

# **The Effects of School Proximity and the School Social Index on Housing Prices**

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# Agenda

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## 1. Motivation, Existing Literature & Research Question

*Why school proximity and social indices matter.*

## 2. Data & Methodology

*Data used and our empirical model.*

## 3. Results & Main Findings

*Presentation and interpretation of our findings.*

## 4. Limitations & Conclusion

*Limitations of our work and concluding thoughts.*

## **Motivation, Existing Literature & Research Question**

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# Motivation

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- **Personal Interest:** 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.
- **Academic and Practical Relevance:** 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 (Seo and Simons 2009).

# Motivation

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Understanding the relationship between school distance, school quality and property prices can provide valuable insights for researchers and individuals interested in the real estate market.

# Related Literature Background

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Several papers have examined the effect of proximity to schools on housing prices:

- **Empirical Strategies:** While hedonic models are the dominant approach to estimating housing price effects, alternative empirical strategies have also been proposed (see Black and Machin 2011)
- **Findings:** Empirical evidence suggests that proximity to schools positively affects housing prices (Rosiers, Lagana, and Theriault 2001; Huang and Hess 2018)

# Related Literature Background

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- **Other Factors:** Related work also documents capitalization effects of school reputation (Chin and Foong 2006), differences between public and private schools (Sah, Conroy, and Narwold 2016) and school quality (Edusei, Espey, and Lin 2007; Metz 2015)
- **Environment of studies:** Much of the literature focuses on settings with binding school catchment areas and measures school quality primarily through test scores rather than demographic composition.

# Research Question

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We study a setting *without binding school catchment areas* (NRW, Germany) and assess whether both *school proximity* and a *demographically based school social index* are capitalized into housing prices.



# Research Question

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**Research Question:** How do school proximity and school social indices affect the prices of detached houses, and do these effects differ between primary and secondary schools in North Rhine–Westphalia?

## **Data & Methodology**

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# Data

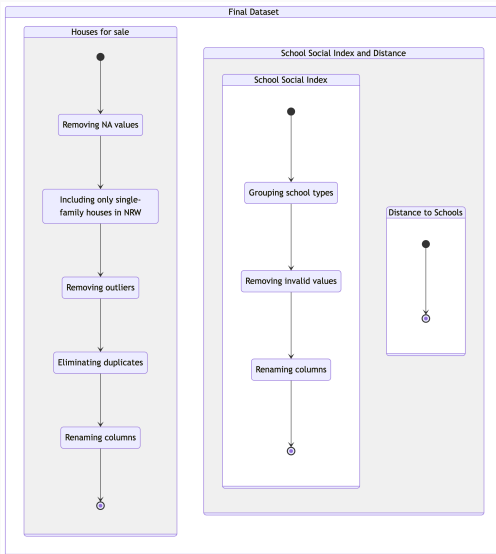
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- **Housing Data:** Cross-section dataset for houses for sale published by the Research Data Center Ruhr (FDZ Ruhr) (RWI and ImmobilienScout24 2023).
- **School Data:** School social index dataset from North Rhine-Westphalias Ministry of Schools and Education (Ministerium für Schule und Bildung des Landes Nordrhein-Westfalen 2024).

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Data used from both datasets refer to the year 2022.

# Pre-Processing of Data



# Empirical Framework

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We estimate regression-based hedonic models to

- examine how school proximity and school characteristics are capitalized into housing prices and
- whether the impact of school proximity on housing prices differs by the school's social index

# Empirical Framework: Hedonic Price Model

$$\log(P_i) = \beta_0 + \beta_1 \text{Dist}_i + X_i' \gamma + \varepsilon_i$$

- $P_i$  denotes the listing price of house  $i$
- $\text{Dist}_i$  measures distance to the nearest school
- $X_i$  is a vector of housing characteristics
- $\gamma$  is a vector of coefficients corresponding to  $X_i$
- $\varepsilon_i$  captures unobserved factors

# Empirical Framework: Hedonic Price Model + Interaction

$$\log(P_i) = \beta_0 + \beta_1(\text{Index}_i \times \text{Dist}_i) + X_i'\gamma + \varepsilon_i$$

- $P_i$  denotes the listing price of house  $i$
- $\text{Index}_i$  is the school social index
- $\text{Dist}_i$  measures distance to the nearest school
- $X_i$  is a vector of housing characteristics
- $\varepsilon_i$  captures unobserved factors

# Empirical Framework: Final Model

$$\log(P_i) = \beta_0 + \beta_1 \text{Dist}_i + \beta_2 \text{Index}_i \\ + \beta_3 (\text{Dist}_i \times \text{Index}_i) + X_i' \gamma + \mu_{\ell(i)} + \varepsilon_i$$

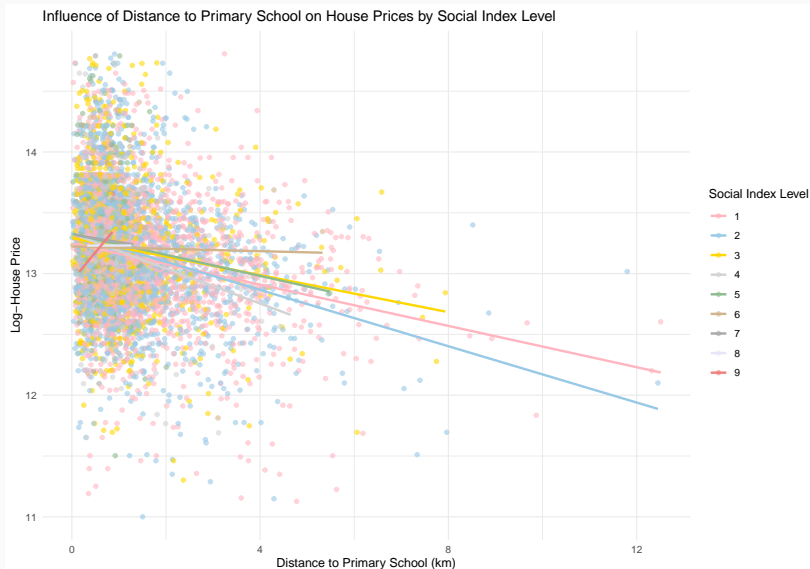
- $P_i$  denotes the listing price of house  $i$
- $\text{Dist}_i$  measures distance to the nearest school
- $X_i$  is a vector of housing characteristics
- $\text{Index}_i$  is the school social index
- $\mu_{\ell(i)}$  are municipality fixed effects
- $\varepsilon_i$  captures unobserved factors



## **Results and Main Findings**

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# Visualization for Distance to Primary School



# Limitations

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- **Direct Distance:** The distance is not measured from the houses to the nearest school directly but from the school to the center of the raster cell.
- **Fragmented Grid:** We do not have data for every grid cell of NRW but only a fragmented set of grids containing houses from the available datasets.

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