

# 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 & Research Question

- *Why is this interesting to us?* - We believe that understanding this relationship can offer valuable insights for individuals making decisions about where to live based on local education quality. Die Qualität von Schulen hat einen entscheidenden Einfluss auf den Wert von Immobilien in der Region. In Nordrhein-Westfalen (NRW) untersuchen wir die folgenden Fragen:
- *Why is this important in a broader context?* - *Housing markets* are influenced by various social and economic factors, and school quality is often cited as a key determinant of property values, also in research.<sup>1</sup>

## Research Question:

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

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<sup>1</sup>Youngme Seo, Robert A. Simons, 2009

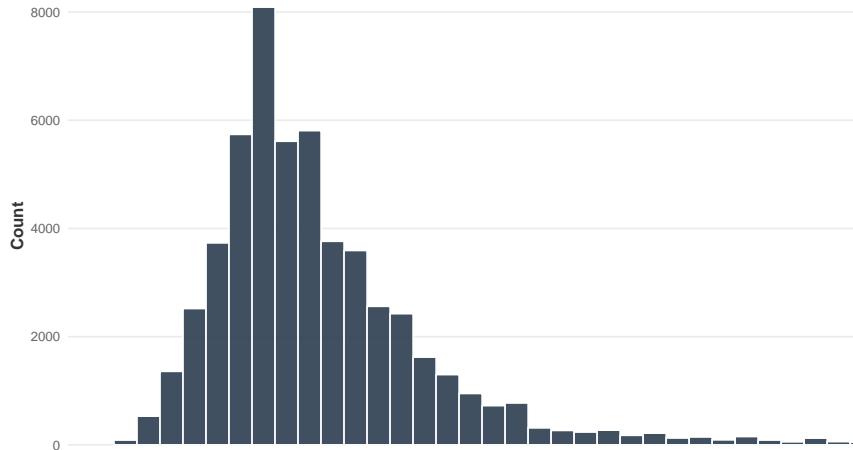
# Data

- *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

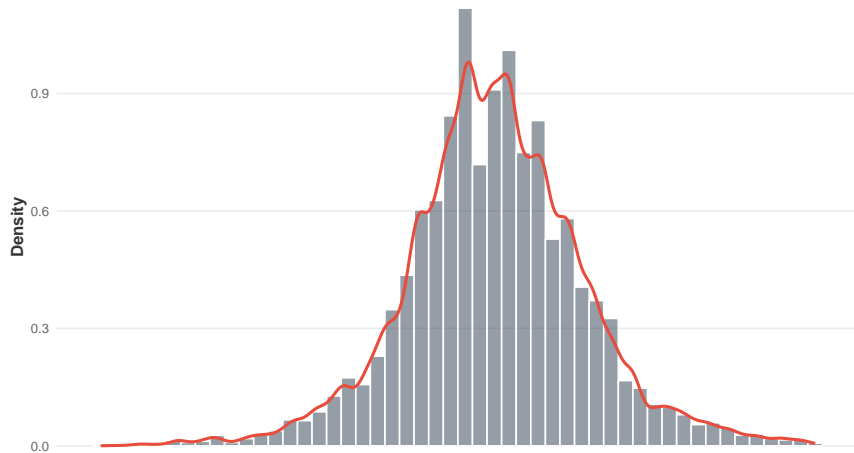
## Distribution of Purchase Prices

Zoomed in on main market (Top 1% outliers hidden)



## Log-transformed Price Distribution

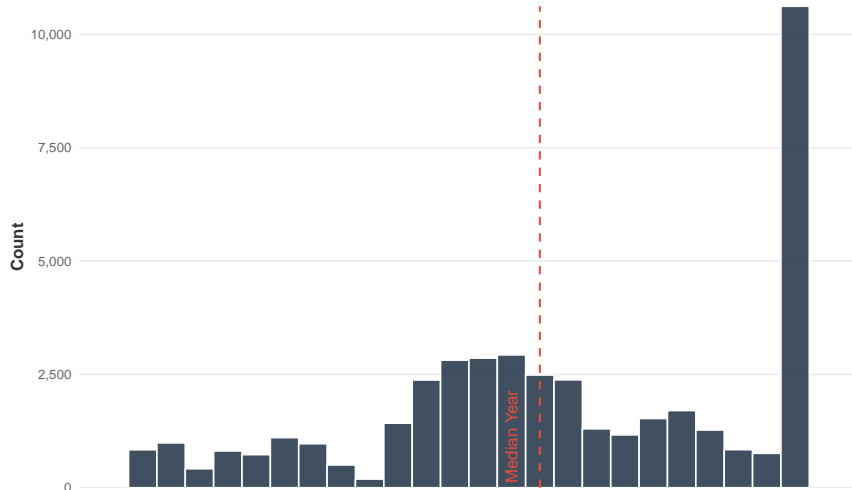
Approximates normal distribution



# Data

## Age Structure of Houses

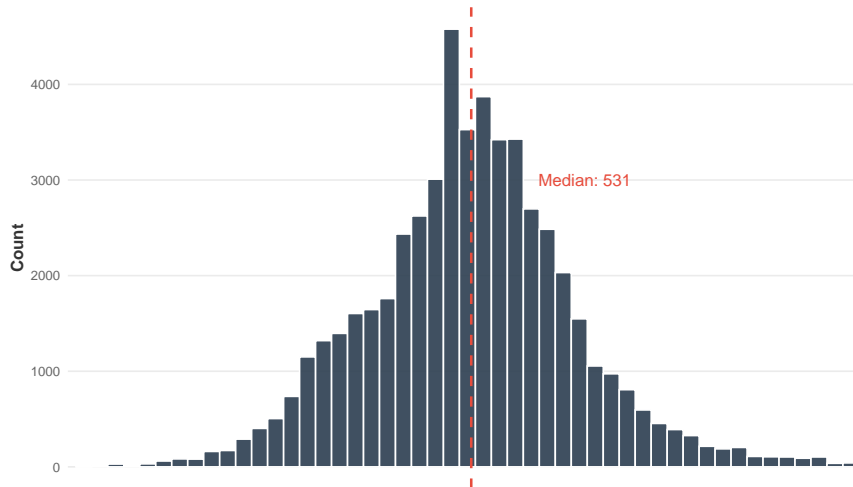
Distribution of Construction Year (Baujahr)



# Data

## Distribution of Plot Area

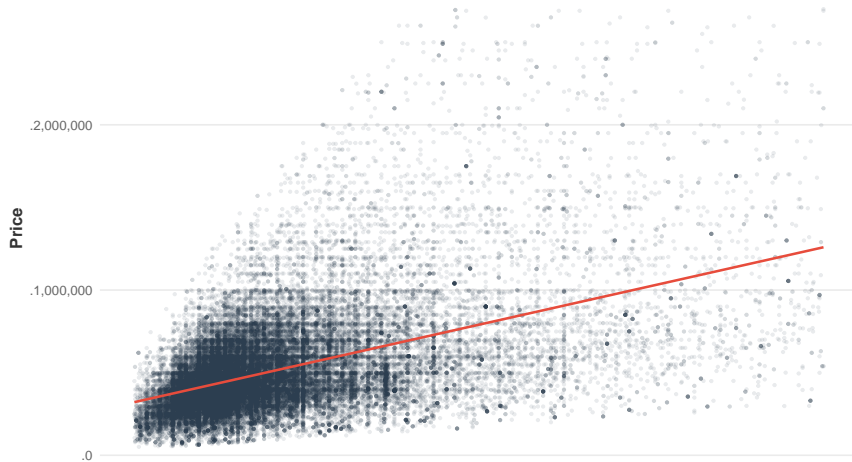
Histogram with Logarithmic X-Axis (Starts from 50 sqm)





## Sanity Check: Living Area vs. Price

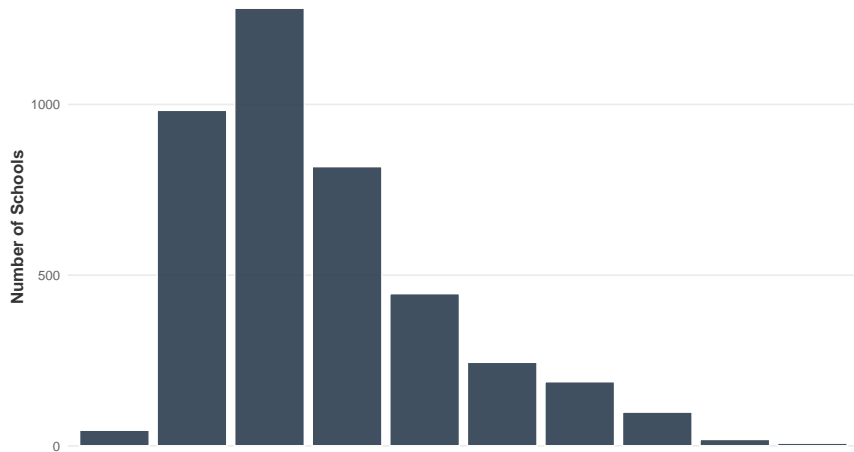
Relationship between Wohnflaeche and Price



# Data

## Distribution of School Social Index

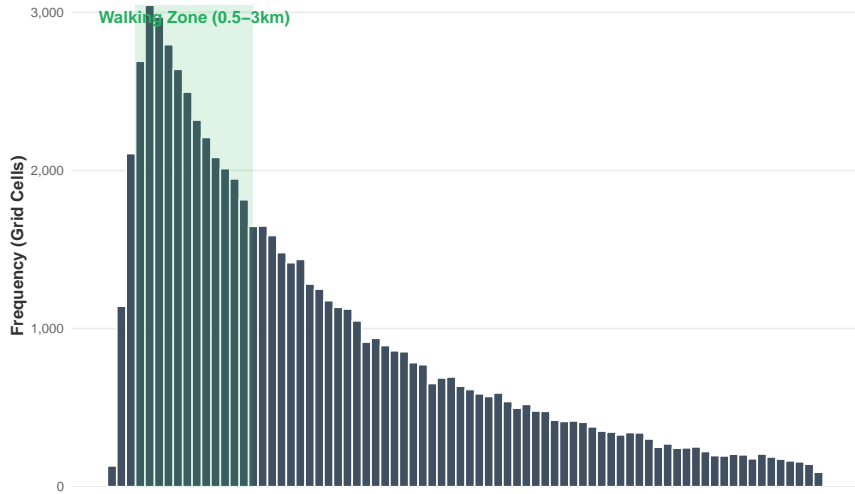
1 = Low Challenge, 9 = High Challenge



# Data

## Distance to Nearest School

Green zone indicates reasonable walking distance



## 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.