

Property Tax Changes: A Case Study of a Small Open Region

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1. Introduction and Background

There is a vast and rich literature on the property tax and the associated issue of property tax capitalization.¹ To the best of our knowledge, there are no published studies outlining the impact of a rather straightforward policy question: What occurs to housing affordability in a small open region, such as a state, if there is a substitution out of a residential property tax into some other tax, or if surplus funds can be used to permanently reduce the property tax? That such a tax substitution-reduction will increase housing affordability is a claim often made by proponents of property tax cuts. But are such claims warranted?

For a property tax reduction to lead to “more affordable housing,” property tax reductions must NOT be fully capitalized into the value of existing property. A simple numerical example makes the point. Consider a residential property with a particular set of characteristics, in a jurisdiction providing a particular set of local public goods, that has a permanent \$3,000 annual tax liability associated with its ownership. Given existing conditions, assume the house has a market value of \$100,000. Suppose now that this permanent annual tax liability is reduced to \$2,000, while all other attributes of the property, including public spending remain the same. The residence now costs \$1,000 a year less to maintain than before the tax change. Assuming a 10 percent discount rate and an infinite time horizon, the present discounted value of the decline in the cost of owning the property is \$10,000. If this property tax cut is capitalized, then the market price of the residence rises to \$110,000. Any new buyer of the property is no better or worse off by the tax regime change: The property tax cut did nothing to make housing more affordable. Housing is only more affordable *if*, for some systematic rea-

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¹ Those studies that have most strongly influenced the work done for this paper include Netzer (1966), Bentick (1979), Owen and Thirsk (1974), Quang and Sirmans (1994), Thirsk (1979) and Yinger, et. al (1988).

son, the market price of the house rises by an amount less than \$10,000.² So the housing affordability implications of a property tax cut depends on whether the cuts are fully capitalized.

If the flow of public services is held constant, as we will assume throughout, there are three possibilities for sharing the benefits of a property tax cut. If property tax cuts are fully capitalized then all of the benefits are reaped exclusively by current homeowners. At the other end of the spectrum, if property tax cuts are not capitalized at all then benefits flow to homebuyers. In any intermediate case of partial capitalization the benefits are split between owners and buyers. The analysis of how the benefits of a property tax cut are apportioned in a specific geographic region is made complex by several factors. As recognized in the literature (Quang and Sirmans 1994) the impact of any change in taxes on housing values depends on both the degree of capitalization and the rate of time preference of market participants. Usually, the rate of time preference is taken to be equal to the mortgage interest rate (a practice that we follow). The degree of capitalization itself depends on a myriad of local housing market conditions that influence housing supply. To estimate with any precision the empirical apportionment of the benefits of a property tax cut requires a data set richer than that available for this study. However, we can, with a reasonable degree of certainty, estimate the possible ranges of benefits.

In the next section we sketch a theoretical argument as to why capitalization of a tax cut of this kind is unlikely to be complete. The third section discusses and defines the concept of affordability and outlines how affordability is enhanced by less than perfectly capitalized property tax cuts. In the fourth section of the paper, we present data from the housing market of Delaware County, Indiana, and use the data to assess the effect on housing affordability for a 25 percent decrease in the effective property tax rate. A final section presents some tentative conclusions.

² Of course, if capitalization is complete, existing homeowners find their wealth has increased by the present discounted value of the property tax cut. In addition, the reduction in annual tax liability makes the future burden of maintaining residence in the current home less onerous. In this sense their current residence is "more affordable." However, if capitalization did not occur **at all**, this decline in future burden would also be reduced for an existing owner. To current owners, property tax reductions always make the cost of maintaining the current residence lower, and by extension, "more affordable." The capitalization question is whether upon sale of the residence, can the current owner capture those tax cuts in the sale price. If she can capture all the cuts, then any new owner finds the existing housing unit to have the same net cost after the tax cut.

2. The capitalization controversy: A new view

Whether, after a tax decrease, buyers can move up to higher quality housing or to newly constructed housing depends on what happens to purchase prices for existing and new homes. If the entire tax cut is capitalized into purchase prices there would be no change in the affordability. Thus, the degree of capitalization is of considerable interest. But why would capitalization not occur and why would it be anything less than 100 percent? Moreover, what is the evidence on property tax capitalization?

The most comprehensive study of property tax capitalization is contained in Yinger (et. al, 1988). The policy experiment of that study is, however, quite different from the one we envision. Their study posed the question of whether differences in effective tax rates among individual property owners due to assessment policies were capitalized into property values. They did this by looking at Massachusetts localities that had undergone court-mandated reassessments and constructed a data set of houses that were sold both *before and after* the reassessment. Controlling for other relevant factors tax capitalization is estimated to be around 22 percent. That is, residential properties that upon reassessment noticed increases in their tax liabilities did not suffer from a decline in market price equal to the fully capitalized value of the tax increase. Correspondingly, residential properties that upon reassessment noticed decreases in their tax liabilities did not enjoy an increase in market price equal to the fully capitalized value of the tax decrease.

Yinger and his colleagues offer a number of plausible explanations for this absence of observed capitalization. First, reassessments may have been *anticipated*. This implies that the impact of the revaluation on property values may have been incorporated before the actual reassessment. Second, there may be reason to believe that assessment errors may be *re-established*. If reassessed values of existing property are relatively stagnant although their values rise, while new and presumably correctly assessed housing stock is added to the tax base in the future, then older housing stock would note a decline in its tax exposure. It is not at all clear that these reasons for under capitalization are relevant to the policy experiment we are examining. A general reduction in property taxes has no obvious effect on relative valuations between old generally under-assessed property and new, more recent, and correctly assessed property.

We hypothesize that there is a reason why capitalization will be less than 100 percent of the present value of the changed tax liability *even if* the tax change is unexpected before it is instituted and perfectly certain to be permanent after it is imposed. Our argument assumes that the ju-

jurisdiction changing property taxes is small relative to the national market for capital and open to the migration of capital.³

Consider the market for residential property as illustrated in Figure 1 below. The market is constructed as a market for rental property measured in square feet of living space. Rental prices can readily be transformed into capital assets prices. The price of a house is simply the present discounted value of its future expected rental prices over the relevant life of the house. In a competitive market equilibrium this rental value must equal the annualized cost of land acquisition, construction cost, insurance and maintenance costs. Suppose these costs are, in the long run, constant so that LS_1 represents the long run supply of housing in the market area in terms of annual rental costs.⁴

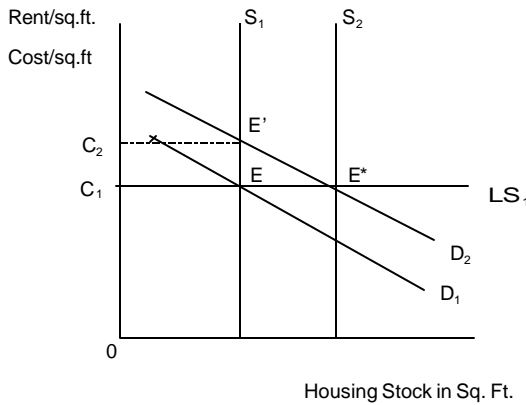


Figure 1. Market for residential property

³ Our argument is similar to that made by Bruce Hamilton (1976) who argued that "... fiscal variables, which in the long run do not influence the price of inputs into housing should not in the long run be correlated with house value." (p. 648, fn2).

⁴ For simplicity let all other housing variables (difference in features, neighborhood and environmental amenities, etc.) be uniform over all properties in the market area.

Of course, public sector variables influence the desirability of any housing unit. Let property taxes and public services be modeled as demand shift variables. (Suppose, rather implausibly, renters have the legal obligation to remit the tax obligation of the housing unit to the local tax authorities.) Initially, the demand curve for housing in the market is given by D_1 , which assumes a set level of public service provision and tax liability for each unit of housing supply. The short run supply of housing is assumed fixed (vertical) at S_1 . The equilibrium cost (rental) per square foot of housing unit is C_1 as established at market equilibrium E.

At E supply and demand for housing services match. In addition, the rental rate is just sufficient to cover the opportunity cost of capital investment in the market area. There is no incentive to either expand or contract the current stock of housing.

Now suppose that the tax rate on housing is lowered, while public service provisions remain constant. The demand curve for housing in the market area will shift out to D_2 because the tax burden of rental has decreased. In the short run the rental rate for housing will rise to C_2 because the supply of housing is fixed at S_1 . In the short run the benefit of the tax cut accrues to landlords. This is because the supply of housing is fixed, so landlords (current owners) can and presumably will capture the tax cut by raising rents.

However, this increase in rental price makes the return on investments in new housing higher than on other forms of capital. Investors, therefore, will switch capital into housing construction in the jurisdiction that cut taxes. New units will come on market until the rental price of housing drops to C_1 . The short run supply curve shifts to S_2 and the equilibrium rental price of housing is restored to C_1 on the long run supply curve, LS_1 .

In terms of the capitalized price of a house in the market area, we expect the following sequence of events. Consider the \$100,000 house that enjoys \$1,000 annual property tax decrease. Assume as before a 10 percent discount rate and an infinite time horizon so the present value of the tax cut is \$10,000. This \$100,000 dwelling would increase in price to something above \$100,000 but below \$110,000 immediately after the tax cut. Over time its price would fall back to exactly \$100,000.

The exact amount of the initial price increase in the house would depend on the time frame of the supply response. Suppose in the first year after the tax cut, construction of new housing stock began, but no new supplies were forthcoming so that the rental price of housing remained at C_2 . Suppose that in the second year some new housing was forthcoming but just enough to lower the price of rental housing to half way between C_2 and C_1 . (Short-run supply curve S_1 had shifted out, but not to S_2 .)

Immediately after the tax decrease our archetypal \$100,000 home would be worth exactly \$101,454, or \$1,454 more assuming a 10 percent discount rate. This amount is the present value of the increased rental price the house over the two-year time frame. It is precisely this increase in price that generates the “construction boom” that shifts the short run supply curve S_1 to S_2 , but the supply response itself ensures that the price of the house will, after the two-year time frame fall back to \$100,000.

Of course, the conclusion that the price of housing is unaffected by the property tax cut in the long run is predicated on the supply curve of housing services being perfectly elastic in the market region where taxes are cut. If, for example, land prices rise as new construction ensues, the long run supply curve for housing units would be upward sloping as indicated in Figure 2. In this case, as before, the short run impact of a property tax cut would be to increase the rental price from C_1 to C_2 . However, in this case the short-run supply curve shifts out until it intersects D_2 and LS at C_3 . Note that $C_2 > C_3 > C_1$. In this case the long run price of our archetypal \$100,000 house would exceed \$100,000, and **some** of the tax cut would be capitalized in the value of the house. Only in the extreme case, when factors of supply for new construction were perfectly inelastic, would all the tax cut be capitalized into the price of existing properties.

Estimation of the actual increase in affordability would have to be based on a measure of the supply response elasticity as a function of time. Solving this empirical problem is beyond the scope of this paper. Historical studies suggest short run supply elasticities between 0.2 and 0.3 and long run elasticities of 0.3 to 0.7. Thus, we would expect that the intermediate case of partial capitalization (coupled with some increase in housing affordability) would be typical. It is clear that a myriad of local factors including, land availability, local zoning, local construction costs

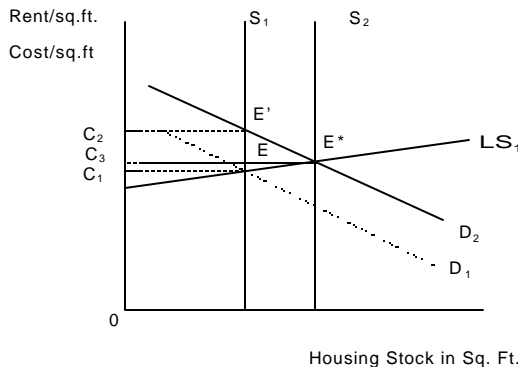


Figure 2. Alternative specification of the market for residential

and building codes, affect supply elasticity, making the issue of tax capitalization in any market or region sensitive to local housing market conditions.

3. Housing Affordability

Housing affordability is itself a slippery concept which will be explored briefly here.⁵ A key dimension of this issue is whether certain groups are systematically excluded by income from participating in the housing market as owner-occupants. Any study of the housing market must start from the observation that, at any point in time, the population is fundamentally “housed,” in the sense that most of us have roofs over our heads. The truly homeless have never been estimated to be more than 0.4 percent of the population. Given that vacancy rates in apartments renting below \$250 per month runs roughly at the eight percent to nine percent level at any point in time it would be hard to conclude that there is a housing shortage in the U.S.

Of course, it is not a public policy aim that every one be simply housed. For purposes of public policy we address adequate housing in terms of living in units that are not overcrowded and are not substandard. Both of these concepts have proven to be moving targets. Our default public policy is one of downward filtering which has been more successful at reducing the number of families in substandard housing than in reducing overcrowding. We have supplemented this basic policy with public housing, supply side and demand side subsidies, rent controls, and building codes. The question raised by the proposed cut in property taxes is to what extent it could supplement or replace these policies. We proceed by separating this question into two parts. The first part addresses the affordability of buying a house. The second part examines the impact of a tax cut.

To bid on a particular house a family must be able to make the associated payments including mortgage, insurance, and property taxes. Letting B equal the bid price, r equal the interest rate and i equal the insurance cost expressed as a percent of the market value of the house, t_E equal the effective property tax rate, we can express the prospective annual cost of ownership as:

$$R = B*(r + i + t_E) \quad (1)$$

R divided by twelve is the anticipated monthly payments for housing. The affordability issue hinges on what percentage of income a household

⁵ Much of our discussion in this section follows Savage(1998).

can or will spend on housing and what wealth it has accumulated up to the time it decides to buy a house.

Tastes and preferences for housing as well as other goods will determine this percentage for an individual household. Estimates commonly used in housing market studies range from 25 percent to 30 percent of income for the sum of mortgage, property taxes and home insurance. The mortgage industry standard is 28 percent. Other installment payment debt also limits housing affordability. Again, a rule of thumb is that all required monthly payments should not exceed 36 percent of income. For some families this will be the limiting factor. For other families the limiting factor is cash available.

How much house a family making \$20,000 per year could afford under a variety of assumptions about cash available and monthly non-housing installment debt payments is reported in Table 1. The monthly payment includes 0.125 percent of the maximum house value per month for property taxes and 0.027 percent per month for hazard insurance. In the first two rows, cash available is the constraint on the house that is affordable. These cases assume a minimum down payment of five percent of the house value. Closing costs absorbs the remainder of cash available. In the third case, income becomes the constraint in that total housing payments are to be held at or below 28 percent of income. In the last case, it is the high monthly payments on installment debt and the fact that these payments plus housing payment must be at or below 36 percent of income.

Table 1. Housing Affordability for a Family Earning \$20,000 Per Year

Monthly Installment debt payment	Cash Available	Maximum House value	Down Payment	Monthly Payment	Limiting Factor
\$100	\$2000	\$28,986	\$1,449	\$223	Cash
100	3,000	43,478	2,174	334	Cash
100	5,000	61,335	3,850	467	Income
400	3,000	26,992	2,510	200	Debt

Households with different incomes but for whom income is the only limiting factor are examined in Table 2. The left hand part of Table 2 illustrates the bid prices a family could make for housing (mortgage, taxes and insurance) assuming: 1) 30 percent of income will be spent on housing, and 2) the mortgage rate is 7 percent, the effective property tax rate is 3 percent and the annual cost of insurance is 1 percent of the housing unit's market value. The right hand part indicates how much the same household could bid for a house after a 25 percent cut in the effective property tax rate (to 2.25 percent).

The bid prices are calculated by inverting equation (1), that is,

$$B = R / (r + i + t_E) \tag{2}$$

The calculations reveal an across-the-board increase in bid prices of 7.32 percent. All other factors remaining the same, a family that could have bid \$100,000 for a house before a 25 percent tax cut, could bid \$107,320 for a house after the tax cut. Although the amount any state or local government could or would reduce property taxes varies, this gives a rough estimate of the impact a significant property tax reduction could generate in terms of increased housing affordability: everyone in the home-buyer market could bid around seven percent more.⁶

Table 2. Maximum Bid Prices For Single Family Dwelling Units

Household Income	Yearly Outlay	Maximum Bid Price	After a 25% Tax Cut	Percent Change
\$20,000	\$6,000	\$54,545	\$58,537	7.32%
30,000	9,000	81,818	87,805	7.32
40,000	12,000	109,091	117,073	7.32
50,000	15,000	136,364	146,341	7.32
60,000	18,000	163,636	175,610	7.32
70,000	21,000	190,909	204,878	7.32
80,000	24,000	218,182	234,146	7.32

The calculations for Table 2 show what a buyer at each income level could bid but, of course, it does not tell us what happens to housing prices in response to the increased ability to bid. That will depend on the degree of capitalization of the tax reduction into housing values. The annual amount a family is willing to pay for a house (R) is the value it places on the annual flow of housing services (shelter, location, privacy, neighborhood amenities, etc.). Taxes and insurance are costs of providing that flow. The equilibrium market value of a house (in an efficient market) is the present value of the difference. Adding **d**, the degree to

⁶ This table ignores some obvious complexities including the fact that the percent of income that can be spent on housing tends to increase with income because of the fixed nature of spending on such things as food and children’s clothing and the fact that the mortgage interest deduction becomes more valuable in higher tax brackets. As mentioned earlier it also ignores the fact that a household must have sufficient cash to make a down payment. For many low-income families accumulating sufficient cash assets to make a down payment is the limiting factor in how much house they can afford given that mortgage lenders screen out families that would also have to borrow a down payment. For families for which cash availability is the constraining factor, a property tax cut is unlikely to permit them to change from being renters to buyers in the short run. To the extent that the tax cut results in a reduction in rent, these households could, if they chose, accumulate cash at a faster rate. They could also use the tax cut to move to higher quality rental units and that has implications for the supply side of the housing market that are considered elsewhere. Families constrained by income or installment debt could bid approximately 7.3 percent more for housing after the tax decrease. Nor is the percentage increase influenced by the fraction of household income spent on housing.

which taxes are capitalized into housing value to our notation and assuming for simplicity that insurance cost is zero, the market value of a house tends toward:

$$M = \frac{R}{r} - \frac{dT}{r} \quad (3)$$

Allowing t_N to be the nominal tax rate and a to be the fraction of market value used for assessment purposes ($t_E = t_N a$), equation (3) can be rewritten as:

$$M = \frac{R}{r} - \frac{d \cdot t_N \cdot a \cdot M}{r} \quad (3a)$$

Further manipulation results in the market value being expressed as:

$$M = \frac{R}{r + d \cdot t_N \cdot a} \quad (4)$$

In other words, if capitalization is complete, $d=1$, the market prices of a house will change by the full present value of the tax change, implying no increase in affordability from a tax cut. If capitalization does not occur at all, $d=0$, then the market price of houses are unaffected by tax changes implying that the entire tax cut augments buyer affordability.

It will help to set the scene to consider first the impact on affordability of complete capitalization ($d = 1$). Assume an existing housing unit that produces \$9,000 of housing services per year, an effective tax rate of three percent and suppose the average prospective buyer's discount rate to be six percent. The market value of the house would be \$100,000. Now suppose a drop in the effective tax rate of one-third (to two percent). If capitalization were 100% this would result in an increase in the value of the house of \$12,500 to \$112,500. From a buyer's point of view the increase in the price of the house (if the seller capitalizes the tax cut into his asking price) would just exactly match the present value of the decrease in tax liability if the house is purchased. Thus, there would be no change in the affordability of the package (house plus tax liability).

However, suppose that capitalization was at the modal value found by Yinger, and his colleagues ($d = 22$ percent). Then the price of the house increases by \$2,750 to \$102,750. The cost of the house plus tax package has actually declined by \$9,750 in present value terms. This would be the equivalent of holding taxes constant but somehow lowering the price of the house to \$92,750. Incomplete capitalization after a tax cut, if it persists, increases the affordability of existing housing, other things equal.

4. Housing Affordability in Delaware County, Indiana

This section of the paper considers the impact of a local property tax cut on the affordability of residential property in Indiana. Translating the information in Tables 1 and 2 to the situation facing Indiana households requires comparing the current distribution of Indiana household income with the distribution of housing units currently on the market. Doing this for the entire state was well beyond the resources available. Thus, this part of the study compares the current distribution of income in Indiana with a sample distribution of asking prices for houses in Delaware County, which constitutes the Muncie, IN, SMA. We note at the outset that the data used in this part of the study do not represent an unbiased or complete sample that could be used to measure affordability across the state. Delaware County has had substantial income growth despite virtually no job growth in the past decade. As a consequence, while demand has been fairly vigorous for higher-priced new, or recently constructed homes, it has been weak in the lower reaches of the real estate market. For this reason, Delaware County's experience would not be directly comparable to counties with both high income and high job growth (such as the Indianapolis metropolitan area) or to counties with high job growth even if per capital income growth was similar. Nonetheless, consideration of the impact of a tax cut on housing affordability in Delaware County is instructive regarding the general nature of what one might expect across the state.

The distribution of income in the state of Indiana in 1989 from the 1990 Census with the income brackets with 1989 dollars converted into 1998 dollars using the GDP deflator to adjust for the impact of inflation is provided in Table 3. The assumptions that generate the upper limit of affordability for each income bracket are the same as for Table 2.⁷

Data collected from Issue 560 (October 1998) of *Homes and Lifestyles of Delaware County*, published for the Muncie Board of Realtors is presented in Table 4. This publication is a guide to homes, land acreage, and commercial properties currently for sale. It does not claim to be a comprehensive publication, nor is the policy of all Realtors to list prices of described properties in this publication. Thus, it has an unknown bias as a source of price data. Further, the prices that are listed are asking prices. Prices at which transactions actually occur are not disclosed in this publication. Indiana law did not require transaction prices to be publicly

⁷ As before, we assume: 1) 30 percent of income will be spent on housing, 2) the mortgage rate is 7 percent, the effective property tax rate is 3 percent and the annual cost of insurance is 1 percent of the housing unit's market value. These conditions were approximated in Delaware County, Indiana, at the time of the study.

recorded at the time of this study. There were 760 houses or duplexes listed and 590 of these had listed asking prices. Based on the photographs and locations indicated it would appear that lower priced houses were just as likely to have asking price information withheld as higher priced houses. The average price found was \$92,082 while the median price was \$ 72,700.

Table 3. Distribution of Affordability Using 30% of Income for Housing

Income Bracket	Income Brackets Using 1998 dollars		Households 1989 Count	Percent	Cumulative Percent	House Price	
	From	To				Affordability	Range
1	\$0	6,499	112,983	5.5%	5.5%	\$0	17,725
2	6,600	12,999	186,940	9.1	14.6	17,727	35,452
3	13,000	19,499	191,924	9.3	23.9	35,455	53,179
4	19,500	32,499	397,682	19.3	43.1	53,182	88,634
5	32,500	45,499	356,877	17.3	60.4	88,636	124,088
6	45,500	64,999	398,924	19.3	79.7	124,091	177,270
7	65,000	97,499	291,741	14.1	93.9	177,273	265,906
8	97,500	129,999	75,857	3.7	97.5	265,909	354,543
9	130,000	194,999	32,632	1.6	99.1	354,545	531,815
10	195,000 median	and up 37,421	18,686 2,064,246	0.9	100.0	531,818	and up

Table 4. Affordability Based on Asking Price in Delaware County, October 1998

Income Bracket	Percent of Households	Cumulative Percent	House Count	Cumulative Count	Percent	Cumulative Percent	Raw Difference	Cumulative Difference
1	5.5%	5.5%	10	10	1.7%	1.75	-3.8%	-3.8%
2	9.1	14.6	56	66	9.5	11.2	0.4	-3.4
3	9.3	23.9	108	174	18.3	29.5	9.0	5.6
4	19.3	43.2	186	360	31.5	61.0	12.3	16.8
5	17.3	60.5	100	460	16.9	78.0	-0.3	17.5
6	19.3	79.8	74	534	12.5	90.5	-6.8	11.7
7	14.1	93.9	44	578	7.5	98.0	-6.7	4.1
8	3.7	97.6	8	586	1.4	99.3	-2.3	1.7
9	1.6	99.2	2	588	0.3	99.7	-1.2	0.5
10	0.9	100	2	590	0.3	100.0	-0.6	0
		Total	590					

In this table the number of houses with bid prices in the range affordable by households in each income bracket is presented as a raw number as well as percent of the market. The “raw difference” column number is negative if there is “an excess demand” in a particular bracket and positive if there is an excess supply in the bracket. For example, while 5.5 percent of households fall into the lowest income bracket only 1.7 percent of the houses on the market would have been affordable to these families if they limited housing expenditures to 30 percent of their household budget. In contrast, while only 19.3 percent of households fall into the income bracket bounded by \$19,500 and \$32,500, 31.5 percent of

the housing on the market falls into this range. Further, a cumulative 61 percent of housing would have been affordable to families at the top end of this income bracket. It would appear clear that, except for the lowest income households there was no lack of affordable housing in the sample of properties on sale in the early fall of 1998 in Delaware County.

Table 5 indicates what would happen following a 25 percent cut in property taxes followed, alternatively, by a 22 percent capitalization of the tax reduction into the asking prices of the sample of housing units on the market in October 1998 and a 50 percent capitalization of the tax reduction. To obtain the new counts the price of each house was increased by the capitalized tax savings assuming an infinite time horizon. If capitalization is 22 percent housing, prices rise by 2.75 percent and if capitalization is 50 percent, prices rise by 6.25 percent.

Table 5. Impact of A Twenty-five Percent Tax Cut Combined with Twenty-two Percent and Fifty Percent Capitalization

Income Bracket	House Price Affordability Range		House Count	Cumulative Count	Percent	Cumulative Percent	House Count	Cumulative Count	Percent	Cumulative Percent
1	\$0	\$19,022	13	13	2.2%	2.2%	12	12	2.0%	2.0%
2	19,022	38,047	57	70	9.7%	11.9	54	66	9.2	11.2
3	38,047	57,072	124	194	21.0%	32.9	108	174	18.3	29.5
4	57,072	95,122	189	383	32.0%	64.9	187	361	31.7	61.2
5	95,122	133,171	86	469	14.8%	79.7	105	466	17.8	79.0
6	133,171	190,264	72	541	12.2%	91.9	70	536	11.9	90.8
7	190,264	285,370	40	581	6.8%	98.7	42	578	7.1	98.0
8	285,370	380,496	6	587	1.0%	99.7	8	586	1.4	99.3
9	380,496	570,744	1	588	0.2%	99.8	2	588	0.3	99.7
10	570,744	and up	2	590	0.3%	100.0	2	590	0.3	100.0
		Total	590							

Columns 2 and 3 in Table 5 indicate the increase in the housing bid prices for each income bracket in Table 3. Comparison of Tables 4 and 5 indicate that there is an across the board increase in affordability of housing that is quite pronounced if capitalization is at 22 percent but much less pronounced if capitalization is 50 percent. If the Yinger, et.al, estimate of capitalization (22 percent) is accurate, then the lowest-income bracket could afford to buy 2.2 percent of the houses on the market compared to 1.7 percent before. Similarly, families with incomes of \$32,500 could afford to buy 64.9 percent of the houses on the market compared to 61 percent before the property tax decrease. As would be expected, increases in affordable houses is much less pronounced if the capitalization rate is 50 percent.

The distribution of benefits under the assumption of 22 percent capitalization is interesting. Examining the cumulative number counts, it is households in the lower-middle income range who would see the most increase in availability. Households in the second bracket, with maxi-

imum income of \$13,000 would see the number houses affordable rise from 66 to 70, whereas those in the fourth bracket, with maximum income of \$32,500 would see the number of affordable houses rise from 360 to 383. In contrast a household in the seventh bracket with maximum income of \$97,500 would see the number of affordable houses rise from 578 to 581. It seems clear that in terms of creating new housing opportunities, a property tax cut does little for either the very poor, whose access to home ownership is intrinsically limited, or the very rich, who face few financial barriers to home ownership. Property tax cuts would confer upward housing mobility primarily to those in the lower-middle income brackets. Examining the cumulative counts for the 50 percent capitalization suggests that the remaining benefits are even more concentrated in the middle income brackets. This is partially a sample artifact. There are several gaps in the asking price data for October that would probably be smoothed over in a sample drawn from a full year's listing of homes for sale. That there is an increase in affordability is clear, however, because the 25 percent decrease in the tax rate increases the affordable price by 7.3 percent, while 50 percent capitalization would increase housing prices by only 6.25 percent.

5. Conclusions

In an era of budget surplus property tax cuts are likely to have political appeal. An argument for property tax cuts is that they make housing more affordable. A reasonable definition of affordability is that a household with a particular income is capable of purchasing more or better housing after a tax cut. Whether property tax cuts enhance affordability depends on whether the property tax cut is capitalized into the value of existing houses. If tax cuts are fully capitalized, then no increase in affordability can occur. We argue that full capitalization of property tax cuts is unlikely. This is because rates of return on investment in new housing are also affected by a property tax cut. In essence, we expect property tax cuts in the long-run, to increase the supply of housing, which, in turn, lowers net housing prices ultimately enhancing affordability.

To model the size of these impacts we consider the impact a 25 percent cut in Indiana residential property taxes (coupled with a 22 percent rate of capitalization) has on housing affordability in Delaware County, Indiana. Assuming the most a household can pay, in terms of mortgage, taxes and insurance is 30 percent of their income. We find that a household with \$32,500 in income is, before the tax cut, able to purchase 360 out of the 590 homes available for sale in Delaware County at the time of our survey. This number rises to 383 after the tax cut.

Although the specific impact depends on a number of factors influencing the supply elasticity of housing and local housing market conditions, property tax cuts are expected to make more housing units of better quality available to more potential homeowners. Property tax cuts are expected to impact housing affordability by an amount of interest to legislators and policymakers.

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