4th INTERNATIONAL WORKSHOP ON HIGH-SPEED RAIL SOCIOECONOMIC IMPACTS

# Does the Opening of a High-Speed-Rail Station Impact on House Prices?

## Evidence from a quasi-natural experiment: Reggio Emilia Mediopadana

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# Study object

## Impact of HSR station opening on real-estate prices

*The focus of this study is to assess the **causal impact of the connection of a local area to a high speed rail network (HSR) on real-estate prices**. The **quasi-random location** of the HSR station in the Italian city of **Reggio Emilia** is exploited in a **Difference in Differences** (DiD) research design applied to data from the "Osservatorio del Mercato Immobiliare" provided by the Agenzia delle Entrate. The opening of the Reggio Emilia Mediopadana High-Speed Railway Station represents a significant infrastructure investment with potential implications for the local economy, urban development, and real-estate market. Analyzing its impact on the latter is crucial because such **large-scale transport projects can influence property values by improving accessibility, enhancing connectivity, and making nearby locations more attractive for residential and commercial purposes.** Understanding these effects helps policymakers, investors, and stakeholders making informed decisions about urban planning, investment strategies, and future developments. Additionally, it provides insights into how transportation infrastructure can shape regional economic growth and socio-economic dynamics.*

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# Overview 1/5

## Motivation

- Transport infrastructure investments, transport networks & local economic activity are hotly debated issues that score highly among the policy tools considered by policymakers in place-based policies (Neumark and Simpson, 2015[1]; Ferrari et al. 2019[2]);
- Empirical evidence in economics, regional science and economic geography shows that new transportation networks have **positive** effects on employment, GDP, innovation and land rents of central locations, while **intermediate ones sometimes may lose** (Ahlfeldt & Feddersen 2018[3], Bernard et al. 2019[4]; Koster et al. 2022[5]);
- Many enlargements of High-Speed Railways (HSR) planned or realized. Huge financial resources involved (China has realized 40.000 KMs HSR during last twenty years).

[1]Neumark, D., & Simpson, H. (2015). Place-based policies. In *Handbook of regional and urban economics* (Vol. 5, pp. 1197-1287). Elsevier.
[2]Ferrari, C., Bottasso, A., Conti, M., & Tei, A. (2019). Economic role of transport infrastructure: Theory and models. Elsevier.
[3]Ahlfeldt, G. M., & Feddersen, A. (2018). From periphery to core: measuring agglomeration effects using high-speed rail. Journal of Economic Geography, 18(2), 355-390.
[4]Bernard, A. B., Moxnes, A., & Saito, Y. U. (2019). Production networks, geography, and firm performance. Journal of Political Economy, 127(2), 639-688.
[5]Koster, H. R., Tabuchi, T., & Thisse, J. F. (2022). To be connected or not to be connected? The role of long-haul economies. Journal of Economic Geography, 22(4), 711-753.

# Overview 2/5

## Motivation

- Transportation infrastructure plays an important role in reshaping economic activities. This happens as the changes in accessibility and proximity to the transportation network induce the location effect and the agglomeration effect.
- An improved transportation network increases the number of reachable destinations for a given journey time. As results, business operations become more efficient and local and regional economy prosper.
- The HSR network promotes intercity resources transfer, migration and labors movement. The HSR network induces huge savings in travel time and costs, which makes daily commuting between smaller cities and bigger central cities feasible.

# Overview 3/5

## Motivation

- The "**centripetal force effect**" indicates that resource allocation becomes more polarized among large and small cities and housing prices in the larger centrally located cities increase.
- The "**centrifugal force effect**" indicates that production resources and population spread from the core metropolises to small cities along the corridors of HSR when the network substantially shorten the space–time distance between metropolises and small cities (Hall, 2009[6]), which may push up housing prices in small cities.
- In short, **housing prices are likely to increase when cities have improved access to the HSR network**. As such, this study tests the hypothesis that HSR network accessibility has a positive impact on urban housing prices.

[6]Hall, P. (2009). Magic carpets and seamless webs: Opportunities and constraints for high-speed trains in Europe. Built Environment, 35(1), 59-69.

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# Overview 4/5

## Literature Findings

- **Positive Impact on Property Prices**: HSR tends to increase residential property values, particularly in small and medium-sized cities and suburban areas near new HSR stations. This effect is often observed during the construction phase and when HSR stations are located outside city centers, enhancing overall accessibility and stimulating local real estate markets (Chen and Haynes 2015[7]);
- **Variations by City Type**: The impact of HSR on property prices is not uniform. In large metropolitan cities, the effect is often minor or even negative due to high initial property values and other influencing factors like noise and crime. Conversely, smaller cities and suburban areas show more significant positive changes in property prices due to improved connectivity and increased commuting options (Di Ruocco et al. 2022[8])

[7]Chen, Z., & Haynes, K. E. (2015). Impact of high speed rail on housing values: An observation from the Beijing–Shanghai line. Journal of Transport Geography, 43, 91-100.
[8]Di Ruocco, I., Mauriello, F., & Pagliara, F. (2022). Impacts of high speed rail on residential property prices in Italy: A panel-data set analysis. In International workshop on HSR socioeconomic impacts (pp. 195-213). Cham: Springer International Publishing.

# Overview 5/5

## Literature Findings

- **Factors Influencing Property Value Changes**: Key factors affecting how HSR influences real estate prices include proximity to HSR stations, accessibility to other transport modes, and the economic profile of the area. The presence of additional infrastructure, such as metro stops or shopping centers near HSR stations, can further enhance property values (Di Ruocco et al. 2022);
- **Local economic and social fabric**: Chen and Haynes (2015) suggest that HSR's potential to transform real estate markets depends heavily on local economic conditions and commuter behavior, providing conditions for heterogeneous effects;
- **Spatial and Economic Disparities**: HSR contributes to reducing regional economic disparities by enhancing accessibility, which can lead to increased property prices in previously underdeveloped or less connected areas. However, the impact varies significantly across regions and urban contexts, often reflecting broader economic and spatial dynamics (Liu et al. 2021[9]).

[9]Liu, X., Jiang, C., Wang, F., & Yao, S. (2021). The impact of high-speed railway on urban housing prices in China: A network accessibility perspective. Transportation Research Part A: Policy and Practice, 152, 84-99.

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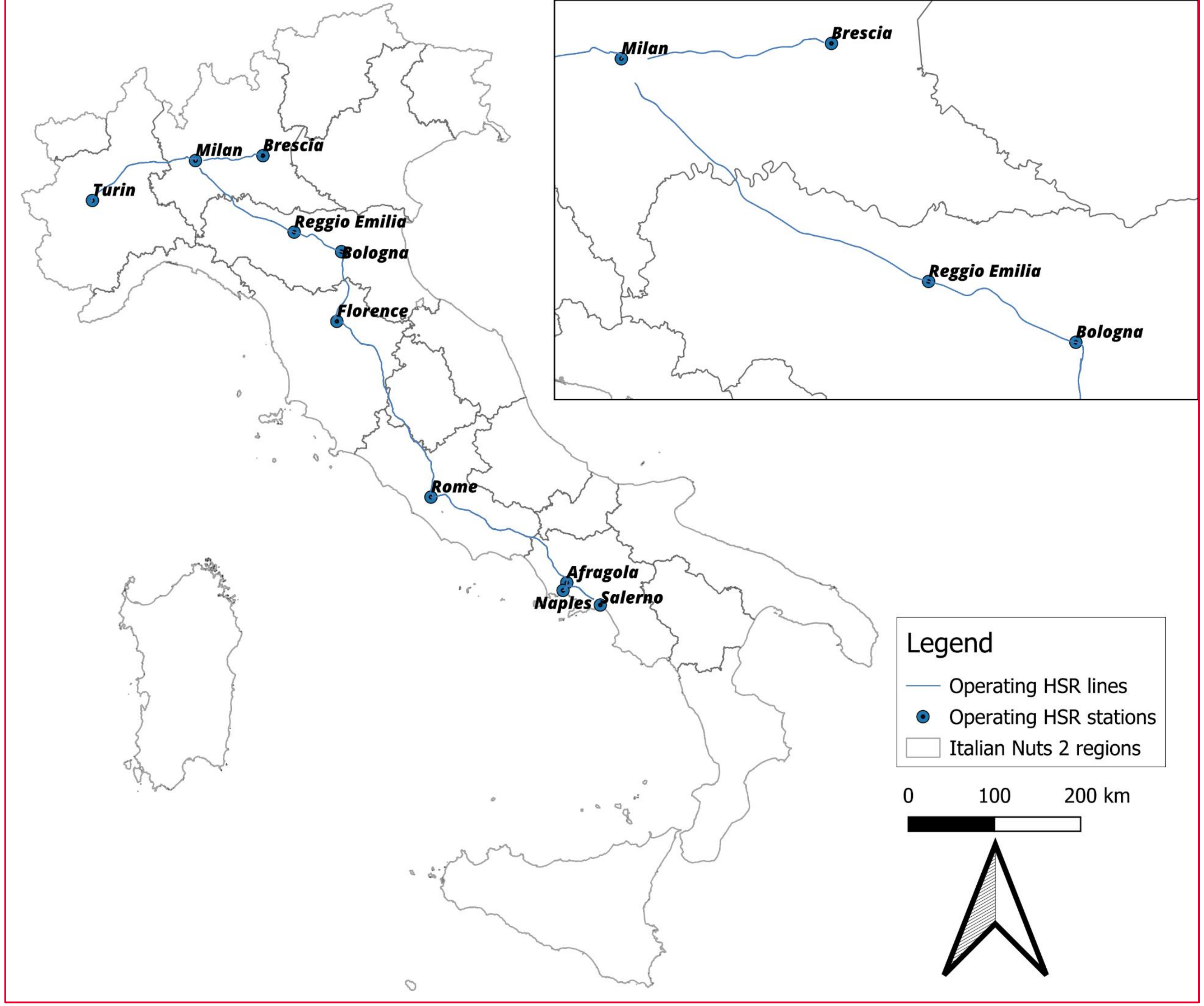
# Contribution 1/3

## Validity

- **Connection of an intermediate region** (Koster et al. 2022): HSR directly connects Reggio-Emilia to Milan and Bologna, having both much larger population;
- **Incidental treatment approach to identification** (Redding and Turner 2015[10]): Reggio-Emilia is almost on the straight line connecting Bologna and Milan;
- The decision to have the HSR stop in Reggio-Emilia resulted from a **political negotiation**, hence the choice of Reggio Emilia can be reasonably considered as good as randomly assigned.




[10]Redding, S. J., & Turner, M. A. (2015). Transportation costs and the spatial organization of economic activity. Handbook of regional and urban economics, 5, 1339-1398.

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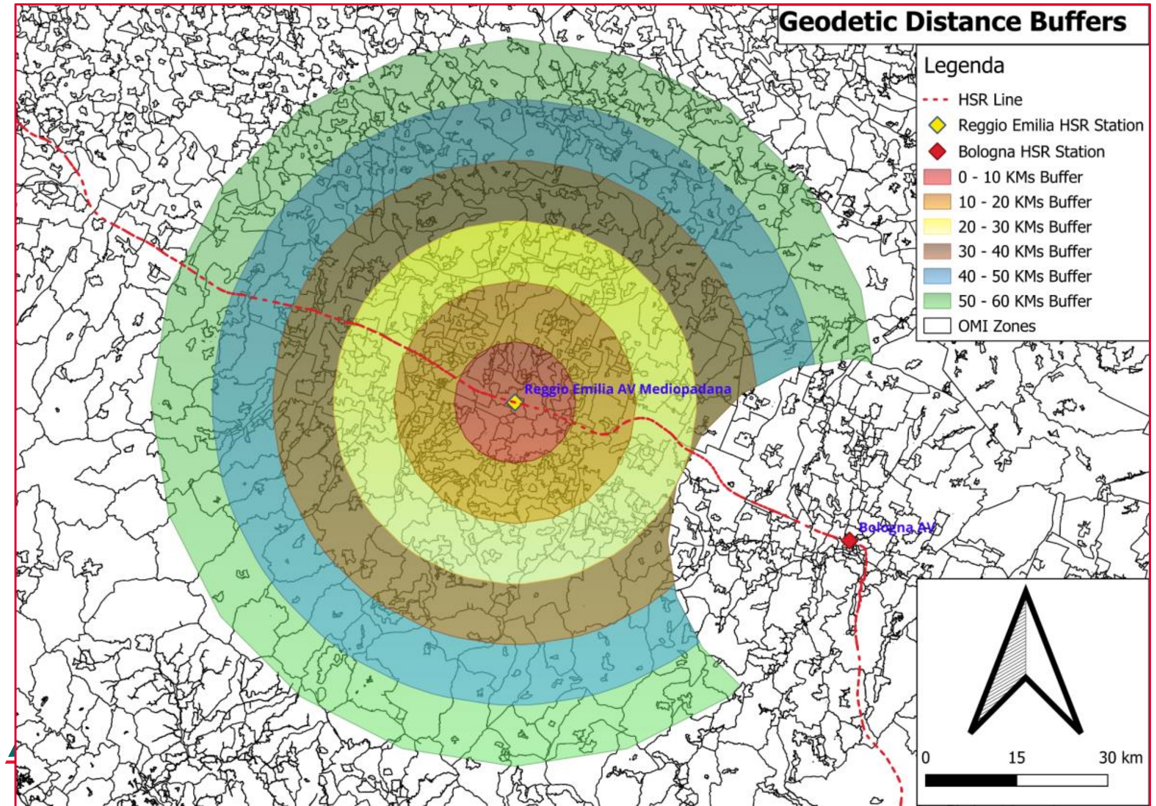
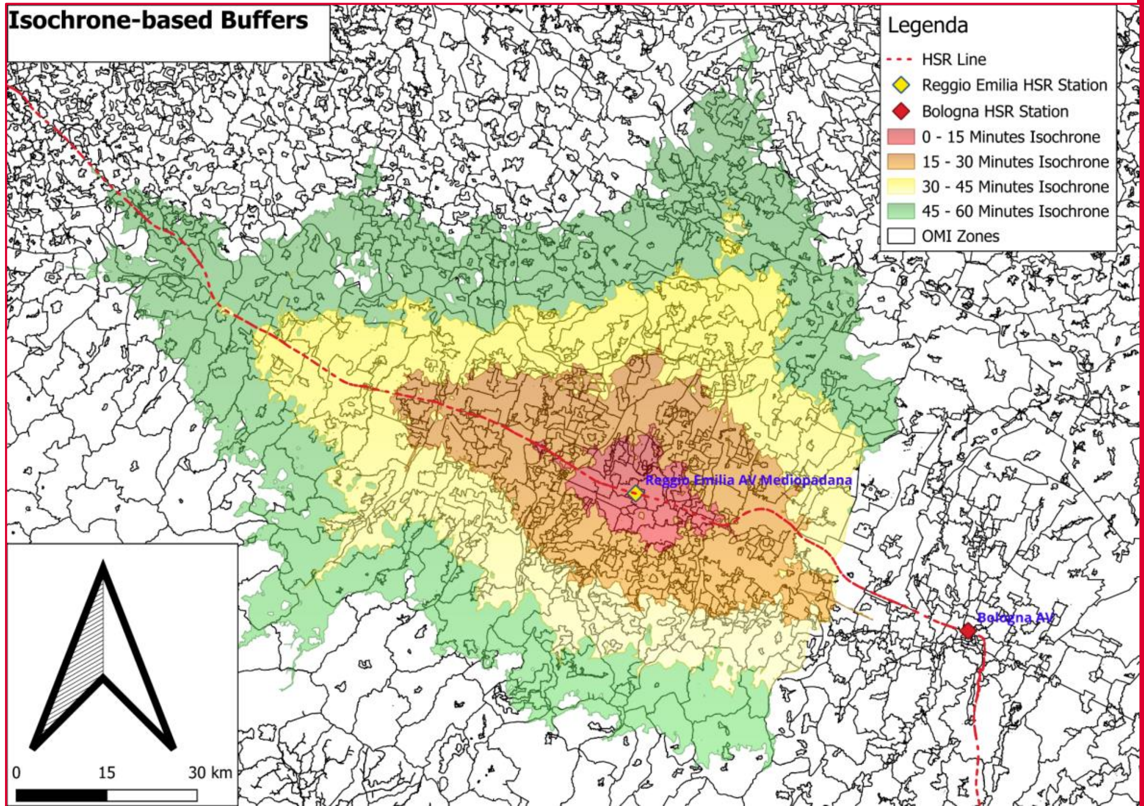
# Contribution 2/3

## Data

- **2004-2021 half-yearly property quotations**, for each delimited homogeneous territorial area (OMI zone) of each municipality and per unit area in euro per square-meter, of market values, by property type (Agenzia delle Entrate). Each OMI zone **georeferenced** using Qgis® software;
  - Geodetic-distance-based analysis: 0-10 KMs, 10-20 KMs, 20-30 KMs, 30-40 KMs, 40-50 KMs, 50-60 KMs, excluding areas around Bologna HSR station;
  - Isochrone-based analysis: 0-15 minutes, 15-30 minutes, 30-45 minutes, 45-60 minutes travel time (no Bologna).



# Contribution 3/3 Research Design

- The following (DiD) three-way fixed effects model is estimated with OLS:

$$\ln Prices_{i,p,t} = \beta_1 + \beta_2\left(Treated_{i,p} * Post_t\right) + \beta_3 X + \mu_{i,p} + \tau_t + \gamma_{l,t} + \varepsilon_{i,t} \quad (1)$$

- $\ln Prices_{i,t}$ is the natural logarithm of properties' average selling prices for OMI zone *i*, building type *p*, in semester *t;*
- $Treated_{i,p}$ is a dummy equal to 1 for:
  - 0-10 KMs, 10-20 KMs and 20-30 KMs buffers in the geodetic-distance-based analysis;
  - 0-15 minutes, 15-30 minutes travel time buffers in the isochrones-based analysis.
- $Post_t$ is a dummy equal to 1 since the opening of Reggio Emilia HSR station, namely for periods after the second half of 2013 (included);
- $X$ is a full set of municipality-level predetermined variables (population characteristics, sectoral composition of employment, income conditions), as of 2001, aimed at control for pre-existing socio-economic differences;
- $\mu_i, \tau_t, \gamma_{l,t}$ are OMI zone, time and Local Labor Market-by-time (LLM) fixed effects, respectively;
- $\varepsilon_{i,t}$ is an error term.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent Variable: properties' average selling prices (log) | | | | | | |
| Treated*Post | 0. 0297** | 0.0239** | 0.0169* | 0.0162* | | |
| | (0.0122) | (0.0111) | (0.0100) | (0.0093) | | |
| (0-10 KMs)*Post | | | | | 0.0389*** | 0.0173 |
| | | | | | (0.0144) | (0.0227) |
| (10-20 KMs)*Post | | | | | 0.0353*** | 0.0139 |
| | | | | | (0.0133) | (0.0106) |
| (20-30 KMs)*Post | | | | | 0.0536*** | 0.0438*** |
| | | | | | (0.0185) | (0.0127) |
| (30-40 KMs)*Post | | | | | 0.0509** | 0.0473** |
| | | | | | (0.0201) | (0.0185) |
| OMI Zone FE | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES |
| LLM-by-Time FE | YES | YES | YES | YES | YES | YES |
| Population Controls | NO | YES | YES | YES | NO | YES |
| Employment Controls | NO | NO | YES | YES | NO | YES |
| Income Controls | NO | NO | NO | YES | NO | YES |
| Observations | 121,751 | 121,751 | 121,586 | 121,586 | 121,751 | 121,586 |
| R-squared | 0.974 | 0.975 | 0.975 | 0.975 | 0.975 | 0.976 |
| F Test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Estimates of Equation (1) based on the geodetic-distance-based approach. Treated units are the OMI zones located in the 0-30 KMs buffer from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 KMs buffer. All models include Omi zone, time and LLM-by-time FE, respectively. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. In Columns (5) and (6) we conduct a sensitivity analysis in which we check how results vary according to the selection of the treatment and control groups in order to shed light on possible violations of the SUTVA condition. We define separate dummies for OMI zones located in buffers in the following distances from the HSR station 0-10 km; 10-20 km; 20-30 km; 30-40 km. We then interact them with the Post dummy for the post-opening period as in Equation (1), leaving only firms located further away from the HSR station (40-60 km) in the control group. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Results 2/7

Isochrone-based Analysis

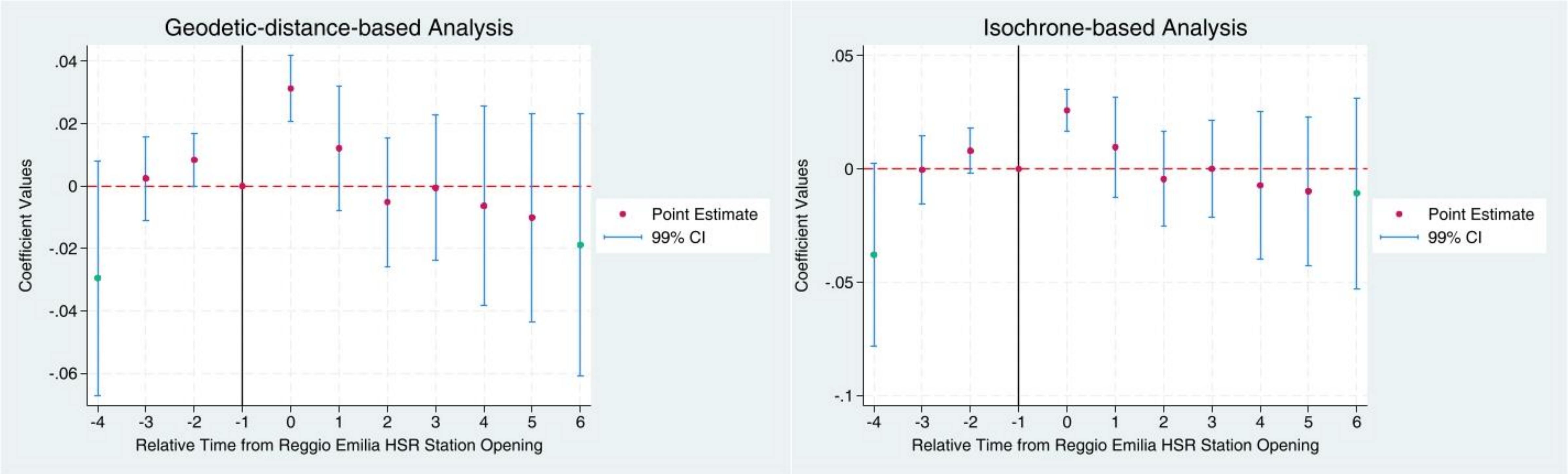
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent Variable: properties' average selling prices (log) | | | | | | |
| Treated*Post | 0.0437*** | 0.0451*** | 0.0395*** | 0.0229** | | |
| | (0.0124) | (0.0115) | (0.0119) | (0.0103) | | |
| (0-15 minutes)*Post | | | | | 0.1195*** | 0.0936*** |
| | | | | | (0.0374) | (0.0361) |
| (15-30 minutes)*Post | | | | | 0.1410*** | 0.1072*** |
| | | | | | (0.0366) | (0.0309) |
| (30-45 minutes)*Post | | | | | 0.0818** | 0.0734** |
| | | | | | (0.0328) | (0.0299) |
| OMI Zone FE | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES |
| LLM-by-Time FE | YES | YES | YES | YES | YES | YES |
| Population Controls | NO | YES | YES | YES | NO | YES |
| Employment Controls | NO | NO | YES | YES | NO | YES |
| Income Controls | NO | NO | NO | YES | NO | YES |
| Observations | 104,038 | 104,038 | 104,038 | 104,038 | 104,029 | 104,029 |
| R-squared | 0.976 | 0.976 | 0.977 | 0.977 | 0.981 | 0.981 |
| F Test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Estimates of Equation (1) based on the isochrone-based approach. Treated units are the OMI zones located at 0-30 minutes travel time range from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 minutes range. All models include Omi zone, time and LLM-by-time FE, respectively. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. In Columns (5) and (6) we conduct a sensitivity analysis in which we check how results vary according to the selection of the treatment and control groups in order to shed light on possible violations of the SUTVA condition. We define separate dummies for OMI zones located at the following travel time ranges from the HSR station 0-15 minutes; 15-30 minutes; 30-45 minutes. We then interact them with the Post dummy for the post-opening period as in Equation (1), leaving only firms located further away from the HSR station (45-60 minutes) in the control group. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

# Results 3/7

## Event Study Analysis

$$\ln Prices_{i,t} = \beta_1 + \sum_{t=-4^-}^{6^+} \gamma_t \,(Treated_i * Year_t) + \beta_3 X + \mu_i + \tau_t + \gamma_{i,t} + \varepsilon_{i,t} \quad \textbf{(2)}$$




Notes: Event-study estimates of Equation (2) based on the geodetic-distance-based (the isochrone-based) approach. Treated units are the OMI zones located in the 0-30 KMs buffer (0-30 minutes travel time range) from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 KMs buffer (30-60 minutes range). All models include Omi zone, time and LLM-by-time FE, respectively, as well as controls. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

# Results 4/7

## Geodetic-distance-based Heterogeneity Analysis

| Dep Var: properties' average selling prices (log) | (1) Civil | (2) Commercial | (3) Civil Buildings | (4) Civil Economic Buildings | (5) Manor Buildings | (6) Industrial/Artisan Buildings Shopping Centres | (7) Shops Offices | (8) Others |
|---|---|---|---|---|---|---|---|---|
| Treated*Post | 0.0184* | -0.0129 | 0.0268** | 0.0237** | 0.0274** | 0.0218* | 0.0081 | -0.0072 |
| | (0.0109) | (0.0113) | (0.0122) | (0.0118) | (0.0138) | (0.0115) | (0.014) | (0.0185) |
| OMI Zone FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| LLM-by-Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Population Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Employment Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Income Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 69,657 | 51,929 | 22,814 | 15,049 | 15,457 | 28,777 | 23,152 | 16,337 |
| R-squared | 0.969 | 0.983 | 0.966 | 0.960 | 0.944 | 0.975 | 0.949 | 0.960 |
| F Test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Estimates of Equation (1), based on the geodetic-distance-based approach, on sub-samples defined by property type. Treated units are the OMI zones located in the 0-30 KMs buffer from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 KMs buffer. All models include Omi zone, time and LLM-by-time FE, respectively, as well as controls. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

# Results 5/7

## Isochrone-based Heterogeneity Analysis

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Dep Var: properties' average selling prices (log) | Civil | Commercial | Civil Buildings | Civil Economic Buildings | Manor Buildings | Industrial/Artisan Buildings Shopping Centres | Shops Offices | Others |
| Treated*Post | 0.0582*** | 0.0271 | 0.0638*** | 0.0497** | 0.0549** | 0.0165 | 0.0385 | 0.0477 |
| | (0.0187) | (0.0174) | (0.0168) | (0.0251) | (0.0243) | (0.0145) | (0.0239) | (0.0299) |
| OMI Zone FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| LLM-by-Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Population Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Employment Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Income Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 56,170 | 47,858 | 17,450 | 11,575 | 12,654 | 27,349 | 20,386 | 14,177 |
| R-squared | 0.980 | 0.984 | 0.979 | 0.975 | 0.965 | 0.976 | 0.963 | 0.976 |
| F Test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.008 |

Notes: Estimates of Equation (1), based on the isochrone-based approach, on sub-samples defined by property type. Treated units are the OMI zones located at 0-30 minutes travel time range from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 minutes range. All models include Omi zone, time and LLM-by-time FE, respectively, as well as controls. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

# Results 6/7

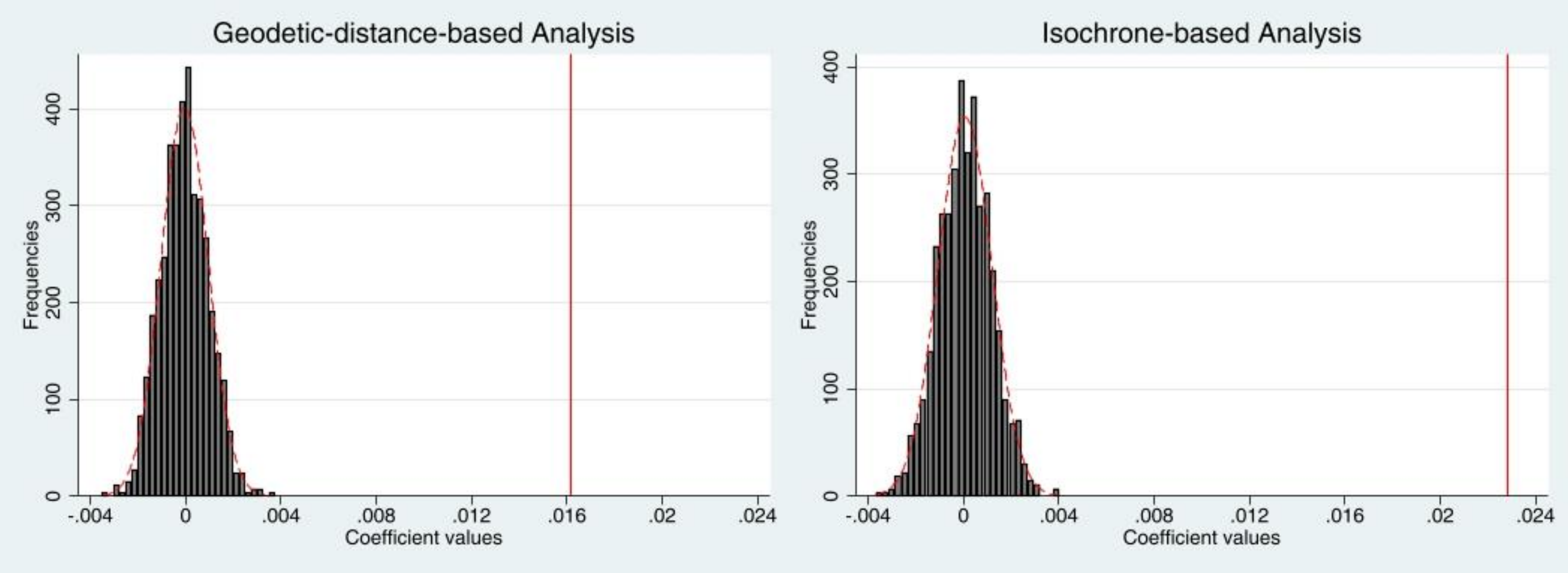
## Robustness Analysis

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Geodetic-distance-based Analysis | | | Isochrone-based Analysis | | | Geodetic-distance-based Analysis | Isochrone-based Analysis |
| Dependent Variable: | Properties' average selling prices (log) | | | | | | Properties' fake average selling prices (log) | |
| (Fake Treated)*Post | 0.0002 | | | 0.0008 | | | | |
| | (0.0012) | | | (0. 0013) | | | | |
| Treated*(Fake Post) | | 0.0149 | | | -0.0052 | | | |
| | | (0.0103) | | | (0.0123) | | | |
| (Fake Treated)*(Fake Post) | | | 0.0008 | | | -0.0003 | | |
| | | | (0.0017) | | | (0. 0012) | | |
| Treated*Post | | | | | | | -0.0004 | -0.0005 |
| | | | | | | | (0.0007) | (0.0006) |
| OMI Zone FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| LLM-by-Time FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Population Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Employment Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Income Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 121,586 | 121,586 | 121,586 | 104,038 | 104,038 | 104,038 | 121,662 | 104,087 |
| R-squared | 0.975 | 0.975 | 0.975 | 0.977 | 0.973 | 0.977 | 0.996 | 0.997 |
| F Test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |

Notes: *Placebo* estimates of Equation (1) based on the geodetic-distance-based (the isochrone-based) approach. Treated units are the OMI zones located in the 0-30 KMs buffer (0-30 minutes travel time range) from the Reggio-Emilia HSR station, while control units are the ones in the 30-60 KMs buffer (30-60 minutes range). *Fake* treatments and *fake* Post are both drawn from Bernoulli distributions with parameters *t* and *p* (probability of success), derived from the original sample distributions, respectively. *Fake* prices are drawn from random price distributions resembling sample ones (same mean and variance). All models include Omi zone, time and LLM-by-time FE, respectively, as well as controls. Population controls include municipality-level data on resident population and presence of foreigners. Employment controls include municipality-level unemployment rates, the incidence of employment in (1) agriculture, (2) manufacturing, (3) services, (4) trade, (5) high-skill occupations, (6) manual occupations, and (7) low-skill occupations, as well as foreign employment rates. Income controls include municipality-level data on the amount of taxable personal income subject to additional taxes on personal income and the total income in different personal income brackets. All models are estimated with OLS and robust standard errors, clustered at municipality level, are shown in parentheses: *** p<0.01, ** p<0.05, * p<0.1

# Results 7/7

## Placebo Plot Test




Notes. In this test we randomly assign the treatment by generating simulated values for the dummy $Treated_i$. In particular, we build a *fake* one equal to 1 if random numbers drawn from a uniform distribution [0,1] are greater than the sample treatment probability. We then estimate Equation (1) after including the new treatment indicator,$Treated_i^{fake}$, and we iterate such procedure 1,000 times in order to obtain a distribution of *placebo* coefficients to compare with the actual average estimated value from the more extended model of Equation (1). The rationale was that a statistically significant average treatment effect should differ from that obtained with *placebo* estimates. Dark bars represent the distribution of estimated *placebo* coefficients. The vertical solid red line represents the actual estimated average treatment effect. The dash red line fits a Normal distribution.

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# Conclusions 1/2

- The opening of the Reggio Emilia Mediopadana High-Speed Railway Station has led to **increased property prices**, particularly in areas close to the station, that experience higher price premiums.
- These effects are mainly driven by **civil buildings**, and are more pronounced within both 20-30 kilometers and at 15-30 minutes travel time from the station, suggesting that improved accessibility and connectivity significantly enhance real estate values in these zones.
- According to the literature (Hall, 2009), when the HSR substantially shorten the space–time distance between metropolises (Milan and Bologna) and small cities, a **centrifugal force effect** may arise, i.e. population may spread from the core metropolises to small cities along the corridors of HSR, which may push up housing prices in the latter ones.
- Our results provide evidence other than China, an issue that is less debated in the literature, suggesting possible policy implications.

# Conclusions 2/2

- **Strategic Urban Planning**: Policymakers should leverage the benefits of HSR by integrating urban development plans with transport infrastructure. This can include zoning adjustments, development incentives, and investments in complementary amenities near HSR stations to maximize economic benefits and manage urban growth effectively.
- **Supportive Infrastructure and Connectivity**: To amplify the positive impact on property prices, additional investments in local public transport, pedestrian infrastructure, and commercial facilities around HSR stations are essential. Enhancing overall accessibility can create vibrant, well-connected urban hubs that attract businesses and residents.
- **Addressing Socioeconomic Disparities**: While HSR can boost property values and economic activity, it is important to consider potential negative effects, such as gentrification or displacement of lower-income residents. Policymakers should implement measures to ensure equitable development, such as affordable housing policies and support for affected communities.


THANK YOU
ANY QUESTION?