Tax Spike Dashboard Documentation

Dashboard Authors

Nicole Jardine – Chief Data Officer, Cook County Assessor's Office
Kyra Sturgill – Director of Data Analytics, Cook County Assessor's Office
William Ridgeway – Senior Data Scientist, Cook County Assessor's Office

Tax Spike Dashboard Overview

https://www.cookcountyassessor.com/historical-analysis-property-tax-spikes-2021-2023
Published in May 2025

What does this dashboard do?

The interactive Tax Spike dashboard quantifies "tax spikes" from Tax Years 2020-2021, 2021-2022, and 2022-2023, affecting tax bills issued in calendar years 2022, 2023, and 2024.

It visualizes bar charts counting PINs that experienced the defined tax spike and bill change amounts, and maps indicating the percentage of homes that have experienced a tax spike.

These spikes are aggregated at different levels: countywide, per Assessor neighborhood, and per political geography.

The dashboard allows the user to define the parameters of a tax spike, based on the % change and the $ change of the change in the tax bill, and the maximum value of the home. The dashboard contains calculations that automatically recalculate the data visualized to reflect the user's changed parameters.

This dashboard was built using data publicly available, including tax data from PTAXSIM. It is not designed to update.

The rest of this document contains an overview of the calculations and logic within this dashboard, with some notes and caveats.

Technical questions?

Reach Nicole, Kyra, and William at Assessor.Data@cookcountyil.gov

Tabs

Tab Name	Tab Goal	Contains sheets
Property Tax Spikes	Introduce tax spikes and parameters, show countywide summary and map, and link out to other tabs.	caption_params, Tax Spike Map – County, count: County
By: Municipality	Show tax spikes per municipality, in bar charts and a map.	caption_params, count: Municipality, Tax Spike Map - Municipality
By: Township	Show tax spikes per Township, in bar charts and a map.	caption_params, count: Township, Tax Spike Map - Township
By: Ward	Show tax spikes per Chicago ward, in bar charts and a map.	caption_params, count: Chi, Tax Spike Map – Ward
By: State House	Show tax spikes per State House district, in bar charts and a map.	caption_params, count: House, Tax Spike Map – State House
By: State Senate	Show tax spikes per State Senate district, in bar charts and a map.	caption_params, count: Senate, Tax Spike Map – State Senate

Raw Data & Extract Creation

Raw Data

There are two data sources:

- Spatial file of assessment neighborhoods (Assessor – Neighborhood Map)
- Flat file of property tax data, reshaped mostly using data from PTAXSIM (the file can be downloaded by selecting this link)

Briefly, the raw data is a reshaped version of tax.pin for property tax class, AV, and bill data, joined to political geographies from vw_pin_universe by PIN. It is based on a universe of all Cook County PINs that existed in TY2020-2023.

The raw data does not contain every PIN in Cook County. The data source excludes:

- any PIN that did not have at least one homestead exemption in any TY2020-2023.
- PINs with null AVs in 2023 (otherwise the geographic aggregation becomes difficult to interpret because these expired PINs could be associated with political geographies that were altered in 2023 redistricting).
- Any PINs that were not class 2 in at least one year in TY2020-2023.

Reducing the number of rows helps reduce the file size of the raw data, which can improve dashboard speed and make the data easier to analyze using other software.

The raw data also includes a few columns that reflect calculations, such as a column that indicates whether a PIN had the same set of exemptions across two years. Persisting these in the raw data rather than calculating them in Tableau is a best practice for a responsive dashboard.

Extract creation

The neighborhood [shape](#) file connects to the `ptax` flat file export.

2021.geojson		ptax_raw

This is the relationship between these:

2021.geojson	Operator	ptax_raw
Abc Town Nbhd ▼	= ▼	Abc Nbhd1 ▼

Tableau parameters, groups, calculated fields, filters, and logic

The dashboard is interactive and responds to the user's parameters. It also has filters and logic.

The general idea is that first, the dashboard determines whether a PIN is a "Pre-Qualified" homeowner. A PIN is "Pre-Qualified" if its property class code was 2 (residential), and it had the same exemptions, across a year-over-year span (i.e., 2020-2021, 2021-2022, or 2022-2023). These are fixed in the dashboard and are unaffected by the user's parameters.

A PIN is counted as a "Qualified" homeowner with a tax spike if it meets two criteria: it is a "Pre-Qualified" homeowner, *and* it meets the user's parameters for a tax spike in the same year.

User Parameters

There are three parameters that the user can modify to adjust tax spike criteria:

- **Tax % change (min):** the minimum year-over-year % change for a bill to qualify as a spike.
- **Tax $ change (min)**: the minimum year-over-year $ change for a bill to qualify as a spike.
- **Max market value (end year):** the maximum fair market value the PIN can have, in the latter year of the tax change. In the calculated fields determining if a PIN is Qualified, the market value is converted to Assessed Value (AV) by applying the level of assessment of 10% for residential properties.

These all affect the "Qualified" calculations described in the next section.

Calculated fields: PreQualified

There are four calculated fields – `[PreQualified 20to21]`, `[PreQualified 21to22]`, `[PreQualified 22to23]`, and `[PreQualified]` – developed to identify whether the PIN is a PreQualified homeowner (based on class and exemptions, before looking at tax spike criteria) in a one-year change, e.g., 2020-2021.

See the calculated field for this. For example, here's the calculation for `[PreQualified 20to21]`:

```
IF
   [Exe 20Vs21] = 'Same exe' AND
   [Class 2020]='2' AND
   [Class 2021]='2'
 THEN TRUE
 ELSE FALSE
END
```

We use similar calculations for `[PreQualified 21to22]` and `[PreQualified 22to23]`.

A PIN is PreQualified if it is PreQualified in at least one of the year-over-year spans. Here is the calculation for `[PreQualified]`:

```
IF
([PreQualified 20to21]=TRUE OR [PreQualified 21to22]=TRUE OR
[PreQualified 22to23]=TRUE) THEN TRUE
ELSE FALSE
END
```

Calculated fields: tax change variables

`[Q_tax_$change]` and `[Q_tax_%change]` calculate the $ and % change for *qualified* PINs, depending on the year.

```
// for Qualified PINs only: the $ tax change, from the base year to the
end year of the qualified change.

IF [Qualified 20to21] THEN [tax$ 20to21]
   ELSEIF [Qualified 21to22] THEN [tax$ 21to22]
   ELSEIF [Qualified 22to23] THEN [tax$ 22to23]
   ELSE NULL
END
```

These rely on other calculated fields, like [tax$ 20to21], that just take the diff of the raw data – in this case, `[Ptax 2021] – [Ptax 2020]`.

Note that for the tax percent changes, like `[tax% 20to21]`, we add $1 to the numerator and denominator to prevent a divide-by-zero error, which would erroneously exclude Qualified PINs that go from a $0 bill to a $1800 bill:

```
// % tax change.
//
// Adds 1 to the numerator and denominator so that if the denominator
was a $0 bill year, we aren't creating a divide-by-zero error.

([tax$ 20to21]+1)/([Ptax 2020]+1)
```

Calculated field: TF taxchange

The calculated fields `[TF taxchange 20vs21]`, `[TF taxchange 21vs22]`, and `[TF taxchange 20vs21]` compare the tax bills across a one-year change to see if the difference in the bills meets the user's parameters for a spike based on the dollar change and the percent change. For example, the calculated field for `[TF taxchange 20vs21]` is:

```
IF [tax% 20to21]>=[Param tax % change]
AND [tax$ 20to21]>=[Param tax $ change]
THEN TRUE
ELSE FALSE
END
```

These calculated fields return a Boolean based on condition that both `[tax% 20to21]` and `[tax$ 20to21]` are greater than or equal to the user's parameters.

Calculated field: Qualified

If a PIN meets PreQualified (Homeowner) criteria in a year-over-year-span (e.g., 20to21) *and* it has a market value and a tax spike meeting the user criteria, then it is a Qualified PIN, i.e. a Homeowner with a Tax Spike from 20to21.

Here is the calculation for `[Qualified 20to21]`:

```
// PIN is qualified based on exemptions, class, and AV criteria.
(boolean)
IF
   [PreQualified 20to21] AND
   [TF taxchange 20vs21] AND
   [Bor Av 2021]<=[Param max MV (Q end year)] / 10
 THEN TRUE
ELSE FALSE
END
```

We use similar logic for calculated fields `[Qualified 21to22]` and `[Qualified 22to23]`.

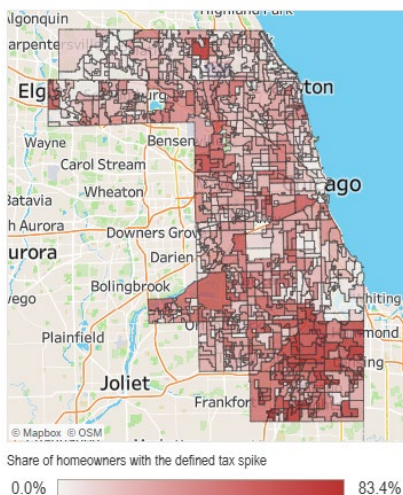Finally, here is the calculation for `[Qualified]`:

```
IF
([Qualified 20to21]=TRUE OR [Qualified 21to22]=TRUE OR [Qualified
22to23]=TRUE) THEN TRUE
ELSE FALSE
END
```

Note that this will return TRUE if any one of the years is met.

Data visualized

236,841 homeowners had a **property tax bill spike** between Tax Years 2021-2023.

Share of homeowners with the defined tax spike
0.0% — 83.4%

Choropleth maps: Percent of homeowners

The maps show polygons of assessor neighborhood, with color indicating the percentage of homes that meet the spike criteria. This calculated field is `[% spike PINs out of preQ]` within a neighborhood.

The calculation for this takes the number of PINs that meet Qualified criteria, i.e., Homeowners with Tax Spikes, calculated as `[# spike PINs]`, divided by the number of PINs that meet PreQualified criteria (Homeowners), calculated as `[# pre-qualified PINs]`.

Bar Charts

All bar charts contain **# spike PINs, Median tax spike ($),** and **Total tax spike ($)**.

These bar charts are filtered to only show data from Qualified PINs. The bars count the number of distinct PINs that meet Qualified criteria, contain the median tax spike, and the

sum of all tax spikes, for those homeowners with tax spikes (i.e., this data is filtered to only PINs where `[Qualified]` is `TRUE`).

Notes and caveats

- **PINs can meet the criteria multiple times but will be counted in the total a maximum of once: the first year it meets Qualified criteria.**
  If a PIN meets the criteria for multiple years, data are _not_ summed across multiple years. The dashboard uses data from the PIN's first qualified year.
  This means that if a PIN met the criteria `[Qualified 20to21]` and `[Qualified21to22]`, it will add 1 to the tax spike PIN count, and its bill from Tax Years 2020 and 2021 will be used for the calculations of the bill spikes.

- **This dashboard exhibits behavior that might be counterintuitive when the spike criteria are very low, such as a minimum tax change of 0% change and $0.** With these parameters, there are 989k homeowners meeting these criteria, but note that the median tax spike is just $165, and the total tax spike $447M. _This dashboard is not built to analyze tax bill changes per year_. This _does not mean_ that the median tax bill change across the county in a single year was $165 (it depends on which area was reassessed), and it _does not mean_ that the total tax change experienced by homeowners from 20-21, 21-22, or 22-23 is $447M (it was much larger)._
  Here's why. From the bullet above, recall that a PIN meets the Qualified criteria the first year it qualifies, _not_ for the biggest spike it has, from 20-21, 21-22, or 22-23. As an example, imagine a South Tri PIN that had a bill increase of $5 in 20-21, $5 in 21-22, and $5,000 in 22-23. Because our criteria are a 0% and $0 increase, its first qualified year is 20-21, and so its tax bill change of $5 is what is used to calculate the median and total tax change.
  Analysts who want to learn more about median tax changes are encouraged to look to the Cook County Treasurer's reports released each Tax Year.

- **Assessor neighborhood geographies do not align with political geographies, and are not taxcodes or taxing geographies.**
  This dashboard uses Assessor Neighborhood maps, but these neighborhoods were developed to reflect housing submarkets within assessment townships. Neighborhood boundaries do not necessarily align with various political geographies.
  This is related to the By: Municipality, By: Ward, By: State House, and By: State Senate dashboards. On these dashboards, the user can select a specific geo id, such as State House District 1.
  When the map filters to show the selected geography (for example, selecting "Dixmoor" on the "By: Municipality" tab), it will show any neighborhood that has at least 1 PIN meeting the Qualified criteria in that geography. The whole neighborhood polygon will be shown, even though the geography might not extend throughout the whole neighborhood and there might only be 1 PIN meeting the criteria. But the data for that neighborhood (the PIN count and bill data) will only be determined by the PINs in the selected geography.

- **"PreQualified" and "Qualified" are variable names, _not_ administrative determinations about whether a PIN is qualified for property tax relief.**
  At the time of publication, Illinois does not have a funded circuit breaker program that would provide tax relief to PINs experiencing Tax Spikes. However, readers can learn more about a related legislative proposal that was driven by the data in this dashboard.