Project Outline Presentation

Housing Prices & School Quality in NRW

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Agenda

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- Motivation
- Research Question
- Data
- Methods
- Next Steps

Motivation

- *Why is this interesting to us?* - Analyzing the real estate market's reaction to various factors is particularly interesting from an economic standpoint, as it offers insights into market dynamics. Additionally, the topic is personally intriguing, adding an extra layer of motivation to explore it further. - We also believe that understanding the relationship between school quality and property prices can provide valuable insights for researchers and individuals interested in the real estate market.

- *Why is this important in a broader context? - Housing markets* are influenced by various social and economic factors, and school quality is also cited as a underestimated determinant of property values, especially in research.[1] - Investigating how much the social index of schools influences housing prices, especially in relation to the proximity of schools, could offer an interesting perspective on the interplay between these factors in urban environments.

[1] Youngme Seo, Robert A. Simons, 2009

Research Question

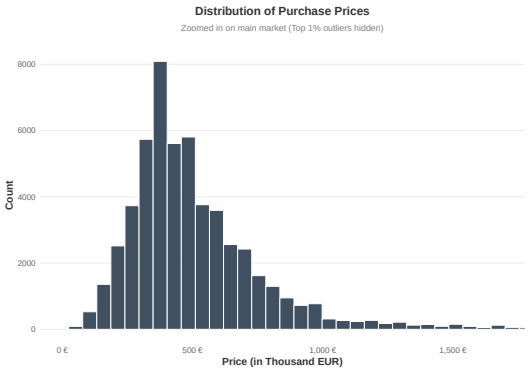
Research Question:
How does the social index of schools influence housing prices, and does the proximity to schools modulate this effect in urban areas?

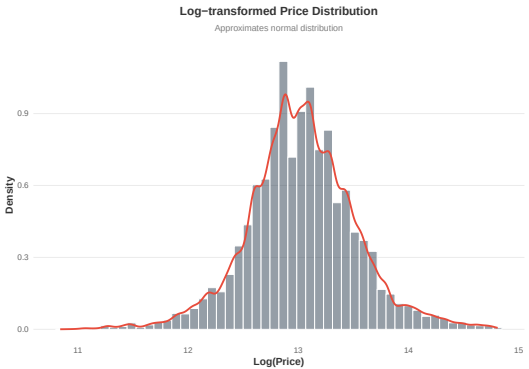
Data

- *Housing Data*(Campus File HK 2022): - Property prices (purchase price, price per sqm) - Characteristics: size, rooms, floor space, year built - Location (urban vs rural)
- *School Data*: - Social Index & quality of education - School types (public, private) - Proximity to schools (distance)
- *Regional Data*: - Demographic: income distribution, unemployment rates - Geographic classification (urban vs rural)

Data : Housing Price Transformation

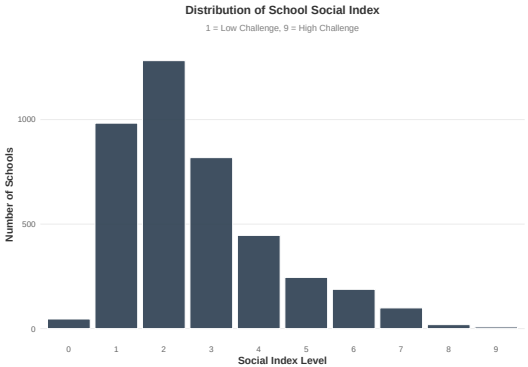
The raw price distribution (left) is highly **right-skewed**, violating the normality assumption required for OLS regression. By applying a **log-transformation** (right), the data approximates a normal distribution, making it suitable for our later analysis model.

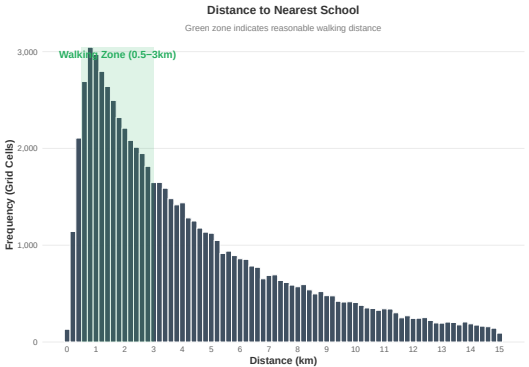




Data : School Quality & Proximity

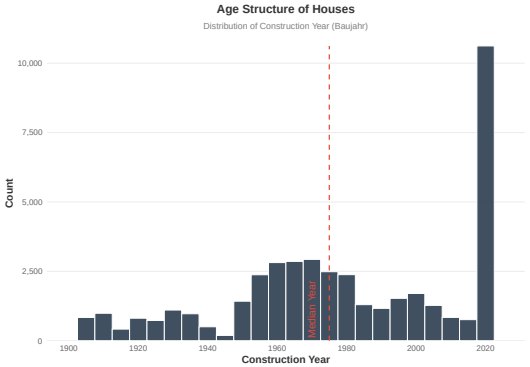
These two variables directly address our research question regarding the impact of school quality and distance on housing prices.

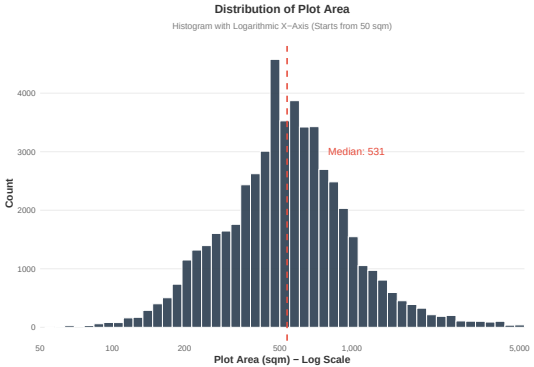




Data : Housing Characteristics

Our sample captures the diversity of the housing stock in NRW. We observe a bimodal age structure (Post-war reconstruction vs. Modern development) and a log-normally distributed plot size (Median: 531 sqm).

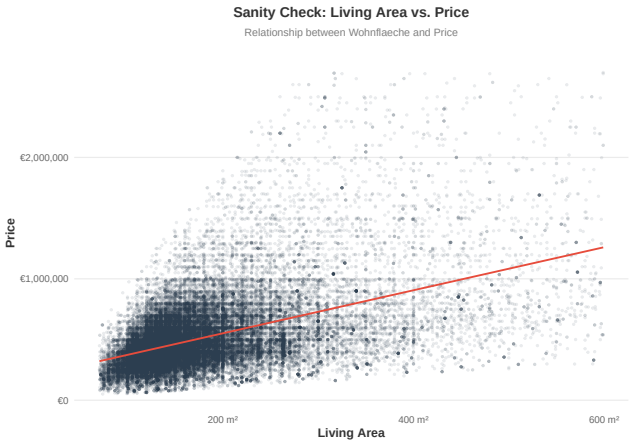




Data Validation

Sanity Check Analysis

- A clear *positive correlation* is observed.
- This confirms economic intuition: *larger houses cost more*.
- The plot helps visually identify *extreme values* for further cleaning.



Empirical approaches in the literature

- In the paper from Black & Machin, they identified six main approaches to analyze the relationship between school characteristics and housing prices:

1. Regression based estimates
2. Parametric and non-parametric modelling of unobservable factors
3. Instrumental variables approaches
4. Discontinuity methods using administrative boundaries
5. Difference-in-difference, repeat sales and quasi-experimental methods
6. Combined methods

Our Method

- Hedonic Pricing Model: Apply a linear regression model to analyze the impact of the social index of schools on housing prices
- Proximity Effect: Incorporate distance to schools as an additional variable to examine whether proximity strengthens or weakens the effect of the social index on housing prices
- Spatial Model: Utilize a Spatial Lag Model or Spatial Durbin Model to account for spatial dependencies and the influence of neighboring schools and properties on housing prices
- Interaction Effects: Investigate the interaction between the social index and distance to schools to assess how proximity modulates the effect of the social index on housing prices

Shortcomings of our strategy

- A regression-based hedonic model in the housing context might be prone to certain endogeneity problems due to omitted variables.
- A reason for that is the extensive scope of relevant housing characteristics and demographic features

`Source: @Machin_2011`

Our Next Steps

- Finalize Data Cleaning: Ensure all data is clean, standardized, and ready for analysis.
- Model Application: Apply appropriate regression and spatial models to examine the impact of school quality and proximity on housing prices.
- Result Interpretation: Analyze the model outputs, interpret key findings, and identify trends.
- Prepare Report & Presentation: Summarize results, create visualizations, and prepare findings for presentation to stakeholders.