

WHY DO PROPERTY TAX BILLS CHANGE SO MUCH FROM ONE YEAR TO THE NEXT?

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Summary. Each individual's property tax *bill* depends directly on everyone else's *assessment*. For this reason, all property owners have an interest in a fair assessment system.

When property tax bills change, especially by large amounts, the change is almost always caused more by changes in people's *relative* assessments than by changes in government spending.

WARNING! I use algebra to develop some of the ideas below. Math phobic readers and others uninterested in math can skip from the first three paragraphs of the "Introduction," immediately following, to the section titled "Implications for property owners."

Introduction. Details below about the property tax system are from Illinois law. Some aspects of the tax differ in other states, but [all systems are similar in their main characteristics](#) and the conclusions apply everywhere.

Property tax bills vary from year to year, often in ways that seem confusing. Much of the confusion arises because the tax consists of many moving parts. Understanding the relationships among each individual taxpayer's assessment, everybody else's assessment, and the amount of money governments want from the property tax will make it easier to understand not only your own property tax bill but also changes in the property tax system proposed by various individuals and interest groups.

Each government body authorized to raise property tax revenue first determines the amount it wants from the property tax. This amount, called the levy (or extension), is divided by the total of all taxable assessments, often called the equalized assessed value, in order to obtain that year's tax rate:

$$(1) \quad r = \frac{L}{EA}, \text{ where:}$$

r = the tax rate for any given taxing body.

L = the levy for that body.

E = [the state-determined equalizer](#) for the county in which the property is located. ¹

A = the sum of all (unequalized) assessments for property that is taxable by that body.

Thus, EA represents total equalized assessments, or the tax base.

An individual's tax bill, or t , can be expressed as:

$$(2) \quad t = rEa, \text{ where:}$$

a = the individual's unequalized assessment (and Ea the individual's equalized assessment).

Irrelevance of the equalizer. One lesson from the preceding arithmetic is that the equalizer has no impact on tax bills. To see this, substitute the formula for the tax rate from Equation (1) into Eq. (2):

$$(3) \quad t = \frac{L}{EA}Ea = \frac{L}{A}a$$

The two occurrences of the equalizer (E) to the right of the first equals sign cancel each other out. If the equalizer increases, driving up assessments, it affects all properties in the same way and drives down the tax rate by the same proportion. Individual tax bills remain unchanged. Likewise, if the equalizer decreases, reducing all assessments, it drives up the tax rate by an offsetting proportion. Again, bills remain unchanged.²

At this point, for some taxpayers, exemptions may come into play, but we ignore them here for the sake of mathematical simplicity.

In the end, the total amount of taxes owed by each individual is the sum of the separate amounts owed to each jurisdiction within which the property is located.

Changing levies and assessments. Now consider what happens to tax bills when levies and assessments change. Mathematically, the change in any variable can be denoted by the symbol Δ , pronounced “delta.” For example, ΔL (“delta L”) means the decimal equivalent to the percent change in the levy (L) from one year to the next. Then L times $(1 + \Delta L)$ is the new levy. In other words, if the levy increases three percent, ΔL is 0.03. The new levy is 1.03 times the previous levy, or $1.03L$.

For any given variable, Δ can be positive, negative, or zero.

Using the Δ notation, Eq. (4) shows how various changes affect an individual’s tax bill:

$$(4) \quad t_2 = \frac{L(1 + \Delta L)}{A(1 + \Delta A)}a(1 + \Delta a), \text{ where:}$$

the subscript on t indicates taxes in the second time period, that is, after possible changes in one or more of the other variables.

Rearranging terms:

$$(5) \quad t_2 = \left(\frac{L}{A}\right)a\left(\frac{1 + \Delta L}{1 + \Delta A}(1 + \Delta a)\right) = t_1(1 + \Delta L)\left(\frac{1 + \Delta a}{1 + \Delta A}\right)$$

The percent change in a tax bill, Δt , from Time 1 to Time 2 is:

$$(6) \quad \Delta t = \frac{t_2 - t_1}{t_1} = \frac{t_1(1 + \Delta L)\left(\frac{1 + \Delta a}{1 + \Delta A}\right) - t_1}{t_1}. \text{ Performing the division by } t_1 \text{ yields:}$$

$$(7) \quad \Delta t = (1 + \Delta L)\left(\frac{1 + \Delta a}{1 + \Delta A}\right) - 1$$

Implications for property owners. Equations (5) and (7) make it clear that the change in any individual's tax bill depends not only on changes in the government's levy, but also, and importantly, on the relationship between the percent change in that individual's assessment and the percent change for all assessments combined. Any change in relative assessments intensifies, up or down, the impact of a change in government levies.

For example, if levies increase three percent, an individual's assessment increases 60 percent, and the tax base (the sum of all assessments) increases 20 percent, the change in that individual's taxes will be:

$$\Delta t = 1.03 \frac{1.6}{1.2} - 1 = 1.373 - 1 = 0.373, \text{ or } 37.3\%.$$

Despite the levy increase of only three percent, new taxes are more than 37 percent higher than they were, or 1.37 times the amount of the previous bill. Although this is less than the 60-percent jump in the individual's assessment, it is still a large tax increase. Even if the levy had not changed at all, this individual's tax bill would go up 33 percent, or one third.

For someone else whose assessment increases 15 percent while the levy increases by three percent and total assessments by 20 percent, taxes decrease by 1.3 percent, to 98.7 percent of what they were. The increase in total assessments more than offsets not only the individual's higher assessment but also the higher levy. If the levy had remained unchanged, this individual's taxes would drop even further—by more than four percent, to 95.8 percent of the previous level.

Implications for policy. In any government body with differing real estate submarkets, such as most cities of even moderate size, reassessments frequently produce variations as large as or larger than the examples just described. The presence of property owners with both large and small percent changes in their assessments within the same taxing jurisdiction leads to widely differing tax changes among taxpayers from one year to the next. This is one of the primary reasons for residents' perception that the property tax is unfair, leading to general discontent with the property tax and sometimes to what are colloquially called taxpayer revolts.

This situation inevitably results from assessments correctly made according to the traditional norms of assessment practice. Realizing this conundrum and finding reasonable, creative ways to deal with it are critical to re-establishing public trust in the underlying fairness of the property tax system.

Implications for everyone. The property tax is the linchpin of strong local governments. Whenever the state and federal governments provide "aid" to local governments, they attach strings to their money. Residents provide the total revenue for all governments through one type of tax or another. Outside aid is always under threat of being taken away whenever the outside government faces its own revenue crisis.

No entity, government or private, can long thrive without a reliable source of revenue under its own discretionary control. People who favor financially vigorous, independent local governments have a strong interest in maintaining or restoring the fairness of and public support for the property tax.

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Details in this report about the property tax system are from Illinois law. Some aspects of the tax differ in other states but many aspects are the same.

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¹Some states do not have local "equalizers." However, as Equation (3) makes clear, the equalizer cancels out and its presence or absence does not limit the applicability to other states.

²The equalizer has always been strictly irrelevant for jurisdictions not subject to state-imposed tax rate limits (in Illinois, these are called "home-rule" governments). In some years for some rate-limited ("non-home-rule") governments, the size of the tax base, EA , indirectly enforces a limit on levies through the maximum rate allowed for that type of body. Any calculated rate higher than the allowed maximum is automatically reduced to the maximum. Local voters can permit a higher rate by approving it in a referendum.

This rate-limiting effect is rarely seen any more in the Chicago area because of the Property Tax Extension Limitation Law (PTELL). The State legislature enacted PTELL partly to counter the tendency of certain non-home-rule units to confuse the relationship between levies and rates. They would levy far in excess of what their maximum rate allowed. Then, however high equalized assessments went, especially in a reassessment year, their rate would remain the same and spokespeople could assert that tax bills increased because of the Assessor's actions or the State equalizer (which they often called the "multiplier" for its putative effect in this case of multiplying taxes).

PTELL limits levy growth for non-home-rule bodies to the lower of five percent or the rate of inflation over the prior year's legally realizable levy. Because most tax bases have grown faster than this, even governments that previously were at their rate limit have now fallen below it.