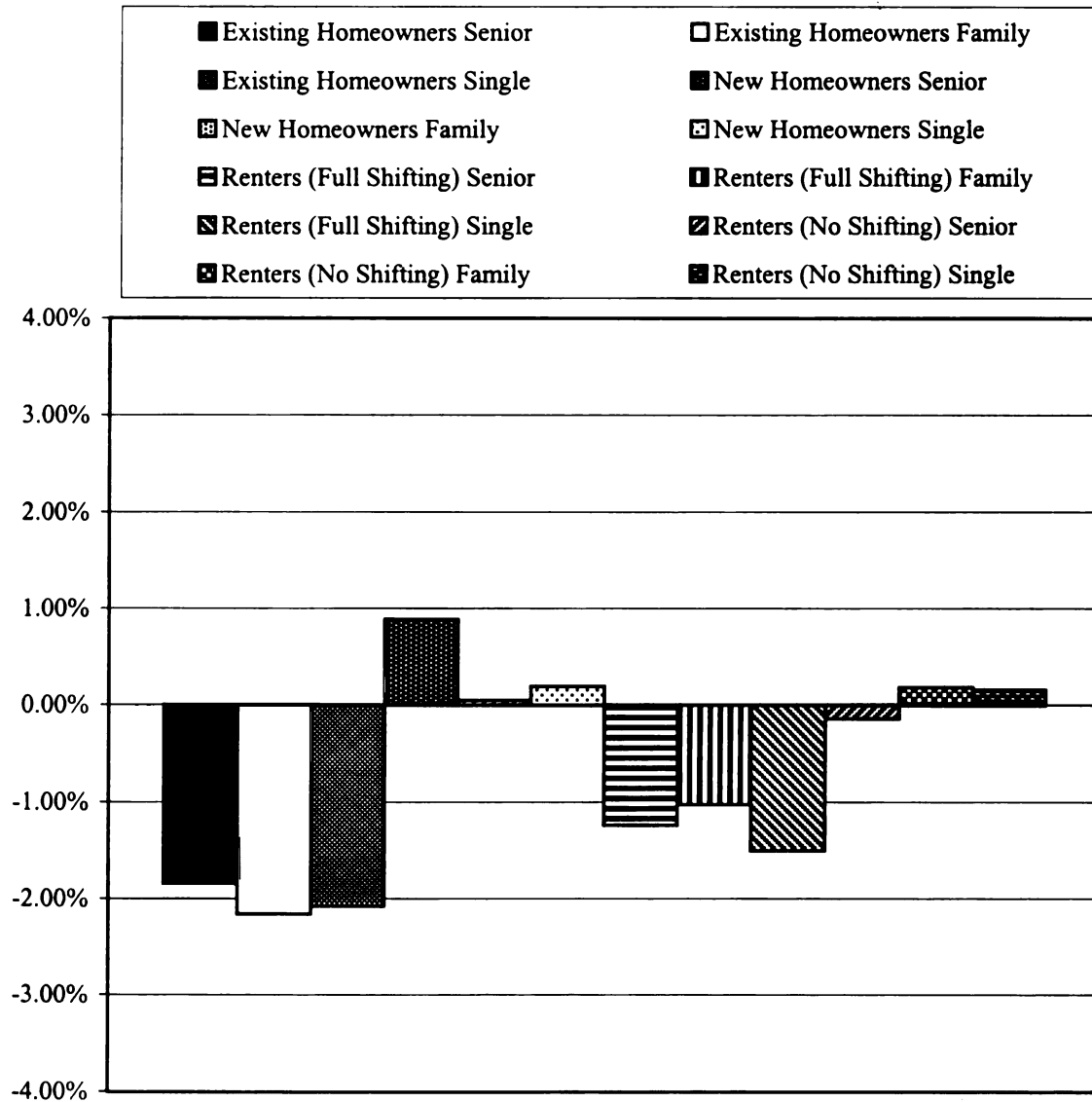
Figure 5.7 - Tax Change as a Pct. of Income (Non-Smoker - Pontiac).

■ Existing Homeowners Senior	☐ Existing Homeowners Family
■ Existing Homeowners Single	▨ New Homeowners Senior
⊞ New Homeowners Family	☐ New Homeowners Single
⊟ Renters (Full Shifting) Senior	◧ Renters (Full Shifting) Family
◩ Renters (Full Shifting) Single	▨ Renters (No Shifting) Senior
◧ Renters (No Shifting) Family	▨ Renters (No Shifting) Single
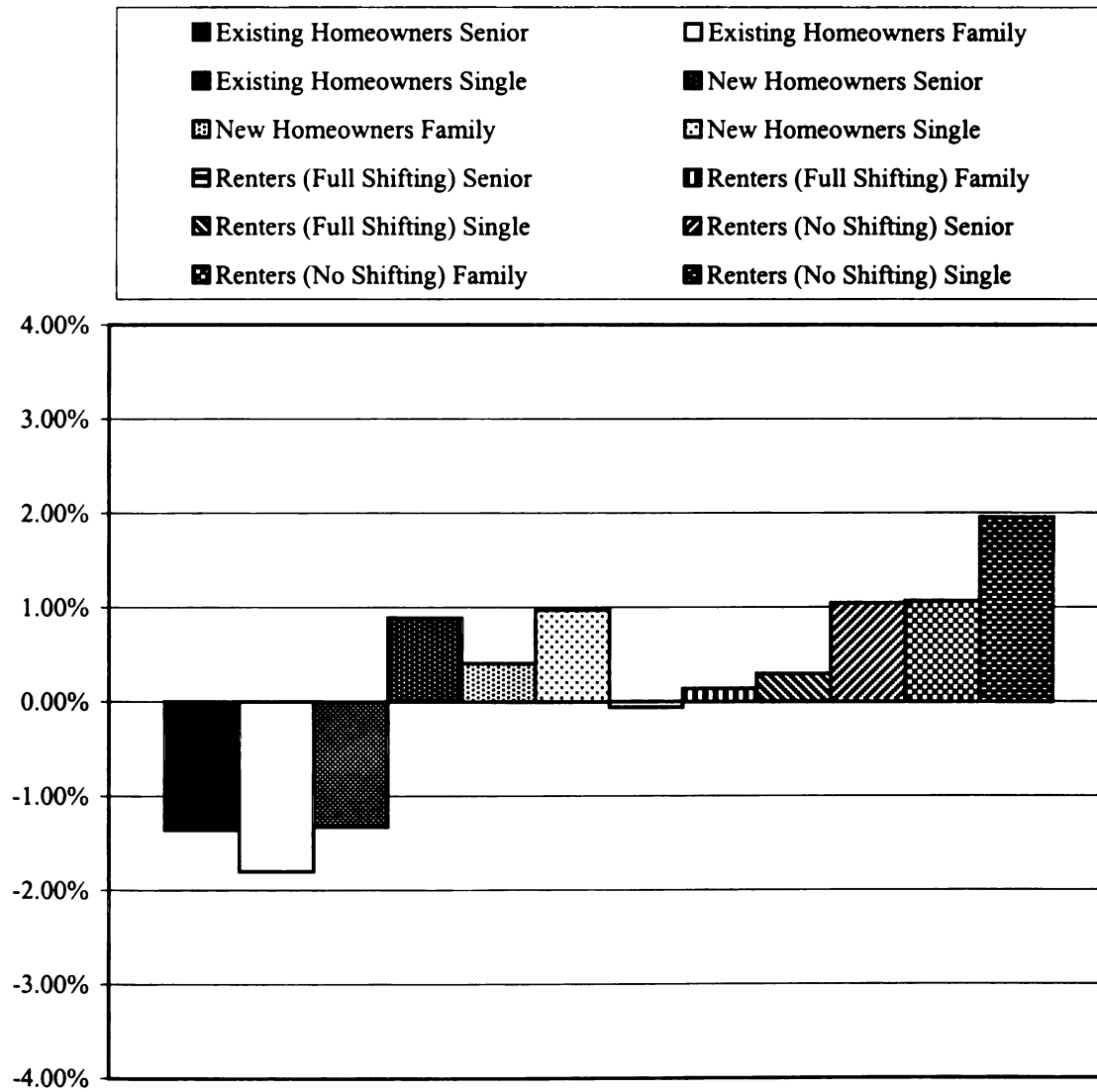
Figure 5.8 - Tax Change as a Pct. of Income (Smoker - Pontiac).

Table 5.1 Estimates of Income for Various Household Types

	Median Income Base	Owner/Renter Adjustment Ratio	Estimated 1990 Income	Income Quintile	Est. Real Income Growth	1996 Income (1990 Dollars)	1996 Income (1996 Dollars)
Brandon Twp (Brandon Schools)							
Homeowner							
Senior	$24,018	1.038	$24,930	3	9.8%	$27,373	$32,848
Family	$47,434	1.038	$49,236	4	11.8%	$55,046	$66,055
Single	$27,061	1.038	$28,089	3	9.8%	$30,842	$37,010
Renter							
Senior	$24,018	0.540	$12,970	2	7.5%	$13,943	$16,731
Family	$47,434	0.540	$25,614	3	9.8%	$28,124	$33,749
Single	$27,061	0.540	$14,612	2	7.5%	$15,708	$18,849
Bloomfield Twp (Bloomfield Hills Schools)							
Homeowner							
Senior	$89,543	1.065	$95,363	5	20.8%	$115,199	$138,238
Family	$96,127	1.065	$102,375	5	20.8%	$123,669	$148,403
Single	$36,716	1.065	$39,102	4	11.8%	$43,716	$52,459
Renter							
Senior	$89,543	0.460	$41,189	4	11.8%	$46,049	$55,259
Family	$96,127	0.460	$44,218	4	11.8%	$49,436	$59,323
Single	$36,716	0.460	$16,889	2	7.5%	$18,156	$21,787
City of Ferndale (Ferndale Schools)							
Homeowner							
Senior	$20,645	1.136	$23,543	3	9.8%	$25,751	$30,902
Family	$33,934	1.136	$38,549	4	11.8%	$43,098	$51,717
Single	$24,000	1.136	$27,264	3	9.8%	$29,936	$35,923
Renter							
Senior	$20,645	0.786	$16,222	2	7.5%	$17,439	$20,926
Family	$33,934	0.786	$26,665	3	9.8%	$29,278	$35,134
Single	$24,000	0.786	$18,859	2	7.5%	$20,273	$24,328
City of Pontiac (Pontiac Schools)							
Homeowner							
Senior	$19,577	1.470	$28,778	3	9.8%	$31,598	$37,918
Family	$25,834	1.470	$37,976	4	11.8%	$42,457	$50,949
Single	$12,867	1.470	$18,914	2	7.5%	$20,333	$24,399
Renter							
Senior	$19,577	0.620	$12,137	1	6.5%	$12,926	$15,511
Family	$25,834	0.620	$16,017	2	7.5%	$17,218	$20,662
Single	$12,867	0.620	$7,997	1	6.5%	$8,496	$10,195

Source: 1990 Census and Current Population Reports
Note: Some figures have been rounded.

Table 5.2 Sales Tax Estimates for Various Demographic Groups

	Estimated Income 1996 (1996 Dollars)	% Income Spent on Taxable Items	Dollars Spent On Taxable Items	Sales Tax 4%	Sales Tax 6%	Increase in Tax Paid
Brandon Twp (Brandon Schools)						
Homeowner						
Senior	$32,848	39.1%	$12,843	$514	$771	$257
Family	$66,055	27.7%	$18,297	$732	$1,098	$366
Single	$37,010	37.1%	$13,731	$549	$824	$275
Renter						
Senior	$16,731	45.0%	$7,529	$301	$452	$151
Family	$33,749	39.1%	$13,196	$528	$792	$264
Single	$18,849	45.0%	$8,482	$339	$509	$170
Bloomfield Twp (Bloomfield Hills Schools)						
Homeowner						
Senior	$138,238	27.7%	$38,292	$1,532	$2,298	$766
Family	$148,403	27.7%	$41,108	$1,644	$2,466	$822
Single	$52,459	32.8%	$17,207	$688	$1,032	$344
Renter						
Senior	$55,259	32.8%	$18,125	$725	$1,088	$363
Family	$59,323	27.7%	$16,432	$657	$986	$329
Single	$21,787	45.0%	$9,804	$392	$588	$196
City of Ferndale (Ferndale Schools)						
Homeowner						
Senior	$30,902	39.1%	$12,083	$483	$725	$242
Family	$51,717	32.8%	$16,693	$679	$1,018	$339
Single	$35,923	37.1%	$13,327	$533	$800	$267
Renter						
Senior	$20,926	45.0%	$9,417	$377	$565	$188
Family	$35,134	37.1%	$13,035	$521	$782	$261
Single	$24,328	39.1%	$9,512	$380	$571	$190
City of Pontiac (Pontiac Schools)						
Homeowner						
Senior	$37,918	37.1%	$14,068	$563	$844	$281
Family	$50,949	32.8%	$16,711	$668	$1,003	$334
Single	$24,399	39.1%	$9,540	$382	$572	$191
Renter						
Senior	$15,511	45.0%	$6,980	$279	$419	$140
Family	$20,662	45.0%	$9,298	$372	$558	$186
Single	$10,195	57.3%	$5,842	$234	$350	$117

Source: Office of Revenue and Tax Analysis and Author's Calculations
Note: Some figures have been rounded.

Table 5.3 Calculations of Rent Savings from Michigan's School Reforms

	Base Rent Annual 1996 (w/o Prop A)	Implicit Annual Property Tax (w/o Prop A)	Est. $'s School Tax in Rent (w/o Prop A)	Pct. Change School Tax Non-homestead	Annual Rent Savings Under Various Assumptions			
					Full Shifting	Zero Shifting	Half Shifting	11 Percent Shifting
Brandon Twp (Brandon Schools)								
Senior	$6,192	$1,238	$894	-29.41%	$263	$0	$131	$29
Family	$6,883	$1,377	$994	-29.41%	$292	$0	$146	$32
Single	$6,984	$1,397	$1,008	-29.41%	$297	$0	$148	$33
Bloomfield Twp (Bloomfield Hills Schools)								
Senior	$8,496	$1,699	$1,087	-4.80%	$52	$0	$26	$6
Family	$9,130	$1,826	$1,169	-4.80%	$56	$0	$28	$6
Single	$7,862	$1,572	$1,006	-4.80%	$48	$0	$24	$5
City of Ferndale (Ferndale Schools)								
Senior	$7,517	$1,503	$887	-32.74%	$290	$0	$145	$32
Family	$7,070	$1,414	$834	-32.74%	$273	$0	$137	$30
Single	$8,726	$1,745	$1030	-32.74%	$337	$0	$169	$37
City of Pontiac (Pontiac Schools)								
Senior	$5,357	$1,071	$573	-37.38%	$214	$0	$107	$24
Family	$7,070	$1,414	$757	-37.38%	$283	$0	$141	$31
Single	$4,795	$959	$513	-37.38%	$192	$0	$96	$21

Source: 1990 Census and Author's Calculations

Table 5.4 Property Tax Credit Estimates -- Renters

	Prop Tax for Credit Purposes (w/o Reforms)	Tax Credit (w/o Reforms)	Estimates of Implicit Tax for Credit Purposes (Post Reform)				Estimate of Property Tax Credit (Post Reform)				Increase in Property Tax Credit			
			Full Shifting	Zero Shifting	Half Shifting	11 Percent Shifting	Full Shifting	Zero Shifting	Half Shifting	11 Percent Shifting	Full Shifting	Zero Shifting	Half Shifting	11 Percent Shifting
Brandon Twp (Brandon Schools)														
Senior	$1,052	$467	$1,186	$1,238	$1,212	$1,233	$600	$653	$627	$647	$133	$186	$159	$180
Family	$1,170	$0	$1,318	$1,377	$1,347	$1,370	$82	$117	$100	$113	$82	$117	$100	$113
Single	$1,187	$317	$1,337	$1,397	$1,367	$1,390	$407	$442	$424	$438	$90	$126	$108	$122
Bloomfield Twp (Bloomfield Hills Schools)														
Senior	$1,444	$0	$1,689	$1,699	$1,649	$1,698	$0	$0	$0	$0	$0	$0	$0	$0
Family	$1,552	$0	$1,185	$1,826	$1,820	$1,825	$0	$0	$0	$0	$0	$0	$0	$0
Single	$1,336	$344	$1,563	$1,572	$1,568	$1,571	$480	$486	$483	$485	$136	$142	$139	$141
City of Ferndale (Ferndale Schools)														
Senior	$1,278	$545	$1,445	$1,503	$1,474	$1,497	$713	$771	$742	$765	$192	$270	$196	$219
Family	$1,202	$0	$1,359	$1,414	$1,387	$1,408	$78	$111	$94	$107	$78	$111	$94	$107
Single	$1,483	$379	$1,678	$1,745	$1,712	$1,738	$496	$536	$516	$532	$117	$157	$137	$153
City of Pontiac (Pontiac Schools)														
Senior	$910	$368	$1,029	$1,071	$1,050	$1,067	$486	$528	$507	$524	$118	$161	$139	$156
Family	$1,202	$287	$1,358	$1,414	$1,368	$1,408	$381	$415	$398	$411	$93	$127	$110	$124
Single	$815	$275	$921	$959	$940	$955	$338	$361	$350	$359	$63	$86	$75	$84

Source: 1990 Census and Author Calculations

Note: Some numbers have been rounded.

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Table 5.5 Estimated Property Tax Payments and Credits for Homeowners (existing and new) – w/o Reforms

	House Price (w/o Reforms)	Income	Estimated Marginal Tax Rate	School Tax (w/o Reforms)	School Tax Deduction (w/o Reforms)	Michigan Prop Tax Credit (w/o Reforms)
Brandon Twp (Brandon Schools)						
Senior	$60,444	$32,848	15%	$1,357	$203	$413
Family	$119,374	$66,055	15%	$2,679	$402	$464
Single	$68,102	$37,010	15%	$1,528	$229	$279
Bloomfield Twp (Bloomfield Hills Schools)						
Senior	$270,496	$138,238	31%	$3,860	$1,196	$0
Family	$290,386	$148,403	31%	$4,143	$1,284	$0
Single	$110,912	$52,549	15%	$1,583	$237	$136
City of Ferndale (Ferndale Schools)						
Senior	$32,906	$30,902	15%	$765	$115	$0
Family	$54,089	$51,717	15%	$1,258	$189	$0
Single	$38,255	$35,923	15%	$889	$133	$0
City of Pontiac (Pontiac Schools)						
Senior	$39,336	$37,918	15%	$917	$138	$100
Family	$51,908	$50,919	15%	$1,210	$181	$61
Single	$25,853	$24,399	15%	$603	$90	$50

Source: 1990 Census and Author's Calculations
Note: Some numbers have been rounded.

Table 5.6 Estimates of Reform Effects on Existing Homeowners

	House Price (w/o Reforms)	School Tax (w/ Reforms)	School Tax Deductions (w/ Reforms)	Michigan Prop. Tax Credit (w/ Reforms)	Unrealized Capital Gain	Est. Annual Value of Capital Gain	Est. Annual Payment Savings
Brandon Twp (Brandon Schools)							
Senior	$60,444	$319	$48	$0	$8,293	$696	$1,166
Family	$119,374	$630	$95	$0	$16,378	$1,374	$2,652
Single	$68,102	$360	$54	$0	$9,334	$784	$1,498
Bloomfield Twp (Bloomfield Hills Schools)							
Senior	$270,496	$2,583	$801	$0	$9,738	$817	$1,699
Family	$290,386	$2,773	$860	$0	$10,454	$877	$1,829
Single	$110,912	$1,059	$159	$0	$3,993	$335	$645
City of Ferndale (Ferndale Schools)							
Senior	$32,906	$173	$26	$0	$5,627	$472	$975
Family	$54,089	$285	$43	$0	$9,249	$776	$1,603
Single	$38,255	$202	$30	$0	$6,542	$549	$1,133
City of Pontiac (Pontiac Schools)							
Senior	$39,336	$172	$26	$0	$5,314	$446	$979
Family	$51,908	$227	$34	$0	$7,013	$588	$1,363
Single	$25,853	$113	$17	$0	$3,493	$293	$660

Source: Author's Calculations and Guilfoyle (1997)

Note: Some numbers have been rounded.

Table 5.7 Estimates of Reform Effects on New Homeowners

	House Price (w/ Reforms)	School Tax (w/ Reforms)	School Tax Deductions (w/ Reforms)	Michigan Prop. Tax Credit (w/ Reforms)	Net Additional Mortgage Payment[1]	Annual Payment Savings
Brandon Twp (Brandon Schools)						
Senior	$69,252	$363	$54	$0	$602	-$170
Family	$136,770	$717	$107	$0	$1,190	$13
Single	$78,027	$409	$61	$0	$679	-$7
Bloomfield Twp (Bloomfield Hills Schools)						
Senior	$282,335	$2,676	$830	$0	$590	$228
Family	$303,096	$2,873	$891	$0	$634	$243
Single	$115,767	$1,097	$165	$0	$290	-$12
City of Ferndale (Ferndale Schools)						
Senior	$37,917	$198	$30	$0	$409	$73
Family	$62,325	$326	$49	$0	$672	$120
Single	$44,080	$231	$35	$0	$475	$85
City of Pontiac (Pontiac Schools)						
Senior	$44,985	$195	$29	$0	$386	$127
Family	$59,363	$258	$39	$0	$509	$240
Single	$29,566	$128	$19	$0	$254	$100

[1] Represents additional mortgage payment after adjusting for the deduction of mortgage interest from the Federal Income Tax.

Source: Author's calculations and Guilfoyle (1997).

Note: Some numbers have been rounded.

Table 5.8 Income Tax Estimates for Various Demographic Groups

	Estimated Income (1996)	Number of Exemptions	Exemption Value	Est. Social Security Income	65 and older Exemption	Pension Deduction (Max $63,840)	Taxable Income	Pre Reform Tax¹ (4.6%)	Post Reform Tax¹ (4.4%)	Annual Tax Savings
Brandon (Brandon Schools)										
Owners										
Senior	$32,848	2	$5,000	$14,919	$1,800	$17,929	$0	$0	$0	$0
Family	$66,055	4	$10,000	$0	$0	$0	$56,055	$2,192	$2,096	$95
Single	$37,010	1	$2,500	$0	$0	$0	$34,510	$1,349	$1,291	$59
Renters										
Senior	$16,731	2	$5,000	$14,919	$1,800	$1,812	$0	$0	$0	$0
Family	$33,749	4	$10,000	$0	$0	$0	$23,749	$1,092	$1,045	$47
Single	$18,849	1	$2,500	$0	$0	$0	$16,349	$752	$719	$33
Bloomfield Twp (Bloomfield Hills Schools)										
Owners										
Senior	$138,238	2	$5,000	$14,919	$1,800	$63,840	$52,679	$1,672	$1,599	$73
Family	$148,403	4	$10,000	$0	$0	$0	$138,403	$4,393	$4,202	$191
Single	$52,459	1	$2,500	$0	$0	$0	$49,959	$1,953	$1,868	$85
Renters										
Senior	$55,259	2	$5,000	$14,919	$1,800	$40,340	$0	$0	$0	$0
Family	$59,323	4	$10,000	$0	$0	$0	$49,323	$2,269	$2,170	$99
Single	$21,787	1	$2,500	$0	$0	$0	$19,287	$887	$849	$39
City of Ferndale (Ferndale Schools)										
Owners										
Senior	$30,902	2	$5,000	$14,919	$1,800	$15,983	$0	$0	$0	$0
Family	$51,717	4	$10,000	$0	$0	$0	$41,717	$1,631	$1,560	$71
Single	$35,923	1	$2,500	$0	$0	$0	$33,423	$1,307	$1,250	$57
Renters										
Senior	$20,926	2	$5,000	$14,919	$1,800	$6,007	$0	$0	$0	$0
Family	$35,134	4	$10,000	$0	$0	$0	$25,134	$1,156	$1,106	$50
Single	$24,328	1	$2,500	$0	$0	$0	$21,828	$1,004	$960	$44
City of Pontiac (Pontiac Schools)										
Owners										
Senior	$37,918	2	$5,000	$14,919	$1,800	$22,999	$0	$0	$0	$0
Family	$50,949	4	$10,000	$0	$0	$0	$40,949	$1,601	$1,531	$70
Single	$24,399	1	$2,500	$0	$0	$0	$21,899	$856	$819	$37
Renters										
Senior	$15,511	2	$5,000	$14,919	$1,800	$592	$0	$0	$0	$0
Family	$20,662	4	$10,000	$0	$0	$0	$10,662	$490	$469	$21
Single	$10,195	1	$2,500	$0	$0	$0	$7,695	$354	$339	$15

¹Michigan Income Tax figures are net of any deductions of state income tax allowable on the federal income tax.
Note: Some figures have been rounded. Source: 1990 Census, 1996 MI tax forms and 1995 Statistical Abstract of

Table 5.9 Percentage Smoker by Income for 1993

Income Class	Percent Smoker
Less than $10,000	36.3
$10,000 - $19,999	26.7
$20,000 - $34,999	27.3
$35,000 - $50,000	23.8
Greater than $50,000	17.3

Source: Michigan Office of Revenue and Tax Analysis

Table 5.10 Total Tax Incidence for Renters

	Effect of Sales Tax Change	Effect of Prop Tax Change on Rent	Effect of Prop Tax Credit Change	Effect of Income Tax Change	Total Tax Effect (non-smoker)	Total Tax Effect (Smoker)[1]
Full Shifting						
Brandon Twp						
Senior	$151	-$263	-$133	$0	-$245	-$62
Family	$264	-$292	-$82	-$47	-$157	$26
Single	$170	-$297	-$90	-$33	-$250	$67
Bloomfield Twp						
Senior	$363	-$52	$0	$0	$311	$494
Family	$329	-$56	$0	-$99	$174	$357
Single	$196	-$48	-$136	-$39	-$27	$156
City of Ferndale						
Senior	$188	-$290	-$192	$0	-$294	-$111
Family	$261	-$273	-$78	-$50	-$140	$43
Single	$190	-$337	-$117	-$44	-$308	-$125
City of Pontiac						
Senior	$140	-$214	-$118	$0	-$192	-$9
Family	$186	-$283	-$93	-$21	-$211	$28
Single	$117	-$192	-$63	-$15	-$153	$30
Zero Shifting						
Brandon Twp						
Senior	$151	$0	-$186	$0	-$35	$188
Family	$264	$0	-$117	-$47	$100	$283
Single	$170	$0	-$126	-$33	$11	$194
Bloomfield Twp						
Senior	$363	$0	$0	$0	$363	$546
Family	$329	$0	$0	-$99	$230	$413
Single	$196	$0	-$142	-$39	$15	$198
City of Ferndale						
Senior	$188	$0	-$270	$0	-$82	$101
Family	$261	$0	-$111	-$50	$100	$283
Single	$190	$0	-$157	-$44	-$11	$172
City of Pontiac						
Senior	$140	$0	-$161	$0	-$21	$162
Family	$186	$0	-$127	-$21	$38	$221
Single	$117	$0	-$86	-$15	$16	$199

(Table Continued on Next Page)

Table 5.10 Total Tax Incidence for Renters (Continued)

	Effect of Sales Tax Change	Effect of Prop Tax Change on Rent	Effect of Prop Tax Credit Change	Effect of Income Tax Change	Total Tax Effect (non-smoker)	Total Tax Effect (Smoker)
1/2 Shifting						
Brandon Twp						
Senior	$151	-$131	-$159	$0	-$139	$44
Family	$264	-$146	-$100	-$47	-$29	$154
Single	$170	-$148	-$108	-$33	-$119	$64
Bloomfield Twp						
Senior	$363	-$26	$0	$0	$337	$520
Family	$329	-$28	$0	-$99	$202	$385
Single	$196	-$24	-$139	-$39	-$6	$177
City of Ferndale						
Senior	$188	-$145	-$196	$0	-$153	$33
Family	$261	-$137	-$94	-$50	-$20	$163
Single	$190	-$169	-$137	-$44	-$160	$23
City of Pontiac						
Senior	$140	-$107	-$139	$0	-$106	$77
Family	$186	-$141	-$110	-$21	-$86	$97
Single	$117	-$96	-$75	-$15	-$69	$114
11% Shifting						
Brandon Twp						
Senior	$151	-$29	-$180	$0	-$58	$125
Family	$264	-$32	-$113	-$47	$72	$255
Single	$170	-$33	-$122	-$33	-$18	$165
Bloomfield Twp						
Senior	$363	-$6	$0	$0	$357	$540
Family	$329	-$6	$0	-$99	$224	$407
Single	$196	-$5	-$141	-$39	$11	$194
City of Ferndale						
Senior	$188	-$32	-$219	$0	-$63	$120
Family	$261	-$30	-$107	-$50	$74	$257
Single	$190	-$37	-$153	-$44	-$44	$139
City of Pontiac						
Senior	$140	-$24	-$156	$0	-$40	$143
Family	$186	-$31	-$124	-$21	$10	$193
Single	$117	-$21	-$84	-$15	-$3	$180

¹Assumes household has one smoker who smokes 1 pack a day.

Table 5.11 Total Tax Incidence for Existing Homeowners

	Effect of Sales Tax Change	Effect of Prop. Tax Change	Effect of Income Tax Change[1]	Total Tax Effect (non-smoker)	Total Tax Effect (smoker)[2]
Brandon Twp (Brandon Schools)					
Senior	$257	-$1,331	$0	-$909	-$728
Family	$366	-$2,652	-$95	-$2,381	-$2,198
Single	$275	-$1,498	-$59	-$1,282	-$1,099
Bloomfield Twp (Bloomfield Hills Schools)					
Senior	$766	-$1,699	-$73	-$1,006	-$883
Family	$822	-$1,829	-$191	-$1,198	-$1,015
Single	$344	-$645	-$85	-$386	-$203
City of Ferndale (Ferndale Schools)					
Senior	$242	-$975	$0	-$733	-$550
Family	$339	-$1,603	-$71	-$1,335	-$1,152
Single	$267	-$1,133	-$57	-$923	-$740
City of Pontiac (Pontiac Schools)					
Senior	$281	-$1,019	$0	-$698	-$515
Family	$334	-$1,363	-$70	-$1,099	-$916
Single	$191	-$660	-$37	-$506	-$323

[1]Income tax changes due to the deductions of the property tax from the federal income tax or the Michigan Property Tax Credit are included under property tax effects.

[2]Assumes one smoker in household who smokes 1 pack per day.

Note: Some numbers have been rounded.

Table 5.12 Total Tax Incidence for New Homeowners

	Effect of Sales Tax Change	Effect of Prop. Tax Change[1]	Effect of Income Tax Change[2]	Total Tax Effect (non-smoker)	Total Tax Effect (smoker)[3]
Brandon Twp (Brandon Schools)					
Senior	$257	$5	$0	$427	$610
Family	$366	-$13	-$95	$258	$441
Single	$275	$7	-$59	$223	$406
Bloomfield Twp (Bloomfield Hills Schools)					
Senior	$766	-$228	-$73	$465	$648
Family	$822	-$243	-$191	$388	$571
Single	$344	$12	-$85	$271	$454
City of Ferndale (Ferndale Schools)					
Senior	$242	-$73	$0	$169	$352
Family	$339	-$120	-$71	$148	$331
Single	$267	-$85	-$57	$125	$308
City of Pontiac (Pontiac Schools)					
Senior	$281	-$167	$0	$154	$337
Family	$334	-$240	-$70	$24	$207
Single	$191	-$100	-$37	$54	$237

[1]Includes the additional mortgage payment new homeowners paid due to housing appreciation. Note the effects of service changes (that resulted from Michigan's reforms) on housing prices are included in this calculation.
[2]Income tax changes due to the deductions of the property tax from the federal income tax or the Michigan Property Tax Credit are included under property tax effects.
[3]Assumes household has one smoker who smokes 1 pack per day.

APPENDIX

APPENDIX

This appendix contains a subset of the data that were used in this dissertation. Table A.1 contains summary information on the various cities, townships, and villages of Oakland County. The data contained in this table are mostly from the U.S. census. It is included to give the reader a brief overview of the various communities in Oakland County.

Table A.2 contains a listing of the 709 houses that were used to perform the dual sales capitalization estimates. The dual sales were generated by manually matching lists of house sales in Oakland County. The unmatched house sales lists were produced by the Oakland County Equalization Office. Each house is identified by its sidwell, a unique identifier assigned to the house by municipal authorities. Also included in this list are the city, town, or village, in which the house is located, the school district the house is currently zoned for, the 1992 and 1996 sales price of the house, and the 1992 and 1996 state equalized value of the house.

The final table of this appendix, A.3, contains summary information on Oakland County's school districts. For each the school district in Oakland County, the school millage rate for the fiscal years 1991-92 through 1996-97 are included. Also included are the per-pupil revenues for each school district for fiscal years 1991-92 through 1995-96. Per pupil revenue data for 1996-97 are not yet available. Data on the Northville, Romeo, and Warren school districts are also included, although these districts lie primarily within

other counties. They are included because at least one of the dual sales houses was zoned

for each of these districts.

Table A.1 Oakland County Population and Housing Data

Town ID	Town Name	Median House Price (1990)	Percent Land Available	Housing Units (1990)	1990 Median Income (90 Dollars)	Pct Owner Occupied (1990)	Pop. (1990)	Median Year House Construction	% Chng Households 1990-96
A	Addison	$107,500	82.4%	1,711	$45,846	90.9%	4,785	1972	17.3%
02	Auburn Hills	$68,900	48.8%	7,069	$34,825	53.9%	17,076	1971	17.4%
04	Berkley	$65,100	9.0%	6,729	$36,693	85.2%	16,960	1947	1.0%
TH	Beverly Hills	$155,100	12.1%	4,166	$61,941	91.9%	10,610	1958	0.4%
TB	Bingham Farms	$272,000	28.9%	445	$107,506	98.8%	1,001	1982	3.1%
08	Birmingham	$156,000	13.3%	9,764	$57,573	73.8%	19,997	1952	3.4%
C	Bloomfield	$231,200	16.9%	16,558	$84,441	90.3%	42,473	1964	4.8%
12	Bloomfield Hills	$495,000	25.9%	1,645	$150,001	89.7%	4,288	1966	4.2%
D	Brandon	$94,700	75.5%	3,694	$46,166	94.2%	10,799	1974	16.4%
JC	Clarkston	$132,400	16.8%	448	$43,333	65.4%	1,005	1947	2.0%
16	Clawson	$72,300	3.2%	5,647	$36,532	73.6%	13,874	1957	1.4%
E	Commerce	$100,500	65.6%	8,135	$49,389	92.8%	22,156	1972	22.9%
20	Farmington	$107,300	10.1%	4,898	$41,040	63.5%	10,170	1964	1.2%
22	Farmington Hills	$145,900	22.6%	3,171	$51,986	65.6%	74,614	1974	9.1%
24	Ferndale	$38,400	6.1%	10,207	$28,964	68.1%	25,084	1944	0.4%
TF	Franklin Village	$233,200	11.8%	1,010	$91,423	97.1%	2,626	1957	3.2%
G	Groveland	$104,300	83.5%	1,576	$48,288	91.9%	4,705	1975	28.9%
28	Hazel Park	$36,100	11.5%	7,779	$26,615	70.9%	20,051	1952	3.2%
H	Highland	$93,100	74.7%	6,271	$42,157	92.3%	17,941	1973	11.5%
I	Holly	$61,200	85.3%	1,175	$46,462	87.6%	3,257	1965	12.6%
32	Huntington Woods	$116,100	25.1%	2,411	$61,057	98.3%	6,419	1950	0.4%
J	Independence	$106,500	63.0%	8,298	$53,784	87.5%	23,717	1971	28.7%
36	Keego Harbor	$56,200	10.6%	1,334	$30,417	55.7%	2,932	1954	0.3%
38	Lake Angelus	$377,600	50.3%	138	$80,930	90.2%	328	1955	3.9%

Table A.1 Oakland County Population and Housing Data

Town ID	Town Name	Median House Price (1990)	Percent Land Available	Housing Units (1990)	1990 Median Income (90 Dollars)	Pct Owner Occupied (1990)	Pop. (1990)	Median Year House Construction	% Chng Households 1990-96
OL	Lake Orion	$80,700	18.3%	1,355	$38,750	59.0%	3,057	1942	1.8%
40	Lathrup Village	$99,800	5.4%	1,619	$59,072	94.9%	4,329	1956	1.4%
AL	Leonard	$59,500	76.2%	122	$37,045	88.4%	357	1939	16.4%
K	Lyon	$113,700	74.3%	3,471	$41,056	82.4%	8,828	1975	17.1%
44	Madison Heights	$59,800	11.7%	13,220	$31,757	69.5%	32,196	1959	2.1%
L	Milford	$105,600	70.9%	2,298	$55,763	96.7%	6,624	1976	25.3%
48	Northville	$132,500	6.1%	1,267	$62,435	89.9%	3,367	1972	4.6%
50	Novi	$127,900	60.0%	13,557	$47,518	73.0%	33,148	1978	32.6%
52	Oak Park	$48,000	4.5%	11,344	$36,090	73.8%	30,468	1955	0.3%
N	Oakland	$156,200	59.7%	2,823	$63,881	96.4%	8,227	1973	35.3%
56	Orchard Lake	$376,100	29.2%	760	$106,234	94.1%	2,286	1969	3.5%
O	Orion	$90,200	58.5%	7,654	$46,902	83.5%	21,019	1972	29.5%
DO	Ortonville	$74,800	42.2%	478	$33,229	68.1%	1,252	1964	21.2%
P	Oxford	$88,400	73.6%	3,184	$42,676	88.2%	9,004	1972	24.0%
60	Pleasant Ridge	$93,100	6.1%	1,085	$54,658	93.5%	2,775	1939	0.5%
64	Pontiac	$36,300	27.2%	26,593	$21,962	49.7%	71,136	1954	1.2%
68	Rochester	$92,200	56.0%	3,680	$35,926	48.7%	7,130	1962	7.2%
70	Rochester Hills	$137,900	35.5%	23,535	$54,996	77.7%	61,766	1978	9.8%
R	Rose	$85,200	86.4%	1,770	$45,616	92.6%	4,926	1971	21.9%
72	Royal Oak	$75,600	12.7%	29,163	$36,835	70.0%	65,410	1953	1.4%
80	South Lyon	$83,400	43.9%	2,485	$33,095	74.2%	6,479	1975	27.9%
76	Southfield	$85,145	17.7%	35,061	$40,587	53.9%	75,745	1973	2.3%
U	Springfield	$99,900	76.1%	3,459	$48,630	89.0%	9,927	1973	31.1%
84	Sylvan Lake	$94,100	6.8%	853	$44,464	86.0%	1,914	1954	1.2%

Table A.1 Oakland County Population and Housing Data

Town ID	Town Name	Median House Price (1990)	Percent Land Available	Housing Units (1990)	1990 Median Income (90 Dollars)	Pct Owner Occupied (1990)	Pop. (1990)	Median Year House Construction	% Chng Households 1990-96
88	Troy	$128,900	26.5%	27,197	$55,407	74.7%	72,884	1972	9.9%
IH	Village of Holly	$54,800	38.5%	2,158	$28,995	74.6%	5,595	1962	6.2%
LM	Village of Milford	$84,000	34.8%	2,108	$37,323	66.3%	5,500	1958	20.6%
PO	Village of Oxford	$76,100	33.1%	1,192	$37,639	58.6%	2,929	1946	10.8%
92	Walled Lake	$72,800	35.0%	2,884	$35,433	66.0%	6,278	1973	7.1%
W	Waterford	$76,400	30.2%	26,509	$39,463	73.1%	66,692	1963	8.0%
X	West Bloomfield	$164,000	36.1%	20,378	$68,654	85.5%	54,516	1975	12.2%
Y	White Lake	$97,000	70.9%	8,267	$42,549	89.1%	22,677	1970	21.8%
96	Wixom	$99,100	65.8%	4,475	$31,755	34.2%	8,550	1977	26.7%
EW	Wolverine Lake	$88,700	17.9%	1,712	$42,167	87.2%	4,727	1964	3.1%

Source: 1990 U.S. Census and Southeast Michigan Council of Governments

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
05-22-251-024	A	Addison	Oxford	$95,000	$51,000	$134,900	$58,580
05-35-200-002	A	Addison	Romeo	$110,000	$59,700	$165,000	$61,350
05-36-300-006	A	Addison	Romeo	$80,000	$25,300	$80,000	$47,720
14-05-326-011	2	Auburn Hills	Pontiac	$65,000	$19,800	$78,000	$28,380
14-11-452-047	2	Auburn Hills	Pontiac	$54,000	$24,100	$85,000	$30,990
14-14-205-003	2	Auburn Hills	Pontiac	$69,800	$34,300	$88,000	$37,030
14-14-253-023	2	Auburn Hills	Pontiac	$69,900	$22,000	$98,000	$28,280
14-35-305-002	2	Auburn Hills	Avondale	$81,000	$37,950	$125,000	$46,100
14-35-326-009	2	Auburn Hills	Avondale	$87,000	$37,950	$110,250	$45,070
14-35-326-037	2	Auburn Hills	Avondale	$77,000	$31,350	$113,000	$39,710
14-35-376-007	2	Auburn Hills	Avondale	$82,900	$34,700	$125,500	$41,130
14-35-453-036	2	Auburn Hills	Avondale	$90,000	$38,000	$125,000	$48,640
14-36-427-015	2	Auburn Hills	Avondale	$55,226	$23,100	$68,000	$32,300
25-07-356-008	4	Berkley	Berkley	$33,000	$23,600	$64,500	$31,330
25-07-405-015	4	Berkley	Berkley	$89,000	$30,500	$103,000	$38,180
25-07-410-026	4	Berkley	Berkley	$85,000	$49,300	$137,000	$56,700
25-07-432-028	4	Berkley	Berkley	$131,000	$53,800	$179,900	$73,870
25-07-476-017	4	Berkley	Berkley	$112,000	$50,300	$159,000	$63,730
25-16-353-027	4	Berkley	Royal Oak	$82,500	$27,800	$114,900	$33,230
25-17-106-019	4	Berkley	Berkley	$71,500	$23,900	$110,750	$30,450
25-17-258-025	4	Berkley	Berkley	$87,875	$34,800	$121,000	$44,400
25-17-302-006	4	Berkley	Berkley	$44,000	$19,500	$58,200	$22,000
25-17-303-008	4	Berkley	Berkley	$89,000	$33,300	$140,000	$44,670
25-17-354-017	4	Berkley	Berkley	$58,400	$29,100	$87,000	$38,940
25-17-403-016	4	Berkley	Berkley	$79,000	$27,100	$105,100	$32,990
25-17-408-075	4	Berkley	Berkley	$95,000	$25,300	$119,000	$34,670
25-17-432-026	4	Berkley	Berkley	$96,500	$33,900	$121,000	$43,940
25-17-452-032	4	Berkley	Berkley	$78,000	$39,800	$131,000	$53,900
25-17-456-002	4	Berkley	Berkley	$73,000	$31,000	$95,000	$43,630
25-18-101-027	4	Berkley	Berkley	$62,000	$26,400	$80,000	$34,350
25-18-103-020	4	Berkley	Berkley	$68,400	$26,900	$106,000	$36,060
25-18-106-002	4	Berkley	Berkley	$64,000	$28,000	$100,000	$36,690
25-18-152-005	4	Berkley	Berkley	$69,500	$28,100	$90,000	$33,900
25-18-176-007	4	Berkley	Berkley	$72,500	$30,700	$85,000	$38,530
25-18-202-013	4	Berkley	Berkley	$51,000	$22,100	$84,000	$27,630
25-18-252-023	4	Berkley	Berkley	$75,000	$33,400	$104,900	$45,960
25-18-278-002	4	Berkley	Berkley	$73,900	$28,000	$119,900	$38,870
25-18-303-012	4	Berkley	Berkley	$67,500	$30,900	$93,000	$38,170
25-18-307-032	4	Berkley	Berkley	$81,000	$31,200	$119,000	$39,500
25-18-478-001	4	Berkley	Berkley	$81,000	$41,100	$115,000	$44,150
24-01-283-007	TH	Berverly Hills	Birmingham	$117,500	$43,600	$126,500	$54,890
24-01-151-002	TH	Beverly Hills	Birmingham	$124,000	$65,400	$155,900	$69,320
24-01-228-015	TH	Beverly Hills	Birmingham	$91,600	$40,800	$124,900	$44,530
24-01-228-024	TH	Beverly Hills	Birmingham	$123,000	$60,700	$164,000	$67,200
24-01-254-026	TH	Beverly Hills	Birmingham	$128,000	$65,400	$161,000	$78,730
24-01-282-004	TH	Beverly Hills	Birmingham	$140,000	$67,600	$212,000	$84,830
24-01-433-001	TH	Beverly Hills	Birmingham	$177,000	$76,500	$190,000	$83,980
24-01-456-002	TH	Beverly Hills	Birmingham	$125,900	$66,800	$150,000	$59,400
24-02-151-010	TH	Beverly Hills	Birmingham	$257,500	$101,100	$315,000	$123,100
24-02-378-021	TH	Beverly Hills	Birmingham	$165,000	$70,200	$217,500	$86,990
24-09-203-005	TH	Beverly Hills	Birmingham	$194,500	$84,600	$217,500	$102,550
19-25-151-035	8	Birmingham	Birmingham	$165,000	$80,500	$180,765	$84,870
19-25-428-008	8	Birmingham	Birmingham	$270,000	$170,100	$300,000	$207,010
19-25-452-008	8	Birmingham	Birmingham	$190,500	$85,300	$233,000	$87,410
19-25-476-004	8	Birmingham	Birmingham	$169,000	$88,200	$249,000	$99,220
19-26-328-017	8	Birmingham	Birmingham	$250,000	$134,700	$305,700	$135,380

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
19-35-277-036	8	Birmingham	Birmingham	$175,000	$89,300	$235,000	$113,100
19-35-327-035	8	Birmingham	Birmingham	$179,000	$82,700	$230,000	$70,630
19-36-229-016	8	Birmingham	Birmingham	$151,000	$60,200	$150,000	$69,620
19-36-256-009	8	Birmingham	Birmingham	$153,000	$74,300	$182,100	$63,780
19-36-278-001	8	Birmingham	Birmingham	$153,000	$79,700	$257,000	$75,580
19-36-326-029	8	Birmingham	Birmingham	$135,000	$60,600	$164,000	$74,430
19-36-329-016	8	Birmingham	Birmingham	$175,000	$80,200	$212,500	$86,410
19-36-330-012	8	Birmingham	Birmingham	$150,000	$67,400	$180,000	$80,060
19-36-401-043	8	Birmingham	Birmingham	$148,500	$64,300	$223,500	$71,740
19-36-402-022	8	Birmingham	Birmingham	$173,500	$77,800	$207,000	$71,580
19-36-429-039	8	Birmingham	Birmingham	$83,000	$42,400	$101,500	$45,190
19-36-430-045	8	Birmingham	Birmingham	$95,000	$48,400	$157,250	$60,170
19-36-451-023	8	Birmingham	Birmingham	$119,000	$50,000	$132,575	$63,370
19-36-482-030	8	Birmingham	Birmingham	$60,000	$33,300	$91,000	$39,280
20-30-355-004	8	Birmingham	Birmingham	$267,000	$113,700	$350,000	$114,960
20-30-426-011	8	Birmingham	Birmingham	$129,000	$57,800	$170,000	$69,310
20-30-427-027	8	Birmingham	Birmingham	$126,000	$61,200	$178,000	$74,440
20-31-101-027	8	Birmingham	Birmingham	$140,000	$61,300	$280,000	$76,660
20-31-177-030	8	Birmingham	Birmingham	$85,000	$31,700	$108,000	$43,680
20-31-179-032	8	Birmingham	Birmingham	$102,500	$40,000	$106,500	$53,820
20-31-351-006	8	Birmingham	Birmingham	$93,000	$32,700	$117,000	$41,930
20-31-403-012	8	Birmingham	Birmingham	$105,000	$49,300	$133,000	$60,000
20-31-453-039	8	Birmingham	Birmingham	$112,000	$43,600	$132,500	$60,510
19-01-102-024	C	Bloomfield	Avondale	$235,000	$20,900	$320,000	$123,250
19-03-327-005	C	Bloomfield	Bloom. Hills	$73,500	$32,900	$122,200	$38,240
19-13-177-016	C	Bloomfield	Bloom. Hills	$226,000	$100,600	$295,000	$121,530
19-17-351-013	C	Bloomfield	Bloom. Hills	$158,000	$80,500	$236,000	$92,740
19-19-252-009	C	Bloomfield	Birmingham	$226,000	$104,600	$250,000	$113,370
19-19-427-033	C	Bloomfield	Bloom. Hills	$383,000	$164,900	$540,000	$192,390
19-26-353-008	C	Bloomfield	Bloom. Hills	$220,000	$106,700	$375,000	$131,540
19-27-429-009	C	Bloomfield	Bloom. Hills	$312,000	$148,100	$425,000	$188,040
19-29-101-005	C	Bloomfield	Bloom. Hills	$160,000	$76,100	$165,000	$86,640
19-29-227-003	C	Bloomfield	Bloom. Hills	$182,000	$77,000	$183,000	$94,120
19-30-126-023	C	Bloomfield	Birmingham	$190,000	$84,500	$265,000	$94,410
19-34-103-026	C	Bloomfield	Birmingham	$195,000	$81,800	$241,000	$92,480
19-34-402-009	C	Bloomfield	Birmingham	$200,000	$74,700	$257,500	$93,810
19-01-104-003	C	Bloomfield Twp	Avondale	$246,625	$74,400	$360,000	$142,030
19-18-428-016	C	Bloomfield Twp	Bloom. Hills	$255,000	$99,200	$267,000	$112,790
19-19-352-001	C	Bloomfield Twp	Birmingham	$115,000	$31,000	$131,500	$86,160
19-29-227-026	C	Bloomfield Twp	Bloom. Hills	$244,000	$91,700	$250,000	$112,640
19-31-477-019	C	Bloomfield Twp	Bloom. Hills	$395,000	$153,200	$460,000	$169,550
19-32-203-015	C	Bloomfield Twp	Bloom. Hills	$180,000	$76,100	$210,000	$85,570
03-08-476-015	D	Brandon Twp	Brandon	$96,500	$41,400	$125,000	$52,000
03-14-151-004	D	Brandon Twp	Brandon	$154,000	$58,900	$225,000	$78,400
03-19-278-003	D	Brandon Twp	Brandon	$59,000	$23,500	$76,500	$29,000
03-29-200-034	D	Brandon Twp	Brandon	$150,000	$67,200	$187,000	$83,600
03-29-403-001	D	Brandon Twp	Brandon	$58,000	$20,200	$83,500	$28,800
03-35-103-001	D	Brandon Twp	Brandon	$94,500	$47,700	$90,000	$51,200
20-33-128-015	16	Clawson	Clawson	$84,000	$37,900	$107,900	$46,860
20-33-130-026	16	Clawson	Clawson	$85,000	$39,800	$115,000	$50,540
20-33-201-015	16	Clawson	Clawson	$95,000	$37,200	$126,000	$41,960
20-33-276-002	16	Clawson	Clawson	$87,000	$38,100	$105,000	$74,380
20-33-453-037	16	Clawson	Clawson	$68,750	$37,200	$90,000	$42,970
20-34-356-013	16	Clawson	Clawson	$62,000	$20,000	$70,000	$21,990
25-03-151-045	16	Clawson	Clawson	$80,000	$32,400	$110,000	$37,470
25-04-131-018	16	Clawson	Clawson	$79,000	$29,500	$119,000	$38,160

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
25-04-152-014	16	Clawson	Clawson	$65,000	$23,600	$81,000	$27,420
25-04-228-026	16	Clawson	Clawson	$79,000	$37,100	$100,000	$46,100
17-10-227-035	E	Commerce	Walled Lake	$140,000	$10,500	$175,500	$60,300
17-11-151-007	E	Commerce	Walled Lake	$82,900	$35,100	$95,000	$39,200
17-14-400-041	E	Commerce	Walled Lake	$105,000	$41,200	$137,500	$47,300
17-16-401-029	E	Commerce	Walled Lake	$128,250	$57,200	$162,000	$72,100
17-23-326-003	E	Commerce	Walled Lake	$68,500	$29,500	$102,900	$40,000
17-23-476-021	E	Commerce	Walled Lake	$125,000	$66,800	$165,000	$82,300
17-24-102-015	E	Commerce	Walled Lake	$123,000	$49,200	$145,000	$60,500
17-01-205-002	E	Commerce Twp	Walled Lake	$45,000	$14,900	$85,000	$27,900
17-06-200-032	E	Commerce Twp	Huron Valley	$129,000	$62,000	$160,000	$74,900
17-10-326-003	E	Commerce Twp	Walled Lake	$118,000	$46,300	$137,000	$65,000
17-12-151-030	E	Commerce Twp	Walled Lake	$135,000	$49,900	$160,000	$67,500
17-12-177-009	E	Commerce Twp	Walled Lake	$87,000	$37,000	$110,000	$50,600
17-16-252-020	E	Commerce Twp	Walled Lake	$112,000	$47,000	$133,000	$58,100
17-24-102-006	E	Commerce Twp	Walled Lake	$125,500	$48,800	$156,500	$62,600
17-26-277-016	E	Commerce Twp	Walled Lake	$89,900	$40,700	$131,000	$48,800
17-10-255-005	E	Commerce Twp.	Walled Lake	$88,500	$25,000	$100,000	$34,000
17-16-127-023	E	Commerce Twp.	Walled Lake	$254,913	$68,700	$385,000	$142,600
17-21-277-053	E	Commerce Twp.	Walled Lake	$115,000	$52,000	$139,900	$55,300
17-25-101-028	E	Commerce Twp.	Walled Lake	$58,000	$22,700	$75,000	$28,900
23-26-301-046	20	Farmington	Farmington	$89,500	$38,100	$117,000	$47,500
23-26-304-004	20	Farmington	Farmington	$74,500	$35,900	$105,200	$42,940
23-26-352-014	20	Farmington	Farmington	$81,000	$34,600	$98,000	$37,030
23-26-353-020	20	Farmington	Farmington	$73,000	$33,400	$112,000	$40,150
23-27-106-025	20	Farmington	Farmington	$99,900	$44,100	$140,000	$48,060
23-27-328-011	20	Farmington	Farmington	$120,000	$58,300	$148,000	$66,440
23-27-351-009	20	Farmington	Farmington	$92,000	$47,800	$102,000	$59,950
23-28-205-016	20	Farmington	Farmington	$149,000	$68,900	$180,000	$77,610
23-28-226-007	20	Farmington	Farmington	$130,000	$57,500	$161,000	$70,860
23-28-228-007	20	Farmington	Farmington	$91,500	$33,300	$115,500	$39,410
23-28-254-003	20	Farmington	Farmington	$169,900	$72,900	$189,900	$78,450
23-28-428-037	20	Farmington	Farmington	$145,000	$65,000	$165,000	$72,980
23-34-352-017	20	Farmington	Farmington	$117,000	$51,400	$142,000	$63,680
23-02-176-038	22	Farmington Hills	Farmington	$91,500	$38,100	$130,000	$45,510
23-03-202-022	22	Farmington Hills	Farmington	$176,100	$76,700	$184,500	$83,490
23-03-303-005	22	Farmington Hills	Farmington	$167,500	$80,100	$200,000	$84,880
23-03-402-032	22	Farmington Hills	Farmington	$143,500	$59,100	$190,550	$70,610
23-03-403-033	22	Farmington Hills	Farmington	$133,000	$62,000	$180,000	$73,780
23-04-128-004	22	Farmington Hills	Farmington	$198,000	$87,300	$222,000	$102,860
23-04-226-031	22	Farmington Hills	Farmington	$176,500	$82,300	$215,000	$88,940
23-04-406-007	22	Farmington Hills	Farmington	$133,000	$56,100	$169,000	$66,650
23-04-453-011	22	Farmington Hills	Farmington	$134,000	$56,200	$153,000	$65,260
23-06-431-012	22	Farmington Hills	Walled Lake	$203,000	$89,800	$231,000	$108,260
23-06-451-018	22	Farmington Hills	Walled Lake	$201,000	$90,400	$231,000	$111,160
23-06-451-026	22	Farmington Hills	Walled Lake	$208,500	$96,200	$238,500	$108,240
23-07-155-047	22	Farmington Hills	Farmington	$259,900	$120,700	$286,000	$137,270
23-07-276-007	22	Farmington Hills	Farmington	$315,900	$33,900	$465,000	$184,360
23-07-277-003	22	Farmington Hills	Farmington	$349,200	$27,500	$472,000	$190,360
23-07-351-004	22	Farmington Hills	Farmington	$354,900	$146,400	$385,000	$164,240
23-08-403-029	22	Farmington Hills	Farmington	$170,000	$75,000	$243,000	$89,160
23-08-430-017	22	Farmington Hills	Farmington	$143,000	$65,200	$185,000	$77,010
23-09-152-003	22	Farmington Hills	Farmington	$196,500	$87,800	$204,000	$102,460
23-09-227-009	22	Farmington Hills	Farmington	$197,500	$98,100	$261,000	$109,490
23-09-305-027	22	Farmington Hills	Farmington	$162,500	$77,000	$189,000	$86,410
23-09-351-021	22	Farmington Hills	Farmington	$150,000	$69,300	$176,000	$79,300

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
23-09-429-010	22	Farmington Hills	Farmington	$146,000	$60,500	$173,000	$71,520
23-10-226-021	22	Farmington Hills	Farmington	$138,000	$59,500	$165,000	$67,890
23-10-301-016	22	Farmington Hills	Farmington	$121,000	$55,900	$165,500	$68,300
23-10-329-002	22	Farmington Hills	Farmington	$131,000	$62,900	$172,000	$74,830
23-12-126-032	22	Farmington Hills	Farmington	$179,500	$81,600	$205,000	$94,710
23-13-179-002	22	Farmington Hills	Farmington	$87,000	$35,600	$104,500	$40,480
23-13-206-008	22	Farmington Hills	Farmington	$144,000	$71,800	$184,500	$85,080
23-14-378-012	22	Farmington Hills	Farmington	$114,000	$50,500	$135,000	$56,380
23-16-402-013	22	Farmington Hills	Farmington	$284,000	$85,000	$331,650	$97,120
23-23-378-013	22	Farmington Hills	Farmington	$94,500	$43,900	$123,000	$48,380
23-23-402-026	22	Farmington Hills	Farmington	$156,500	$70,800	$180,000	$88,780
23-23-428-011	22	Farmington Hills	Farmington	$78,000	$26,900	$80,000	$30,170
23-23-477-004	22	Farmington Hills	Farmington	$83,000	$30,900	$95,000	$31,910
23-24-227-006	22	Farmington Hills	Farmington	$149,000	$68,600	$166,000	$77,730
23-25-177-013	22	Farmington Hills	Farmington	$152,000	$76,000	$187,500	$95,000
23-26-252-003	22	Farmington Hills	Farmington	$107,500	$43,100	$139,900	$50,350
23-26-329-052	22	Farmington Hills	Farmington	$85,500	$32,800	$109,000	$37,680
23-26-427-009	22	Farmington Hills	Farmington	$98,000	$39,700	$134,900	$47,520
23-26-454-020	22	Farmington Hills	Farmington	$81,500	$37,800	$113,000	$45,630
23-33-279-050	22	Farmington Hills	Farmington	$85,000	$33,900	$107,500	$38,450
23-33-430-012	22	Farmington Hills	Farmington	$75,000	$25,500	$98,000	$27,680
23-35-230-002	22	Farmington Hills	Farmington	$60,000	$18,400	$79,900	$27,890
23-35-230-023	22	Farmington Hills	Farmington	$68,000	$24,500	$60,000	$35,850
23-36-156-012	22	Farmington Hills	Farmington	$70,000	$29,400	$102,500	$34,940
23-36-204-013	22	Farmington Hills	Farmington	$88,000	$37,700	$122,000	$43,370
25-26-152-028	24	Ferndale	Hazel Park	$39,900	$17,300	$67,000	$20,280
25-26-152-030	24	Ferndale	Hazel Park	$38,900	$17,200	$65,000	$19,380
25-26-351-018	24	Ferndale	Hazel Park	$41,000	$17,800	$56,000	$19,660
25-26-352-024	24	Ferndale	Hazel Park	$29,000	$15,300	$47,000	$16,840
25-27-202-044	24	Ferndale	Ferndale	$40,000	$13,000	$52,500	$18,130
25-27-283-016	24	Ferndale	Ferndale	$20,500	$14,400	$44,500	$17,620
25-27-328-050	24	Ferndale	Ferndale	$60,900	$19,700	$80,900	$24,830
25-27-329-019	24	Ferndale	Ferndale	$31,250	$19,600	$85,500	$25,240
25-27-404-025	24	Ferndale	Ferndale	$43,900	$18,600	$54,900	$20,830
25-27-454-004	24	Ferndale	Ferndale	$38,300	$17,600	$92,000	$20,530
25-28-452-014	24	Ferndale	Ferndale	$62,500	$25,500	$75,000	$34,450
25-33-127-041	24	Ferndale	Ferndale	$55,900	$20,800	$102,900	$28,990
25-33-128-026	24	Ferndale	Ferndale	$51,000	$18,800	$75,000	$23,750
25-33-202-027	24	Ferndale	Ferndale	$46,500	$20,500	$88,000	$32,660
25-33-277-001	24	Ferndale	Ferndale	$46,500	$18,900	$82,500	$22,700
25-34-108-046	24	Ferndale	Ferndale	$38,900	$17,400	$38,900	$23,980
25-34-132-023	24	Ferndale	Ferndale	$47,000	$20,300	$99,999	$30,130
25-34-328-008	24	Ferndale	Ferndale	$33,000	$19,500	$72,000	$27,460
25-34-353-043	24	Ferndale	Ferndale	$41,500	$20,200	$65,000	$26,930
25-35-306-063	24	Ferndale	Ferndale	$35,000	$18,100	$35,000	$23,000
25-35-451-018	24	Ferndale	Hazel Park	$25,800	$12,800	$36,900	$14,620
02-10-200-017	G	Groveland	Brandon	$180,000	$82,700	$262,000	$93,920
02-24-226-004	G	Groveland	Brandon	$147,000	$76,900	$164,000	$77,310
02-24-201-006	G	Groveland Twp	Brandon	$83,000	$31,600	$129,900	$41,180
25-25-129-003	28	Hazel Park	Hazel Park	$52,000	$23,500	$61,700	$29,650
25-25-303-016	28	Hazel Park	Hazel Park	$38,000	$13,400	$49,900	$16,960
25-25-330-022	28	Hazel Park	Hazel Park	$46,900	$18,800	$58,000	$25,310
25-25-379-010	28	Hazel Park	Hazel Park	$41,500	$13,800	$58,000	$19,080
25-26-204-024	28	Hazel Park	Hazel Park	$58,000	$19,600	$77,250	$25,290
25-26-285-018	28	Hazel Park	Hazel Park	$35,900	$14,000	$55,300	$16,290
25-35-283-003	28	Hazel Park	Hazel Park	$38,800	$13,800	$55,000	$15,790

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
25-35-427-036	28	Hazel Park	Hazel Park	$25,000	$13,100	$40,000	$15,790
25-35-427-038	28	Hazel Park	Hazel Park	$15,000	$11,000	$29,000	$15,650
25-35-428-042	28	Hazel Park	Hazel Park	$45,000	$19,000	$62,000	$23,630
25-35-430-005	28	Hazel Park	Hazel Park	$19,500	$11,900	$33,001	$15,860
25-35-476-038	28	Hazel Park	Hazel Park	$26,000	$10,100	$26,000	$12,770
25-36-132-035	28	Hazel Park	Hazel Park	$38,500	$14,200	$48,000	$17,680
25-36-254-014	28	Hazel Park	Hazel Park	$20,000	$13,400	$38,500	$14,840 .
25-36-329-018	28	Hazel Park	Hazel Park	$31,900	$13,600	$39,000	$16,470
25-36-335-006	28	Hazel Park	Hazel Park	$39,500	$15,300	$51,900	$20,380
25-36-452-025	28	Hazel Park	Hazel Park	$26,000	$12,600	$32,200	$14,330
25-36-456-027	28	Hazel Park	Hazel Park	$37,500	$16,600	$42,000	$20,100
11-02-251-013	H	Highland	Huron Valley	$144,000	$13,500	$190,000	$82,030
11-12-132-039	H	Highland	Huron Valley	$73,900	$26,900	$102,000	$36,520
11-11-304-017	H	Highland Twp	Huron Valley	$123,000	$48,400	$141,800	$61,770
11-11-379-003	H	Highland Twp	Huron Valley	$98,000	$43,600	$129,900	$58,620
11-12-302-045	H	Highland Twp	Huron Valley	$71,000	$29,400	$90,000	$32,420
11-09-428-011	H	Highland Twp.	Huron Valley	$53,000	$22,000	$75,000	$25,080
11-12-201-007	H	Highland Twp.	Huron Valley	$62,000	$26,700	$89,900	$32,440
11-12-476-020	H	Highland Twp.	Huron Valley	$79,000	$38,700	$93,425	$39,090
01-27-477-015	I	Holly Twp	Holly	$77,000	$44,000	$110,000	$45,600
01-32-276-010	I	Holly Twp	Holly	$87,500	$47,500	$89,500	$56,100
01-33-276-011	IH	Holly Village	Holly	$51,900	$16,200	$51,900	$28,200
25-20-227-016	32	Huntington Woods	Berkley	$115,000	$42,400	$155,000	$55,120
25-20-229-012	32	Huntington Woods	Berkley	$82,000	$43,200	$172,500	$61,140
25-20-303-002	32	Huntington Woods	Berkley	$96,000	$47,300	$152,900	$57,880
25-21-106-019	32	Huntington Woods	Berkley	$172,000	$78,100	$215,000	$81,250
08-14-476-019	J	Independence	Clarkston	$115,000	$45,900	$160,000	$72,900
08-21-178-006	J	Independence	Clarkston	$121,800	$57,200	$162,500	$60,500
08-22-351-037	J	Independence	Clarkston	$122,000	$47,400	$145,000	$50,300
08-23-101-001	J	Independence	Clarkston	$110,000	$44,300	$123,000	$51,000
08-28-154-007	J	Independence	Clarkston	$92,900	$42,100	$118,500	$55,500
08-32-403-003	J	Independence	Waterford	$120,500	$53,900	$140,000	$57,000
08-34-402-021	J	Independence	Clarkston	$81,500	$38,700	$118,500	$43,100
08-01-354-012	J	Independence Twp	Clarkston	$33,000	$21,300	$41,904	$23,000
08-12-328-043	J	Independence Twp	Clarkston	$77,900	$26,300	$109,900	$37,300
08-17-230-008	J	Independence Twp	Clarkston	$315,000	$127,100	$330,000	$148,300
08-18-178-003	J	Independence Twp	Clarkston	$128,900	$73,100	$168,000	$66,700
08-22-351-039	J	Independence Twp	Clarkston	$112,000	$47,400	$133,000	$55,200
08-26-301-012	J	Independence Twp	Clarkston	$75,000	$27,100	$102,900	$35,500
08-26-353-006	J	Independence Twp	Clarkston	$72,900	$24,500	$92,500	$32,500
08-28-153-012	J	Independence Twp	Clarkston	$112,000	$37,700	$119,700	$60,600
08-31-201-006	J	Independence Twp	Clarkston	$59,700	$30,200	$90,000	$32,800
08-34-252-003	J	Independence Twp	Clarkston	$115,500	$52,500	$140,900	$57,500
08-34-327-011	J	Independence Twp	Clarkston	$75,900	$31,300	$99,000	$35,900
08-34-329-004	J	Independence Twp	Clarkston	$60,000	$28,200	$75,000	$33,300
08-34-403-033	J	Independence Twp	Clarkston	$59,000	$28,400	$93,000	$31,300
09-02-457-008	OL	Lake Orion	Lake Orion	$33,500	$12,500	$38,500	$14,200
24-13-106-007	40	Lathrup Village	Southfield	$112,000	$44,600	$160,000	$54,050
24-14-276-012	40	Lathrup Village	Southfield	$112,500	$44,800	$139,000	$56,400
24-23-280-042	40	Lathrup Village	Southfield	$94,500	$43,500	$137,000	$55,460
25-14-255-009	40	Lathrup Village	Southfield	$135,900	$63,300	$189,890	$83,510
21-03-276-009	K	Lyon	South Lyon	$136,000	$66,500	$185,000	$83,830
21-05-300-063	K	Lyon Twp	South Lyon	$111,000	$49,100	$154,000	$59,240
25-12-453-013	44	Madison Heights	Lamphere	$60,000	$33,900	$90,000	$38,300
25-13-304-024	44	Madison Heights	Madison	$79,500	$33,900	$101,000	$43,320
25-13-354-024	44	Madison Heights	Madison	$48,000	$18,100	$59,700	$22,290

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
25-13-359-004	44	Madison Heights	Madison	$31,000	$18,600	$56,000	$23,890
25-14-230-034	44	Madison Heights	Lamphere	$78,500	$36,700	$95,500	$42,020
25-14-385-017	44	Madison Heights	Royal Oak	$36,000	$17,300	$61,000	$19,750
25-23-205-026	44	Madison Heights	Madison	$55,000	$19,500	$73,000	$26,350
25-23-429-009	44	Madison Heights	Madison	$45,000	$21,900	$63,000	$25,130
25-24-304-011	44	Madison Heights	Madison	$37,500	$25,100	$48,000	$18,650
25-11-232-028	44	Madison Hgts	Lamphere	$43,000	$18,600	$43,000	$24,440
25-12-177-014	44	Madison Hgts	Lamphere	$80,000	$40,300	$123,500	$48,620
25-12-426-008	44	Madison Hgts	Lamphere	$60,000	$24,700	$88,000	$30,880
25-12-430-030	44	Madison Hgts	Lamphere	$83,000	$35,800	$104,500	$39,540
25-13-177-015	44	Madison Hgts	Lamphere	$75,000	$31,700	$98,000	$39,540
25-13-254-006	44	Madison Hgts	Lamphere	$84,500	$32,700	$105,000	$36,960
25-13-279-027	44	Madison Hgts	Madison	$84,000	$35,200	$96,000	$39,420
25-13-303-035	44	Madison Hgts	Madison	$74,000	$36,300	$96,500	$38,850
25-13-451-029	44	Madison Hgts	Madison	$27,000	$14,900	$55,000	$20,800
25-23-253-005	44	Madison Hgts	Madison	$37,000	$17,000	$61,000	$20,040
25-23-427-029	44	Madison Hgts	Madison	$59,000	$23,000	$67,000	$29,790
25-24-128-031	44	Madison Hgts	Madison	$57,900	$21,900	$74,900	$26,640
25-24-132-014	44	Madison Hgts	Madison	$61,500	$19,600	$79,300	$25,340
25-24-456-018	44	Madison Hgts	Madison	$51,500	$19,600	$52,000	$23,410
16-01-100-039	L	Milford Twp	Huron Valley	$142,000	$88,100	$193,010	$109,060
16-02-376-020	LM	Milford Village	Huron Valley	$72,000	$33,100	$106,900	$40,500
16-02-377-039	LM	Milford Village	Huron Valley	$76,301	$31,200	$95,000	$43,230
16-10-429-003	LM	Milford Village	Huron Valley	$78,000	$27,400	$95,000	$34,870
16-10-476-019	LM	Milford Village	Huron Valley	$73,450	$29,900	$124,000	$35,120
16-11-178-011	LM	Milford Village	Huron Valley	$131,000	$38,600	$175,000	$50,430
16-14-201-026	LM	Milford Village	Huron Valley	$75,100	$36,700	$99,000	$43,170
22-33-402-016	48	Northville	Northville	$320,000	$130,300	$330,000	$154,550
22-21-427-034	50	Novi	Novi	$194,000	$72,000	$260,000	$87,250
22-21-451-038	50	Novi	Novi	$147,000	$60,800	$173,000	$74,450
22-22-203-023	50	Novi	Novi	$62,700	$41,800	$126,000	$52,150
22-23-454-008	50	Novi	Novi	$133,750	$56,900	$154,900	$66,350
22-24-376-005	50	Novi	Novi	$110,000	$50,600	$145,000	$57,350
22-25-105-009	50	Novi	Novi	$108,500	$42,200	$127,000	$52,600
22-25-203-002	50	Novi	Novi	$129,000	$61,250	$158,900	$71,400
22-26-226-002	50	Novi	Novi	$113,500	$46,200	$127,900	$52,800
22-27-201-012	50	Novi	Novi	$193,500	$88,050	$254,000	$97,150
22-27-303-001	50	Novi	Northville	$195,500	$94,400	$227,000	$112,350
22-34-154-022	50	Novi	Northville	$158,000	$63,600	$164,000	$75,350
22-34-176-001	50	Novi	Northville	$145,000	$61,700	$180,000	$70,000
22-34-176-023	50	Novi	Northville	$185,000	$82,100	$225,000	$95,900
22-36-127-011	50	Novi	Novi	$144,000	$62,000	$177,900	$72,750
25-19-178-026	52	Oak Park	Berkley	$94,000	$37,600	$140,000	$50,500
25-19-205-001	52	Oak Park	Berkley	$86,500	$36,300	$98,600	$43,500
25-19-327-011	52	Oak Park	Berkley	$82,000	$39,300	$131,500	$51,000
25-19-455-010	52	Oak Park	Berkley	$76,500	$32,400	$89,900	$50,200
25-28-151-019	52	Oak Park	Ferndale	$67,000	$24,000	$93,000	$32,400
25-29-326-003	52	Oak Park	Oak Park	$33,500	$20,200	$40,000	$22,700
25-29-406-001	52	Oak Park	Ferndale	$35,000	$16,800	$68,500	$22,300
25-29-430-028	52	Oak Park	Ferndale	$48,000	$20,000	$67,000	$25,700
25-29-453-007	52	Oak Park	Ferndale	$46,000	$15,900	$71,000	$20,500
25-30-208-015	52	Oak Park	Oak Park	$37,900	$13,200	$56,099	$17,600
25-30-332-037	52	Oak Park	Oak Park	$62,500	$29,300	$62,500	$36,800
25-30-335-011	52	Oak Park	Oak Park	$35,000	$21,000	$79,900	$28,500
25-31-201-015	52	Oak Park	Oak Park	$57,900	$18,300	$74,900	$27,300
25-31-203-014	52	Oak Park	Oak Park	$45,500	$20,500	$79,000	$28,900

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
25-31-276-019	52	Oak Park	Oak Park	$40,000	$22,000	$85,000	$31,100
25-31-476-014	52	Oak Park	Oak Park	$52,900	$18,100	$66,000	$26,500
25-32-203-032	52	Oak Park	Oak Park	$30,500	$12,100	$43,000	$14,500
10-02-158-014	N	Oakland Twp	Romeo	$45,000	$20,700	$81,200	$23,580
10-02-159-020	N	Oakland Twp	Romeo	$116,000	$47,100	$135,000	$56,870
10-24-101-006	N	Oakland Twp	Rochester	$119,000	$50,100	$158,500	$55,130
10-27-177-007	N	Oakland Twp	Rochester	$247,888	$82,300	$324,900	$130,620
10-34-128-011	N	Oakland Twp	Rochester	$375,000	$153,600	$429,000	$176,030
10-34-228-014	N	Oakland Twp	Rochester	$96,000	$48,700	$146,000	$52,890
09-01-477-047	O	Orion	Lake Orion	$65,000	$29,400	$92,000	$34,100
09-10-429-032	O	Orion	Lake Orion	$60,000	$24,300	$118,500	$30,600
09-10-429-039	O	Orion	Lake Orion	$63,000	$23,300	$107,900	$25,800
09-11-316-018	O	Orion	Lake Orion	$80,500	$32,600	$166,000	$43,900
09-21-3583-011	O	Orion	Lake Orion	$143,000	$65,000	$174,000	$71,800
09-30-377-007	O	Orion	Lake Orion	$104,000	$42,400	$128,900	$51,900
09-06-201-005	O	Orion Twp	Lake Orion	$105,000	$52,900	$151,000	$55,000
09-16-276-006	O	Orion Twp	Lake Orion	$84,950	$11,100	$107,500	$44,800
09-21-352-006	O	Orion Twp	Lake Orion	$130,000	$56,400	$145,000	$60,600
09-21-358-026	O	Orion Twp	Lake Orion	$160,000	$67,000	$193,500	$79,300
09-26-403-030	O	Orion Twp	Lake Orion	$160,000	$96,000	$175,000	$97,800
09-26-429-013	O	Orion Twp	Lake Orion	$145,900	$64,900	$164,000	$66,800
09-28-376-001	O	Orion Twp	Lake Orion	$68,500	$23,400	$92,900	$26,400
09-29-255-022	O	Orion Twp	Lake Orion	$96,900	$41,000	$123,000	$44,800
04-28-204-016	P	Oxford	Oxford	$70,000	$44,000	$129,000	$50,530
04-05-276-034	P	Oxford Twp	Oxford	$130,000	$64,300	$149,900	$74,010
04-28-355-034	P	Oxford Twp	Oxford	$61,900	$35,300	$89,900	$42,630
04-30-301-002	P	Oxford Twp	Oxford	$111,000	$42,900	$129,000	$53,400
04-22-378-006	PO	Oxford Village	Oxford	$68,000	$36,100	$100,000	$40,980
04-26-227-015	PO	Oxford Village	Oxford	$140,000	$76,600	$167,500	$76,000
25-28-251-004	60	Pleasant Ridge	Ferndale	$90,000	$41,400	$191,500	$53,370
14-07-453-004	64	Pontiac	Pontiac	$69,800	$28,100	$94,500	$36,020
14-16-403-012	64	Pontiac	Pontiac	$36,000	$19,500	$63,000	$23,940
14-17-129-003	64	Pontiac	Pontiac	$48,900	$18,200	$55,650	$21,110
14-17-351-010	64	Pontiac	Pontiac	$32,000	$15,900	$42,500	$20,440
14-17-408-006	64	Pontiac	Pontiac	$16,150	$11,000	$19,000	$12,790
14-19-208-009	64	Pontiac	Pontiac	$30,800	$15,100	$30,800	$17,970
14-19-429-007	64	Pontiac	Pontiac	$28,500	$7,100	$35,000	$8,420
14-20-331-009	64	Pontiac	Pontiac	$20,000	$14,200	$32,500	$14,750
14-21-207-009	64	Pontiac	Pontiac	$35,000	$10,300	$48,000	$13,250
14-21-251-014	64	Pontiac	Pontiac	$24,000	$11,600	$40,000	$14,690
14-30-328-024	64	Pontiac	Pontiac	$65,000	$22,300	$85,000	$28,310
14-31-208-006	64	Pontiac	Pontiac	$70,000	$26,000	$84,500	$33,080
14-31-227-005	64	Pontiac	Pontiac	$31,500	$21,800	$52,000	$29,850
15-11-160-004	68	Rochester	Rochester	$109,000	$48,100	$134,000	$65,150
15-11-377-007	68	Rochester	Rochester	$75,000	$32,700	$86,500	$33,740
15-15-128-010	68	Rochester	Rochester	$91,000	$30,100	$111,500	$39,480
15-15-129-014	68	Rochester	Rochester	$85,500	$41,600	$123,000	$52,400
15-15-253-007	68	Rochester	Rochester	$103,500	$29,200	$130,000	$39,120
15-15-276-004	68	Rochester	Rochester	$56,000	$23,900	$78,000	$29,720
15-02-301-003	70	Rochester Hills	Rochester	$288,000	$127,200	$332,000	$152,020
15-03-127-003	70	Rochester Hills	Rochester	$147,500	$58,400	$168,500	$68,430
15-04-329-014	70	Rochester Hills	Rochester	$146,000	$67,200	$184,900	$79,560
15-05-126-016	70	Rochester Hills	Rochester	$205,000	$104,600	$265,000	$114,800
15-05-202-016	70	Rochester Hills	Rochester	$209,000	$93,400	$272,000	$114,060
15-05-202-017	70	Rochester Hills	Rochester	$225,900	$101,700	$269,888	$115,310
15-05-203-038	70	Rochester Hills	Rochester	$230,650	$20,600	$278,000	$120,450

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
15-05-204-023	70	Rochester Hills	Rochester	$236,010	$20,600	$270,000	$124,320
15-05-232-008	70	Rochester Hills	Rochester	$184,450	$83,800	$223,500	$91,890
15-05-482-007	70	Rochester Hills	Rochester	$190,000	$94,900	$245,000	$109,990
15-06-151-044	70	Rochester Hills	Rochester	$420,000	$31,000	$450,500	$224,840
15-06-151-046	70	Rochester Hills	Rochester	$350,000	$72,700	$429,000	$184,080
15-06-152-002	70	Rochester Hills	Rochester	$370,000	$11,900	$402,500	$187,660
15-06-152-013	70	Rochester Hills	Rochester	$335,000	$69,700	· $405,000	$178,090
15-06-152-019	70	Rochester Hills	Rochester	$350,000	$33,500	$388,000	$167,790
15-06-179-011	70	Rochester Hills	Rochester	$304,000	$150,400	$337,500	$139,100
15-06-207-002	70	Rochester Hills	Rochester	$193,500	$96,600	$249,000	$105,900
15-06-254-001	70	Rochester Hills	Rochester	$216,000	$99,200	$254,000	$106,470
15-06-254-015	70	Rochester Hills	Rochester	$195,062	$95,900	$263,500	$103,940
15-06-301-003	70	Rochester Hills	Rochester	$244,000	$98,800	$265,000	$111,260
15-06-354-027	70	Rochester Hills	Rochester	$364,000	$89,800	$399,999	$175,690
15-07-376-018	70	Rochester Hills	Rochester	$209,000	$87,900	$235,000	$101,160
15-07-377-036	70	Rochester Hills	Rochester	$210,000	$83,000	$232,900	$97,640
15-08-329-012	70	Rochester Hills	Rochester	$168,000	$77,500	$205,000	$90,000
15-11-102-001	70	Rochester Hills	Rochester	$88,000	$22,800	$122,000	$38,220
15-14-326-012	70	Rochester Hills	Rochester	$152,900	$74,700	$185,888	$81,900
15-14-327-004	70	Rochester Hills	Rochester	$149,000	$61,300	$172,500	$66,980
15-14-352-001	70	Rochester Hills	Rochester	$111,500	$49,600	$147,000	$56,780
15-15-353-038	70	Rochester Hills	Rochester	$210,750	$98,500	$232,900	$101,480
15-16-303-037	70	Rochester Hills	Rochester	$112,000	$55,400	$136,000	$59,480
15-16-327-007	70	Rochester Hills	Rochester	$153,000	$73,900	$209,900	$82,830
15-17-128-021	70	Rochester Hills	Rochester	$125,000	$57,600	$174,600	$64,160
15-17-151-002	70	Rochester Hills	Rochester	$170,000	$84,700	$189,000	$94,830
15-17-452-004	70	Rochester Hills	Rochester	$137,900	$56,600	$153,900	$66,170
15-19-401-007	70	Rochester Hills	Rochester	$285,000	$136,000	$340,000	$145,190
15-22-329-009	70	Rochester Hills	Rochester	$115,000	$50,100	$140,000	$57,490
15-22-402-001	70	Rochester Hills	Rochester	$117,000	$52,100	$140,500	$57,110
15-22-427-009	70	Rochester Hills	Rochester	$113,500	$52,700	$139,000	$55,960
15-23-252-012	70	Rochester Hills	Rochester	$147,500	$19,500	$197,000	$86,000
15-23-254-003	70	Rochester Hills	Rochester	$179,500	$89,400	$233,000	$103,010
15-23-304-007	70	Rochester Hills	Rochester	$159,583	$12,800	$208,000	$89,950
15-25-252-002	70	Rochester Hills	Rochester	$170,000	$25,500	$235,000	$87,550
15-26-276-007	70	Rochester Hills	Rochester	$127,000	$53,600	$150,900	$62,300
15-28-402-095	70	Rochester Hills	Avondale	$88,000	$38,500	$115,000	$43,570
15-35-252-021	70	Rochester Hills	Rochester	$180,000	$72,100	$195,000	$79,280
15-35-352-060	70	Rochester Hills	Avondale	$112,000	$51,200	$138,000	$68,220
15-35-377-047	70	Rochester Hills	Avondale	$82,000	$34,400	$75,000	$43,480
15-35-476-007	70	Rochester Hills	Rochester	$72,900	$33,900	$106,500	$42,120
15-36-256-022	70	Rochester Hills	Rochester	$89,900	$7,300	$116,000	$50,170
06-16-427-003	R	Rose	Holly	$96,000	$50,000	$128,000	$51,900
25-03-253-022	72	Royal Oak	Royal Oak	$78,500	$25,100	$125,000	$37,320
25-03-326-020	72	Royal Oak	Royal Oak	$77,900	$28,800	$114,000	$39,860
25-03-352-017	72	Royal Oak	Royal Oak	$81,000	$37,300	$115,900	$45,880
25-03-405-034	72	Royal Oak	Royal Oak	$50,000	$25,500	$93,000	$31,190
25-03-477-042	72	Royal Oak	Royal Oak	$82,000	$36,000	$119,500	$43,600
25-04-402-022	72	Royal Oak	Royal Oak	$82,000	$38,600	$127,000	$45,190
25-04-402-023	72	Royal Oak	Royal Oak	$93,000	$37,200	$127,000	$48,880
25-04-404-006	72	Royal Oak	Royal Oak	$96,000	$37,200	$146,000	$46,980
25-05-453-012	72	Royal Oak	Royal Oak	$60,000	$27,500	$86,300	$34,240
25-05-454-016	72	Royal Oak	Royal Oak	$63,500	$24,900	$79,700	$29,950
25-06-102-005	72	Royal Oak	Royal Oak	$86,500	$40,900	$122,000	$53,890
25-06-204-003	72	Royal Oak	Royal Oak	$92,000	$43,500	$144,500	$56,810
25-06-206-008	72	Royal Oak	Royal Oak	$79,000	$32,500	$127,750	$41,240

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
25-06-230-022	72	Royal Oak	Royal Oak	$85,000	$35,400	$107,000	$45,590
25-06-254-015	72	Royal Oak	Royal Oak	$106,700	$45,900	$145,500	$58,080
25-06-327-024	72	Royal Oak	Royal Oak	$112,700	$61,300	$159,900	$65,100
25-06-431-031	72	Royal Oak	Royal Oak	$76,900	$32,500	$108,000	$43,050
25-06-433-013	72	Royal Oak	Royal Oak	$78,000	$28,500	$112,000	$39,190
25-07-104-009	72	Royal Oak	Royal Oak	$74,000	$31,700	$95,000	$32,940
25-08-181-021	72	Royal Oak	Royal Oak	$106,000	$31,700	$125,000	$38,010
25-08-401-011	72	Royal Oak	Royal Oak	$139,000	$51,000	$192,000	$71,080
25-08-427-004	72	Royal Oak	Royal Oak	$105,000	$47,800	$158,000	$62,560
25-08-433-013	72	Royal Oak	Royal Oak	$101,000	$50,900	$144,000	$61,790
25-08-484-023	72	Royal Oak	Royal Oak	$81,000	$39,000	$126,500	$49,720
25-09-352-003	72	Royal Oak	Royal Oak	$129,900	$39,700	$180,000	$57,400
25-09-408-015	72	Royal Oak	Royal Oak	$85,900	$38,700	$132,000	$48,830
25-09-478-009	72	Royal Oak	Royal Oak	$105,000	$31,600	$145,000	$45,540
25-10-103-010	72	Royal Oak	Royal Oak	$84,000	$36,200	$129,000	$42,140
25-10-105-002	72	Royal Oak	Royal Oak	$66,000	$29,500	$100,000	$38,970
25-10-129-030	72	Royal Oak	Royal Oak	$50,000	$20,400	$115,000	$33,340
25-10-129-081	72	Royal Oak	Royal Oak	$76,900	$30,400	$124,900	$42,580
25-10-208-019	72	Royal Oak	Royal Oak	$89,900	$40,800	$126,500	$44,710
25-10-477-037	72	Royal Oak	Royal Oak	$68,000	$26,100	$110,000	$35,240
25-14-377-013	72	Royal Oak	Royal Oak	$73,000	$31,800	$105,000	$38,850
25-15-103-022	72	Royal Oak	Royal Oak	$67,000	$28,100	$90,000	$36,900
25-15-103-041	72	Royal Oak	Royal Oak	$77,500	$27,300	$119,900	$34,020
25-15-126-039	72	Royal Oak	Royal Oak	$71,500	$24,800	$92,000	$30,600
25-15-205-021	72	Royal Oak	Royal Oak	$76,000	$32,900	$113,000	$47,300
25-15-209-007	72	Royal Oak	Royal Oak	$81,000	$36,900	$122,450	$44,410
25-15-209-022	72	Royal Oak	Royal Oak	$76,000	$32,700	$119,900	$40,260
25-15-303-007	72	Royal Oak	Royal Oak	$45,000	$28,400	$109,900	$35,410
25-15-327-003	72	Royal Oak	Royal Oak	$70,000	$26,100	$110,500	$32,560
25-15-376-014	72	Royal Oak	Royal Oak	$36,000	$27,300	$95,500	$35,460
25-15-376-017	72	Royal Oak	Royal Oak	$66,500	$21,800	$99,000	$36,790
25-15-453-010	72	Royal Oak	Royal Oak	$83,000	$26,900	$111,000	$37,130
25-15-476-007	72	Royal Oak	Royal Oak	$86,000	$27,900	$111,900	$39,610
25-15-476-021	72	Royal Oak	Royal Oak	$90,500	$33,900	$123,000	$46,920
25-16-252-015	72	Royal Oak	Royal Oak	$105,900	$39,000	$138,000	$50,320
25-16-379-030	72	Royal Oak	Royal Oak	$72,000	$32,200	$133,320	$47,960
25-21-253-012	72	Royal Oak	Royal Oak	$69,000	$27,500	$119,500	$45,840
25-22-182-017	72	Royal Oak	Royal Oak	$79,200	$31,400	$108,000	$46,230
25-22-227-002	72	Royal Oak	Royal Oak	$62,100	$26,000	$138,000	$32,290
25-22-458-018	72	Royal Oak	Royal Oak	$56,000	$22,500	$69,000	$32,950
25-23-159-035	72	Royal Oak	Royal Oak	$65,500	$32,000	$83,500	$39,380
25-23-177-002	72	Royal Oak	Royal Oak	$74,000	$26,900	$103,500	$40,740
25-23-304-026	72	Royal Oak	Royal Oak	$77,500	$28,100	$105,000	$37,250
25-23-309-021	72	Royal Oak	Royal Oak	$72,500	$27,300	$105,000	$34,770
21-19-451-010	80	South Lyon	South Lyon	$73,000	$33,500	$99,900	$39,840
21-20-452-001	80	South Lyon	South Lyon	$113,000	$51,600	$138,000	$63,440
24-10-404-004	76	Southfield	Southfield	$240,000	$113,450	$270,000	$135,570
24-11-204-003	76	Southfield	Birmingham	$118,900	$44,750	$140,000	$53,560
24-11-303-014	76	Southfield	Birmingham	$111,100	$41,700	$131,500	$49,460
24-11-304-019	76	Southfield	Southfield	$86,500	$38,750	$114,000	$46,820
24-11-330-005	76	Southfield	Southfield	$67,000	$33,900	$99,000	$39,650
24-11-332-022	76	Southfield	Southfield	$79,000	$37,050	$123,700	$49,760
24-11-333-017	76	Southfield	Southfield	$84,000	$33,100	$107,000	$47,210
24-11-352-040	76	Southfield	Southfield	$118,000	$47,200	$148,000	$59,920
24-11-477-021	76	Southfield	Southfield	$55,000	$19,850	$87,500	$24,090
24-11-479-003	76	Southfield	Southfield	$77,000	$33,700	$109,000	$44,630

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Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
24-12-233-004	76	Southfield	Birmingham	$79,000	$37,050	$111,000	$50,000
24-12-431-006	76	Southfield	Southfield	$52,500	$20,950	$72,000	$25,840
24-12-478-013	76	Southfield	Southfield	$76,000	$32,550	$96,500	$39,870
24-13-130-044	76	Southfield	Southfield	$63,500	$25,500	$75,000	$31,660
24-13-177-012	76	Southfield	Southfield	$68,000	$27,500	$82,500	$32,290
24-13-228-017	76	Southfield	Southfield	$59,000	$26,300	$69,000	$33,130
24-13-231-004	76	Southfield	Southfield	$53,000	$20,400	$67,800	$25,920
24-13-377-008	76	Southfield	Southfield	$48,000	$27,000	$74,000	$31,200
24-15-178-016	76	Southfield	Southfield	$132,000	$51,050	$125,000	$63,780
24-15-227-031	76	Southfield	Southfield	$97,000	$42,450	$132,800	$51,610
24-15-351-030	76	Southfield	Southfield	$55,000	$21,900	$72,500	$28,940
24-15-376-015	76	Southfield	Southfield	$105,000	$42,350	$135,000	$54,870
24-19-351-018	76	Southfield	Southfield	$43,500	$22,450	$76,900	$31,880
24-21-327-017	76	Southfield	Southfield	$105,000	$52,750	$182,000	$66,950
24-25-255-022	76	Southfield	Southfield	$85,000	$38,000	$113,000	$51,170
24-25-278-008	76	Southfield	Southfield	$70,000	$34,600	$124,000	$44,780
24-25-302-028	76	Southfield	Southfield	$73,000	$29,650	$122,500	$39,070
24-26-276-018	76	Southfield	Southfield	$78,000	$41,500	$78,000	$51,120
24-28-152-001	76	Southfield	Southfield	$113,000	$42,500	$164,500	$57,740
24-28-427-015	76	Southfield	Southfield	$110,000	$44,500	$145,000	$56,430
24-29-102-011	76	Southfield	Southfield	$87,000	$46,850	$114,000	$54,330
24-29-352-018	76	Southfield	Southfield	$86,000	$45,300	$122,000	$53,920
24-31-307-023	76	Southfield	Southfield	$81,000	$45,000	$115,000	$51,650
24-32-202-017	76	Southfield	Southfield	$40,000	$19,100	$69,700	$21,640
24-34-151-026	76	Southfield	Southfield	$60,000	$28,300	$79,000	$34,710
24-34-152-007	76	Southfield	Southfield	$84,000	$44,100	$112,000	$52,560
24-34-153-003	76	Southfield	Southfield	$74,000	$24,200	$110,500	$31,870
24-34-454-021	76	Southfield	Southfield	$40,000	$16,600	$57,900	$19,310
24-35-106-003	76	Southfield	Southfield	$133,000	$59,250	$115,900	$41,100
24-35-129-015	76	Southfield	Southfield	$115,000	$50,900	$160,000	$63,230
24-35-153-060	76	Southfield	Southfield	$53,000	$28,350	$85,000	$30,640
24-36-326-015	76	Southfield	Southfield	$88,000	$28,900	$112,500	$40,130
07-08-476-002	U	Springfield	Holly	$79,900	$35,300	$115,250	$48,600
07-23-101-005	U	Springfield	Clarkston	$119,900	$46,200	$140,000	$57,400
07-25-326-048	U	Springfield	Clarkston	$119,000	$32,700	$170,500	$66,300
07-26-301-004	U	Springfield	Clarkston	$79,000	$36,300	$115,000	$42,100
20-02-301-036	88	Troy	Troy	$171,750	$19,600	$204,000	$80,910
20-03-177-017	88	Troy	Avondale	$114,500	$48,000	$127,750	$57,060
20-05-252-011	88	Troy	Avondale	$179,000	$86,600	$245,500	$101,530
20-05-453-005	88	Troy	Troy	$167,000	$84,500	$224,900	$93,450
20-06-351-007	88	Troy	Bloom. Hills	$157,000	$58,700	$185,000	$74,640
20-06-401-019	88	Troy	Troy	$210,000	$129,400	$315,000	$128,830
20-08-128-007	88	Troy	Troy	$122,000	$55,400	$144,000	$62,640
20-08-153-008	88	Troy	Troy	$156,000	$73,800	$199,800	$89,700
20-11-104-020	88	Troy	Troy	$200,000	$19,000	$265,000	$122,140
20-11-178-012	88	Troy	Troy	$132,000	$59,300	$165,000	$68,960
20-12-180-003	88	Troy	Troy	$155,000	$67,300	$185,000	$76,630
20-12-376-017	88	Troy	Troy	$180,000	$78,700	$230,000	$98,740
20-12-429-009	88	Troy	Troy	$130,500	$59,800	$165,000	$71,090
20-13-204-002	88	Troy	Troy	$103,000	$47,700	$134,000	$55,820
20-13-207-022	88	Troy	Troy	$103,000	$48,800	$130,000	$56,940
20-13-227-012	88	Troy	Troy	$112,000	$51,900	$145,000	$57,590
20-14-203-010	88	Troy	Troy	$135,000	$57,500	$135,000	$66,310
20-17-104-002	88	Troy	Troy	$276,000	$44,700	$382,000	$154,280
20-17-431-008	88	Troy	Troy	$232,000	$100,300	$247,500	$115,630
20-17-476-046	88	Troy	Troy	$261,500	$5,225	$325,500	$138,600

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
20-18-152-005	88	Troy	Troy	$131,600	$68,100	$165,000	$73,500
20-19-152-009	88	Troy	Birmingham	$127,500	$62,300	$169,900	$75,120
20-20-302-002	88	Troy	Troy	$303,333	$20,000	$392,500	$162,360
20-20-327-014	88	Troy	Troy	$308,184	$20,000	$400,750	$159,850
20-21-102-001	88	Troy	Troy	$58,600	$34,300	$66,400	$42,590
20-21-231-009	88	Troy	Troy	$141,000	$19,000	$165,000	$71,090
20-23-153-017	88	Troy	Troy	$126,500	$59,500	$165,200	$66,880
20-23-203-031	88	Troy	Troy	$132,000	$62,600	$165,500	$75,820
20-23-251-015	88	Troy	Troy	$128,000	$56,000	$171,000	$63,830
20-23-276-004	88	Troy	Troy	$130,000	$58,600	$169,800	$68,660
20-23-406-015	88	Troy	Troy	$132,000	$61,600	$158,900	$68,410
20-23-427-004	88	Troy	Troy	$130,000	$62,200	$185,000	$71,620
20-24-102-004	88	Troy	Troy	$220,000	$19,000	$262,000	$113,500
20-24-427-006	88	Troy	Troy	$118,000	$50,500	$174,500	$55,910
20-24-479-012	88	Troy	Troy	$103,000	$45,500	$136,500	$54,480
20-25-178-001	88	Troy	Warren	$85,000	$42,600	$115,000	$47,230
20-25-254-004	88	Troy	Warren	$112,000	$51,300	$134,000	$58,770
20-25-256-003	88	Troy	Warren	$96,500	$45,600	$119,000	$52,760
20-25-280-022	88	Troy	Warren	$100,000	$79,000	$125,000	$59,090
20-25-306-018	88	Troy	Warren	$123,500	$13,000	$162,997	$63,460
20-25-306-035	88	Troy	Warren	$123,180	$13,000	$165,000	$65,370
20-27-403-023	88	Troy	Troy	$101,000	$45,300	$134,250	$53,650
20-30-153-002	88	Troy	Birmingham	$118,000	$51,100	$142,000	$59,780
20-35-301-003	88	Troy	Royal Oak	$96,000	$39,600	$119,500	$48,510
01-33-430-016	IH	Village of Holly	Holly	$48,500	$20,500	$64,900	$24,000
17-26-178-006	92	Walled Lake	Walled Lake	$82,000	$38,500	$118,500	$43,920
17-26-306-022	92	Walled Lake	Walled Lake	$68,000	$24,800	$94,000	$32,870
17-35-154-019	92	Walled Lake	Walled Lake	$79,000	$38,900	$116,000	$45,540
17-35-180-024	92	Walled Lake	Walled Lake	$137,000	$55,700	$165,000	$68,950
13-01-151-008	W	Waterford	Waterford	$112,290	$1,000	$144,000	$66,320
13-01-251-019	W	Waterford	Waterford	$139,000	$11,100	$168,900	$85,380
13-01-252-015	W	Waterford	Waterford	$112,900	$11,100	$149,000	$66,120
13-01-304-001	W	Waterford	Waterford	$106,000	$45,800	$122,000	$59,780
13-01-326-001	W	Waterford	Waterford	$105,000	$54,300	$126,000	$63,000
13-01-328-005	W	Waterford	Waterford	$110,000	$52,300	$129,000	$60,270
13-03-102-027	W	Waterford	Waterford	$107,000	$41,900	$126,000	$44,020
13-03-427-036	W	Waterford	Waterford	$77,000	$42,000	$94,000	$48,340
13-04-154-009	W	Waterford	Waterford	$95,000	$34,500	$122,000	$42,760
13-04-428-012	W	Waterford	Waterford	$68,000	$29,100	$102,900	$37,490
13-04-477-026	W	Waterford	Waterford	$39,500	$16,100	$43,000	$16,980
13-05-130-018	W	Waterford	Waterford	$58,900	$24,200	$73,500	$29,090
13-05-203-039	W	Waterford	Waterford	$96,000	$48,300	$125,000	$55,690
13-06-176-007	W	Waterford	Clarkston	$81,900	$45,000	$114,350	$59,510
13-07-478-027	W	Waterford	Waterford	$58,000	$31,800	$71,500	$39,200
13-08-428-018	W	Waterford	Waterford	$95,500	$49,100	$139,500	$56,610
13-08-453-006	W	Waterford	Waterford	$94,000	$23,000	$155,000	$32,730
13-08-480-006	W	Waterford	Waterford	$94,000	$48,300	$128,600	$57,170
13-09-104-018	W	Waterford	Waterford	$74,900	$36,300	$117,000	$49,660
13-09-181-010	W	Waterford	Waterford	$66,200	$23,900	$92,000	$29,990
13-10-252-011	W	Waterford	Waterford	$65,500	$23,100	$81,000	$26,150
13-10-277-005	W	Waterford	Waterford	$67,000	$27,600	$93,000	$36,420
13-11-127-017	W	Waterford	Waterford	$79,900	$28,700	$92,900	$32,920
13-14-128-034	W	Waterford	Waterford	$85,000	$34,600	$105,000	$43,440
13-15-351-001	W	Waterford	Waterford	$95,200	$42,500	$127,000	$47,670
13-15-402-001	W	Waterford	Waterford	$74,900	$34,600	$98,500	$47,800
13-19-378-015	W	Waterford	Waterford	$143,000	$9,400	$163,760	$75,860

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Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
13-20-127-023	W	Waterford	Waterford	$87,500	$29,400	$108,000	$42,660
13-20-251-026	W	Waterford	Waterford	$78,000	$14,300	$106,000	$47,380
13-21-103-005	W	Waterford	Waterford	$94,000	$36,500	$115,000	$49,490
13-21-280-018	W	Waterford	Waterford	$67,000	$27,700	$83,800	$35,380
13-21-452-002	W	Waterford	Waterford	$83,900	$30,100	$112,900	$40,540
13-21-477-045	W	Waterford	Waterford	$62,900	$23,600	$92,000	$33,970
13-22-477-002	W	Waterford	Waterford	$49,000	$24,700	$69,000	$27,770
13-22-480-012	W	Waterford	Waterford	$139,000	$49,100	$172,000	$69,260
13-23-178-043	W	Waterford	Waterford	$89,000	$39,900	$131,500	$50,430
13-23-378-006	W	Waterford	Waterford	$74,750	$33,400	$105,000	$40,450
13-25-151-016	W	Waterford	Waterford	$88,000	$37,500	$100,000	$42,700
13-25-403-003	W	Waterford	Waterford	$60,500	$26,000	$79,000	$34,360
13-25-406-024	W	Waterford	Waterford	$26,000	$18,700	$71,400	$26,360
13-26-108-009	W	Waterford	Waterford	$79,900	$3,200	$105,000	$39,550
13-26-227-008	W	Waterford	Waterford	$81,000	$31,700	$122,000	$39,390
13-27-201-026	W	Waterford	Waterford	$106,000	$43,200	$136,500	$57,840
13-28-104-018	W	Waterford	Waterford	$64,000	$21,600	$89,000	$30,040
13-28-107-012	W	Waterford	Waterford	$77,900	$35,000	$106,000	$40,660
13-28-128-011	W	Waterford	Waterford	$57,000	$20,000	$79,500	$27,900
13-28-152-018	W	Waterford	Waterford	$65,500	$24,200	$87,500	$32,800
13-30-476-009	W	Waterford	Waterford	$62,000	$33,600	$96,000	$40,160
13-32-200-046	W	Waterford	Waterford	$110,000	$74,100	$154,000	$71,530
13-32-477-001	W	Waterford	Waterford	$190,650	$12,500	$249,900	$115,110
13-33-178-023	W	Waterford	Waterford	$103,900	$40,700	$125,900	$50,990
13-34-157-003	W	Waterford	Waterford	$70,900	$30,900	$97,000	$41,460
13-34-328-009	W	Waterford	Waterford	$93,500	$45,000	$119,900	$63,230
13-34-331-037	W	Waterford	Waterford	$135,000	$56,100	$140,000	$61,060
13-34-427-029	W	Waterford	Waterford	$71,000	$32,200	$90,000	$40,270
13-35-129-011	W	Waterford	Waterford	$88,000	$32,800	$102,500	$38,890
13-35-159-018	W	Waterford	Waterford	$65,000	$17,700	$83,000	$24,130
13-35-252-003	W	Waterford	Waterford	$92,000	$51,700	$125,000	$74,900
13-35-451-011	W	Waterford	Waterford	$80,000	$29,600	$86,000	$43,890
18-01-402-009	X	W. Bloom.	Pontiac	$94,000	$38,850	$92,000	$47,160
18-04-101-014	X	W. Bloom.	Waterford	$205,000	$95,200	$215,000	$99,000
18-04-251-013	X	W. Bloom.	W. Bloom.	$155,000	$69,275	$200,995	$80,820
18-04-252-007	X	W. Bloom.	W. Bloom.	$165,000	$77,150	$193,000	$86,320
18-04-253-005	X	W. Bloom.	W. Bloom.	$166,500	$75,750	$215,000	$89,320
18-05-101-038	X	W. Bloom.	Waterford	$100,000	$36,025	$130,500	$50,540
18-05-202-010	X	W. Bloom.	Waterford	$70,000	$26,375	$83,000	$37,180
18-05-202-017	X	W. Bloom.	Waterford	$64,000	$33,750	$103,000	$59,730
18-05-252-016	X	W. Bloom.	Waterford	$77,000	$29,845	$93,711	$36,590
18-05-476-011	X	W. Bloom.	W. Bloom.	$260,000	$127,450	$294,000	$135,720
18-05-482-006	X	W. Bloom.	W. Bloom.	$310,143	$32,100	$313,500	$147,520
18-06-151-009	X	W. Bloom.	Walled Lake	$75,000	$30,025	$112,500	$39,710
18-07-326-010	X	W. Bloom.	Walled Lake	$202,000	$82,725	$228,000	$111,450
18-12-428-002	X	W. Bloom.	Bloom. Hills	$160,000	$87,175	$245,000	$91,640
18-14-402-002	X	W. Bloom.	Bloom. Hills	$203,000	$91,325	$234,900	$103,450
18-17-129-030	X	W. Bloom.	W. Bloom.	$79,900	$36,650	$100,938	$42,150
18-17-131-001	X	W. Bloom.	W. Bloom.	$128,500	$56,025	$146,500	$63,670
18-17-154-034	X	W. Bloom.	W. Bloom.	$102,000	$38,000	$149,900	$52,890
18-17-302-032	X	W. Bloom.	Walled Lake	$84,000	$37,250	$108,000	$47,070
18-17-351-030	X	W. Bloom.	Walled Lake	$60,000	$28,275	$85,000	$29,320
18-18-226-031	X	W. Bloom.	Walled Lake	$310,000	$150,000	$310,000	$157,750
18-18-228-002	X	W. Bloom.	Walled Lake	$230,000	$100,725	$250,000	$127,710
18-18-306-116	X	W. Bloom.	Walled Lake	$107,500	$54,575	$145,000	$63,030
18-18-404-028	X	W. Bloom.	Walled Lake	$88,000	$33,625	$115,000	$41,660

Table A.2 List of Dual House Sales

Sidwell	Town ID	Town	School Distr.	92 Price	92 SEV	96 Price	96 SEV
18-18-454-029	X	W. Bloom.	Walled Lake	$35,000	$24,000	$85,000	$30,180
18-18-484-001	X	W. Bloom.	Walled Lake	$55,900	$23,625	$72,000	$27,410
18-20-327-005	X	W. Bloom.	Walled Lake	$305,000	$66,925	$365,000	$176,400
18-26-152-001	X	W. Bloom.	W. Bloom.	$145,000	$67,025	$181,950	$83,570
18-26-454-021	X	W. Bloom.	W. Bloom.	$189,000	$100,925	$257,000	$129,860
18-27-254-010	X	W. Bloom.	W. Bloom.	$183,000	$82,325	$227,500	$94,860
18-28-253-20	X	W. Bloom.	W. Bloom.	$151,250	$69,925	$182,000	$79,860
18-28-431-009	X	W. Bloom.	W. Bloom.	$165,000	$71,475	$205,000	$79,270
18-29-136-125	X	W. Bloom.	Walled Lake	$155,000	$33,925	$210,000	$84,630
18-36-202-007	X	W. Bloom.	Birmingham	$191,000	$84,950	$220,000	$92,070
18-36-228-016	X	W. Bloom.	Birmingham	$102,000	$45,400	$139,000	$54,910
12-06-377-057	Y	White Lake	Holly	$58,000	$24,400	$79,900	$28,970
12-08-100-040	Y	White Lake	Holly	$110,500	$45,500	$154,900	$56,730
12-18-206-002	Y	White Lake	Huron Valley	$99,000	$40,900	$127,000	$48,810
12-22-401-030	Y	White Lake	Huron Valley	$136,750	$60,000	$185,000	$70,910
12-23-178-018	Y	White Lake	Huron Valley	$100,000	$41,800	$118,000	$48,560
12-33-202-011	Y	White Lake	Huron Valley	$142,900	$34,200	$175,000	$68,690
12-34-353-014	Y	White Lake	Huron Valley	$85,000	$6,900	$100,000	$46,660
12-35-230-24	Y	White Lake	Walled Lake	$81,000	$38,600	$109,500	$47,460
12-35-231-044	Y	White Lake	Walled Lake	$65,000	$21,500	$81,400	$29,120
12-26-226-018	Y	White Lake Twp	Walled Lake	$157,000	$12,500	$253,000	$82,140
12-31-426-021	Y	White Lake Twp	Huron Valley	$119,000	$37,700	$146,900	$59,590
12-35-479-013	Y	White Lake Twp	Walled Lake	$74,500	$35,000	$87,000	$34,110
17-28-106-099	96	Wixom	Walled Lake	$138,000	$66,600	$167,510	$73,790
17-28-377-010	96	Wixom	Walled Lake	$122,000	$53,800	$144,000	$62,820
17-29-378-018	96	Wixom	Walled Lake	$96,000	$43,200	$133,000	$53,180
17-29-381-014	96	Wixom	Walled Lake	$116,900	$48,800	$154,900	$59,660
17-30-152-001	96	Wixom	Walled Lake	$169,667	$14,200	$205,000	$90,650
17-30-177-020	96	Wixom	Walled Lake	$158,545	$33,800	$196,000	$87,610
17-30-251-033	96	Wixom	Walled Lake	$117,000	$49,500	$138,500	$62,180
17-31-326-016	96	Wixom	Walled Lake	$137,500	$51,000	$162,900	$70,000
17-32-451-003	96	Wixom	Walled Lake	$88,500	$37,300	$116,800	$41,630
17-32-454-013	96	Wixom	Walled Lake	$127,850	$11,000	$166,000	$71,430
17-21-484-025	EW	Wolverine Lake	Walled Lake	$80,000	$31,800	$105,000	$41,400
17-27-180-004	EW	Wolverine Lake	Walled Lake	$71,500	$28,600	$94,900	$36,300
17-27-278-013	EW	Wolverine Lake	Walled Lake	$98,500	$37,300	$105,000	$37,500
17-27-279-014	EW	Wolverine Lake	Walled Lake	$104,000	$44,400	$138,000	$56,300

Source: Author's Compiliation

Note: The Sidwell represents the unique identifier for the property for legal and taxation purposes.

Table A.3 Oakland County School District Tax and Spending Data

School District Name	School Millage Rates						Per Pupil Revenue				
	91-92	92-93	93-94	94-95	95-96	96-97	91-92	92-93	93-94	94-95	95-96
Avondale	38.55	38.55	37.95	13.74	14.45	15.32	$6,613	$6,686	$6,666	$6,883	$7,258
Berkley	43.24	43.66	44.44	6.50	10.40	10.40	$4,734	$4,626	$5,591	$6,660	$6,680
Birmingham	28.06	28.92	27.85	20.24	20.07	19.77	$8,544	$9,444	$9,735	$10,599	$10,843
Bloomfield Hills	25.33	25.67	24.96	18.21	17.96	17.63	$10,749	$10,692	$11,664	$10,812	$11,340
Brandon	45.67	45.67	43.35	13.88	13.88	14.24	$4,339	$4,353	$4,621	$5,663	$5,589
Clarenceville	42.65	42.25	42.18	7.26	9.71	9.67	$6,215	$5,787	$6,521	$6,929	$7,142
Clarkston	40.65	40.53	40.53	7.70	11.64	11.64	$5,003	$4,884	$5,444	$6,481	$6,672
Clawson	42.97	43.00	41.71	6.51	6.20	9.00	$5,349	$5,845	$5,912	$6,954	$6,821
Farmington	33.36	33.51	33.51	20.64	20.64	19.63	$7,832	$8,294	$8,049	$8,969	$9,269
Ferndale	46.09	46.09	46.09	7.60	13.00	13.00	$4,737	$4,874	$5,468	$6,802	$6,852
Hazel Park	42.04	42.04	45.04	9.00	9.00	9.00	$5,154	$4,860	$5,285	$6,513	$6,721
Holly	38.27	37.67	39.29	7.02	10.75	13.00	$4,269	$4,385	$4,980	$5,569	$5,770
Huron Valley	42.36	42.38	43.24	8.88	8.88	11.48	$4,283	$4,313	$4,851	$5,530	$5,747
Lake Orion	40.33	42.89	41.29	11.22	13.24	13.24	$5,848	$5,960	$6,108	$6,550	$6,696
Lamphere	28.65	28.65	28.65	18.65	21.40	21.65	$8,991	$8,591	$8,614	$7,831	$8,380
Madison	41.93	41.93	39.60	11.12	11.15	13.80	$5,655	$4,905	$5,059	$6,200	$6,140
Novi	30.85	33.02	34.20	16.34	17.29	17.19	$5,984	$6,314	$6,959	$7,236	$7,382
Oak Park	49.60	49.60	49.60	14.30	14.30	14.30	$6,795	$6,046	$6,147	$7,412	$7,842
Oxford	42.91	45.47	44.47	13.20	13.20	13.00	$5,110	$5,219	$5,368	$5,938	$6,108
Pontiac	42.73	42.80	42.09	8.80	8.80	8.80	$5,873	$5,686	$5,979	$6,394	$6,827
Rochester	38.72	39.36	38.80	10.88	10.88	10.25	$5,667	$5,775	$6,197	$6,665	$6,889
Royal Oak	38.48	40.99	31.37	16.01	16.20	15.95	$6,759	$7,167	$8,104	$8,639	$9,105
South Lyon	41.53	40.53	40.45	11.88	11.88	12.25	$4,432	$4,205	$5,079	$5,423	$5,567
Southfield	36.03	36.03	35.70	30.38	30.56	30.49	$8,621	$8,968	$8,800	$9,369	$9,701
Troy	32.25	34.56	34.56	19.65	18.36	18.11	$6,837	$7,166	$7,458	$7,857	$8,257
Walled Lake	38.70	38.90	39.38	12.31	12.43	13.55	$6,795	$6,623	$7,303	$7,541	$7,741
Waterford	38.81	38.81	36.87	8.40	8.98	9.06	$5,430	$5,298	$5,664	$6,215	$6,440
West Bloomfield	36.49	36.69	36.21	14.36	14.49	14.36	$7,333	$7,080	$7,136	$7,378	$7,499
Northville	34.15	34.16	33.79	10.30	10.30	9.50	$5,845	$5,774	$6,362	$6,450	$7,006
Romeo	41.12	41.93	40.25	9.46	9.32	9.11	$5,260	$5,317	$5,776	$6,199	$6,318
Warren	34.70	34.71	34.26	16.49	16.42	16.01	$7,204	$7,159	$7,728	$8,204	$8,679

Note: The Northville school district is a Wayne County School District. The Romeo and Warren School Districts are Macomb County districts. These districts extend into Oakland County.

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