Property Taxes and House Values

The Theory and Estimation of Intrajurisdictional Property Tax Capitalization

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What Is Property Tax Capitalization?

Students of local public finance have long recognized that property taxes may be reflected in house values. This phenomenon, which is known as property tax capitalization, is the subject of this book.

1. WHAT IS PROPERTY TAX CAPITALIZATION?

Property taxes are said to be capitalized into house values if, all else equal, a higher property tax payment leads to a lower house value. If the value of a house is $1.00 lower whenever the present value of the stream of property tax payments on the house is $1.00 higher, then property taxes are said to be fully capitalized into house values; in other words, the degree of tax capitalization is 100%. Our objective is to estimate the degree of capitalization.

Because property taxes are paid every year, any comparison of the property taxes on two houses relies on the notions of present value and discounting. A household's discount rate, say i, is the return it could earn in an investment other than housing, such as bonds. The present value of a future flow is the amount someone would pay today in exchange for receiving that flow. The present value of $1.00 received (or a $1.00 payment avoided) next year is $1/(1 + i)$, the present value of a dollar received in two years is $1/(1 + i)^2$, and so on. Thus, the present value of avoiding $1.00 of

property taxes every year from now until the expected lifetime of the house, N, is

$$\sum_{n=1}^{N} \frac{1}{(1+i)^n}.$$

Housing lasts a long time, so it is reasonable to assume that N is large. If so, then this summation can be closely approximated by $1/i$.[1]

Consider, for example, Smith's house and Jones' house, which are in the same neighborhood and are identical except that the annual property tax payment on Smith's house is $300 higher. Suppose the relevant discount rate for households is 3%. Then the present value of the stream of future property taxes is $300/.03 = $10,000 higher for Smith's house than for Jones' house. (The choice of a discount rate obviously is important here. We will have more to say about this choice in Chapter 3.) Property taxes are fully capitalized if the market value of Smith's house, which is the amount Smith could sell it for, is $10,000 lower than the market value of Jones' house. If the market value of Smith's house is only $5000 lower than the market value of Jones' house, then the degree of capitalization is 50%.

Changes in property taxes can also be capitalized, that is, they can lead to changes in house values. In fact, we measure capitalization by examining the relationship between tax changes and value changes. Tax changes are fully capitalized into house values if a $1.00 increase, relative to other houses, in the present value of the stream of future tax payments leads to a $1.00 decrease in house value, relative to other houses.

Suppose that Smith's house and Jones' house begin with the same property tax payment. Now let Smith's annual tax payment increase by $300 while Jones' tax payment, and everything else that affects house values, stays the same. In this case, the present value of Smith's stream of tax payments increases by $300/.03 = $10,000 relative to the present value of Jones's tax payments. If this tax change leads to a $10,000 decrease in the market value of Smith's house relative to Jones' house, then the tax change is said to be fully capitalized into house values.

Property tax differences across jurisdictions and within a single jurisdiction can both be capitalized into house values. These two phenomena are generally known as interjurisdictional and intrajurisdictional property tax capitalization. The effective property tax rate for a house is defined to be the house's property tax payment divided by its market value. Interjurisdictional tax capitalization occurs when, all else equal, houses in towns with relatively high average effective property tax rates have relatively low market values. The tax payment for a house equals a nominal property tax rate, which is the same for all houses within a jurisdiction, multiplied by the assessed value of that house. Intrajurisdictional tax capitalization occurs

when, all else equal, houses with relatively high assessed values have relatively low market values.

2. WHAT DOES THIS BOOK CONTRIBUTE?

This book studies intrajurisdictional property tax capitalization in seven Massachusetts cities and towns. We take advantage of a series of Massachusetts Supreme Court decisions that ordered cities and towns in Massachusetts to assess all houses at their full market value. As a result of these decisions, many communities revalued, that is, they calculated new assessed values for all their houses and other property. These revaluations caused large changes in assessed values and hence in tax payments. We collected data on houses that sold twice, once before and once after a revaluation, and use this double-sales data to investigate the extent to which changes in tax payments generated by revaluation are reflected in changes in house values.

Although property tax capitalization is a simple concept, it has proved to be difficult to estimate. As explained in Chapter 2, existing studies have encountered problems of simultaneity bias, left-out-variable bias, specification error, and inappropriate treatment of the discount rate. Consequently, the results of existing studies vary widely, and no consensus has emerged on the precise extent to which property taxes are capitalized into house values. We develop a methodology that solves these problems and provides more accurate and precise estimates of capitalization than those obtained from previous studies.

In the community with the best data, we estimate that the degree of property tax capitalization is 21%. This estimate of capitalization is highly significant statistically; that is, it is highly unlikely to have occurred by chance.

We also find that the degree of capitalization is not the same in every community. In two other communities with good data, we estimate capitalization rates of 16% and 33%. These estimates are also highly significant statistically. Because of data limitations, our estimates of capitalization in the four remaining communities are not as reliable. These estimates range from 9% to 79%.

Differences in our results across communities reveal the complexity of the capitalization phenomenon. As explained more fully in the next section, the degree of capitalization depends on the information available to and the expectations of house buyers, and on the sources of variation or change in property tax rates. Because these factors are not likely to be the same in all communities, the degree of capitalization is also not likely to be the same. Moreover, tax changes caused by revaluations may be capitalized

at a different rate than tax rate differences across jurisdictions. One of the central conclusions of our study is that one cannot simply assume that property taxes are always capitalized at the same rate. We study the degree to which tax changes caused by revaluation are capitalized into house values; other studies must estimate the degree of capitalization under other circumstances.

3. HOW DOES PROPERTY TAX CAPITALIZATION ARISE?

Property taxes are capitalized into house values because of simple economics: all else equal, the lower the property taxes on a house, the more a household is willing to pay for it. If the present value of the tax payments on Jones' house is $10,000 lower than the present value of the taxes on Smith's otherwise identical house, a rational household will bid $10,000 more for Jones' house than for Smith's. In other words, unless the market prices of houses fully reflect the associated property tax streams, some houses will be bargains and others will be overpriced.

Property tax capitalization expresses the link between an annual flow, property taxes, and the price of an asset, a house. The link between annual flows and asset prices is well known in other contexts. The price of a stock reflects the annual after-tax flow of dividends that accrues to the stockholder. The price of a bond reflects the annual interest payments received by the bondholder less the income tax paid on that interest. In all of these cases, buyers are willing to purchase the asset for a price equal to the present value of the expected stream of net benefits from holding it.

The existence of capitalization can also be explained by examining the calculations typically made by home buyers and real estate professionals. Suppose that a household has figured out the maximum portion of its annual income that it can spend on its annual mortgage payment plus its annual property tax payment. This portion often is formally imposed on the household by a lending institution. To keep the sum of mortgage and tax payments constant, therefore, a $1.00 higher tax payment must be offset by a $1.00 lower mortgage payment. The mortgage payment for a fully mortgaged house is approximately equal to the mortgage interest rate, m, multiplied by the value of the house, V.[2] Because a household has no influence on the mortgage rate, the only way it can reduce its mortgage payment is by reducing the amount it is willing to pay for its house, that is, by reducing V. To lower mV by $1.00, a household must reduce V by $1.00/$m$. In other words, a $1.00 higher annual property tax payment leads to a $1.00/$m$ lower house value, which is exactly the definition of complete capitalization presented earlier. Thus, property tax capitalization can be generated by simple house-

hold calculations, although its existence does not depend on the fixed-payment assumption.

Property taxes are not the only housing flow that can be capitalized. Indeed, anything that affects the flow of services to a homeowner, including the structural characteristics of the house itself, the amenities in the house's neighborhood, and the quality of local public services, can be capitalized into house values. The higher the public service quality in a community, for example, the more people are willing to pay for houses there, all else equal.

Local public services are financed by property taxes, so one might expect the capitalization of local public services and the capitalization of local property taxes to be connected. In particular, one might ask whether the capitalization of services offsets the capitalization of property taxes. The answer is, not necessarily. Within a single community, property tax differences caused by assessment errors are not related to variation in service levels. Similarly, changes in property taxes caused by revaluation, which are corrections of such assessment errors, are not linked to changes in service quality.

Even across communities, service and tax capitalization may work in opposite directions, but they are unlikely to offset each other completely. In fact, some communities with relatively high service quality also have relatively low property taxes because they have a large industrial tax base to share the tax burden. All else equal, the low taxes and high service quality both lead to relatively high property values in these communities. Other communities with relatively high property taxes may have relatively low service quality because their cost for providing services is relatively high; for example, they may have to pay higher wages than other communities to attract employees away from private business. The high taxes and low service quality both lead to relatively low property values in these communities. It is appropriate, therefore, to distinguish between the capitalization of property taxes and of public service quality and to estimate them separately.

A simple asset-pricing model indicates that property tax capitalization will be complete; a $1 difference in the present value of property taxes will lead to a $1 difference in house values. For three reasons, however, this simple model may not apply directly to intrajurisdictional property tax capitalization.

First, a household that is aware of the property taxes on a house it wants to purchase may not know how those taxes compare to the town average. In this book, we study the impact of a house's property tax relative to the average on its relative market value. With imperfect information about taxes on other houses, a household's bid on a house may not exactly reflect the present value of taxes on that house relative to the town average.

Second, even if a household is fully aware of the relative property

taxes on a house, it may be willing to pay a price that does not fully reflect those relative taxes in order to avoid the costs of further housing search. People trying to sell houses with relatively high property taxes obviously would rather not lower their asking prices to reflect those taxes. The combination of sellers avoiding lower asking prices and buyers avoiding search costs could lead to less-than-complete property tax capitalization.

Third, even if households have perfect information and no search costs, they may not expect current property tax differences to persist indefinitely. In the context of this study, property tax differences arise because of assessment errors that occur before revaluation. Even before revaluation is announced, households may expect that these errors eventually will be corrected. The effect of this expectation can be dramatic; we show, for example, that if tax differences are expected to disappear in ten years, the capitalization of current tax differences could be as low as 26%. If errors that exist when a house is sold are expected to disappear over time, then house values will reflect only a fraction of the present value of current tax differences; that is, the capitalization of current tax differences will be incomplete.

We present several pieces of evidence to support the conclusion that the degree of capitalization is far below 100% primarily because households do not expect pre-revaluation property tax differences to persist. Revaluation was widely publicized and debated, for example, and in several communities housing prices in the period immediately preceding revaluation reflect anticipated property tax changes. We also find some evidence that capitalization varies across communities because of differences in information about relative property taxes and differences in housing search costs. The degree of capitalization appears to be lower, for example, in communities with more complex housing markets, where information is more difficult to obtain.

4. WHY DOES PROPERTY TAX CAPITALIZATION MATTER?

Property tax capitalization has an important influence on the evaluation of public policies that alter property tax payments, including assessment reforms, property tax classification, regional tax-base sharing, and state grants to local governments. These policies tend to raise the relative property tax payments of some property owners and lower the relative tax payments of others. Some policies, such as community-wide revaluation, have a direct effect on effective property tax rates within a community. Other policies, such as regional tax-base sharing and equalizing state aid, may lead to property-tax increases in some communities and property-tax decreases in

others. The impact of these tax changes on property owners, which is central to an evaluation of the policies, depends on capitalization.

Consider a homeowner whose relative tax payment rises. Without capitalization, tax changes affect the stream of tax payments but not the market price of the house, so this household can escape its higher taxes by selling its house and moving to another location. With capitalization, on the other hand, tax changes are immediately translated into changes in the price of housing and this homeowner has no escape; either she stays in her house and pays the higher stream of taxes or she sells her house and suffers the capital loss caused by the increase in the tax stream. Furthermore, the capital loss is the present value of the entire future tax stream. Remember that with a discount rate of 3%, a $300 increase in the annual tax payment leads to a $300/.03 = $10,000 decrease in house value. With capitalization, therefore, modest changes in tax payments can lead to large gains and losses for current homeowners. If poor information or high search costs lead to incomplete capitalization, a homeowner can escape some of the burden of higher future tax payments.

Capitalization has important implications for the fairness of policies that alter property tax rates. Assessment reform is often motivated, for example, by the observation that some property owners are paying less than their fair share of taxes. With capitalization, however, no one can buy a house with relatively low taxes unless he or she pays a relatively high price for the house; that is, people with relatively low taxes must pay for the privilege. Similarly, people with relatively high taxes paid a relatively low price for their property. Moreover, correcting an assessment error causes an immediate capital gain or loss equal to the present value of all the future consequences of the correction. Assessment reform involves some inequity, therefore, because it generates capital gains for some taxpayers and capital losses for others.

Despite these arguments, assessment reform is desirable under most circumstances. With fixed or inaccurate assessments, the effective property tax rate on a house, which is the property tax payment divided by the market value of the house, changes as the market value of the house changes. In the presence of capitalization, a taxpayer who experiences a decline in the effective tax rate on her house relative to other houses immediately receives a capital gain equal to the present value of the entire future stream of relative tax savings. This property owner can realize this gain by selling her house, so that any future correction of this assessment error will burden future owners. These owners gain nothing from their relatively low property tax rate, even before it is corrected, because they had to pay a relatively high price for the property. Similarly, taxpayers who experience relative tax-rate increases receive a capital loss on their house. These gains and losses, which are

generated by assessment errors, are inherently unfair, and assessment reform is needed to prevent them.

Overall, the case for assessment reform depends on the balance between the long-run improvement in fairness from preventing future assessment errors and the short-run loss in fairness from eliminating past assessment errors. If the degree of capitalization is 20%, as we estimate, the short-term gains and losses are modest and the case for reform is strong. We demonstrate in Chapter 7, for example, that few of the houses in one Massachusetts community experience gains or losses from revaluation that are greater than 10%. Moreover, the degree of capitalization will be low if house buyers do not expect assessment errors to persist, so a stated policy to update assessed values regularly, and thereby to eliminate assessment errors, will by itself lower the degree of capitalization and minimize short-term capital gains and losses from reform.

The only type of assessment reform that cannot be justified is a sudden, one-time reform after a long period of inaccurate assessments. In this case, the large pre-revaluation effective tax rate differences are expected to persist, so the degree of capitalization is high, and the reform leads to large capital gains and losses for current homeowners. In addition, a one-time reform does not improve fairness in the long run because it does not prevent arbitrary gains and losses after revaluation, as market values once again diverge from assessed values.

Capitalization also has practical consequences for a tax assessor. A house's tax payment is based on the assessor's estimate of its market value. When assessment reform occurs, the tax payments on some houses go up and the tax payments on other houses go down. These tax changes lead to changes in house values, which in turn lead to further changes in tax payments, and so on. In Chapter 7, we also show how to calculate the "final" market value of a house after this cycle of tax and value changes has been completed.

Finally, property tax capitalization has consequences for the efficiency of the property tax. Without property tax capitalization, the property tax raises the effective price of housing and thereby induces households to buy less of it. This distortion in housing decisions, like a tax-induced distortion of any other decision, represents an inefficient allocation of society's resources. With complete property tax capitalization, on the other hand, the price of housing exactly reflects differences in property taxes across and within communities. As a result, the effective price of housing, that is, the market price plus the property tax payment, does not vary across locations and higher property taxes do not lead to lower housing consumption.

Although complete property tax capitalization eliminates housing-market distortion from variation in the property tax, it does not eliminate

housing-market distortion altogether. Even with complete tax capitalization, housing consumption decisions are affected by the average level of property taxes in a metropolitan area. Capitalization only insures that the resulting distortion is the same in every community.[3]

5. HOW IS THIS BOOK ORGANIZED?

Many studies have attempted to estimate the degree of property tax capitalization. We review these studies in Chapter 2. Our review evaluates what has been learned about tax capitalization and focuses on the methodological obstacles confronting previous research, including biases from simultaneity, left-out variables, and misspecification.

In Chapter 3, we present our new approach to estimating intrajurisdictional property tax capitalization. We combine well-known microeconomic tools with the circumstances of revaluation in Massachusetts to derive an equation for estimating the degree of tax capitalization. This equation determines the impact of a change in the effective property tax rate relative to other houses on the percentage change in house value relative to other houses. We also explain how our approach overcomes the methodological obstacles encountered by earlier studies. For example, we account for the simultaneity between house values and tax rates by modeling the behavior of an assessor carrying out a revaluation.

To estimate our capitalization equation, we collected double-sales data for houses in seven communities in Massachusetts. We describe this data in Chapter 4. We explain how we selected the sample communities, outline the characteristics of each community, and list the sources of our double-sales data. In this chapter, we also relate the history of revaluation in two of the communities.

We explain our econometric methodology in Chapter 5. Our estimating equation is nonlinear and involves simultaneity between house value changes and property tax rate changes. We derive a simple linear approximation to this equation, which we can estimate with two-stage least squares, and we discuss the appropriate nonlinear simultaneous equations procedure, which we can estimate with well-known maximization techniques.

We present our results in Chapter 6, focusing on our estimates of the degree of property tax capitalization, as obtained from both our linear approximation and our exact nonlinear form. We examine the importance for estimated capitalization of various control variables and of instruments to correct for the simultaneity between house values and tax rates.

In Chapter 7, we interpret our results and consider the implications of property tax capitalization for public policy. We examine the sources of

variation in the degree of capitalization from one community to another, we explain why policy makers should care about capitalization, show how to incorporate capitalization into property tax assessment procedures, demonstrate the impact of capitalization on the gains and losses from assessment reform, and discuss the implications of capitalization for the equity and efficiency of the property tax.

NOTES

[1] Present value formulas and approximations to them are discussed more fully in Chapter 3.

[2] Ignoring monthly compounding, the annual payment on a mortgage equals the amount of the mortgage multiplied by the expression $m/[1 - (1 + m)^{-M}]$, where M is the term of the mortgage in years. With no down payment and a long term, this expression is approximately equal to m.

[3] Curiously, the capitalization of public service quality, unlike the capitalization of taxes, causes housing market distortion that varies from one community to another. If higher service quality leads to higher house values then it must as a direct consequence lead to lower housing consumption; that is, it must distort housing choices. In this book, we do not shed any light on the capitalization of public service quality into house values. We simply note that a complete evaluation of efficiency in the U.S. system of local governments must consider both types of capitalization. For a detailed discussion of the link between service capitalization and efficiency, see Yinger (1985).