**MODEL CITIZENS CONSULTING**

**Improving Property Tax Assessments**

**SLIDE 2: PHILADELPHIA HOUSING PRICE PREDICTION**

* We already have a bunch of data that Philadelphia and the US collect; the question is how they can help us predict residential prices?
* We want to figure this out because Philadelphia is a rapidly growing city and with that comes a surging housing market—numerous properties need accurate assessments.

**SLIDE 3: THE PROBLEM & THE GOAL**

* So why is this important?
  + Behind assessments are people who want their property valued higher or lower for a variety of reasons:
    - Real estate businesses and people selling will want higher assessments to ask for larger selling prices.
    - Long-time residents being displaced from their gentrifying neighborhoods suffer from overvaluation bleeding from new developments nearby, increasing their property taxes, this is a known issue.

**SLIDE 4: THE PROBLEM & THE GOAL**

* Why do we want this, what’s the benefit?
  + More accurate AVM means less over-taxation and under-taxation, everyone pays their fair share.
  + Less real estate distortion in a booming market means more stability for Philadelphia.
  + Better data means a better understanding of the city and its residents for urban planners.

**SLIDE 5 AND 6: DATA OVERVIEW**

* We used open data from sources like Open Data Philly and the U.S. Census Bureau.

**SLIDE 7 AND 8: WHERE ARE EXPENSIVE HOMES?**

* The higher prices toward the Center City, University City, the riverfront, and affluent pockets of the Northwest.
* Potentially because these areas provide easy access to transit, employment centers, and amenities.
* The northern area stretching above Broad Street into parts of West and North Philadelphia displays lower-priced homes, potentially reflecting long-term disinvestment, high vacancy rates, and aging non-renovated housing stock.
* Suggests that sale price is place-dependent in Philadelphia, mostly due to neighborhood qualities.

**SLIDE 9: WHAT DRIVES PRICES?**

* Larger homes = an increase in price, however the spread gets wider as square footage increases, indicating that while square footage is positively associated with price, the weaker relationship among larger properties suggests that additional living space contributes less to value once the home reaches a certain size threshold.

**SLIDE 10: MODEL PERFORMANCE & COMPARISON**

* **RMSE = 138,279.40 →** Predicted sale price differs by about ± $138,279 from actual market sale price.
* **R² = 0.746 →** Explains 75% of variance in home prices.

**SLIDE 11: TOP PREDICTORS**

* In two identical properties in Fitler Square and East Falls, Fitler Square is expected to sell at $431,911.65 more than East Falls.
* An additional square foot increase is associated with $187.32 increase in the predicted sale price.
* An additional dollar increase in median household income is associated with a $0.63 increase in predicted sale price.

**SLIDE 12: HARDEST TO PREDICT**

* University City is the hardest to predict, Penn owns a lot of property that doesn’t get taxed.
* Some less wealthy and disinvested neighborhoods are overvalued, like Parkside and Wynnefield in West Philadelphia.
* Overall model predicts pretty accurately for most neighborhoods in Philadelphia.

**SLIDE 13: CONCLUSIONS & RECOMMENDATIONS**

* Human review for over-valuated neighborhoods that are slowly being gentrified.

**SLIDE 14: LIMITATIONS & NEXT STEPS**

Limitations / Ethical Concerns:

* Undervalues areas that tend to be wealthier and overvalues areas that are historically disinvested.
* Areas with residents who heavily and more reliably depend on personal vehicles, this model is predicting on public transit, not highways.

Future Potential:

* Incorporate additional categorical variables after consideration, like Exterior Condition assessment to make the model more accurate.
* Generalizes well for urban and suburban spaces, but separate rural modeling can be helpful too.