

Second-Hand Gentrification: Theory and Evidence from High-Speed Rail Extensions

G. Loumeau¹, A. Russo²

¹ETH Zurich

²Loughborough University and CESifo

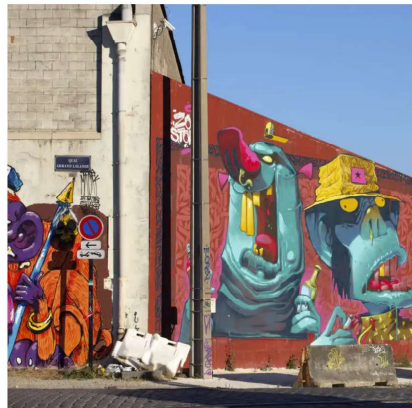
August 25th, 2022

Motivation

- ◇ Wide coverage of concerns about the spread of gentrification from large to mid- or small-sized cities: **second-hand gentrification**.
- ◇ Recent examples include Berlin-Leipzig, London-Brighton, Toronto-Hamilton, Paris-Bordeaux, etc.

News coverage
(The Guardian, 03/2018)

Double trouble? How big cities are gentrifying their neighbours



“I see Bordeaux changing and not for the better”: more than 70% of Bordeaux’s new arrivals are from Leipzig. From Bordeaux to Leipzig to Hamilton, cities are facing a new problem: second-hand gentrification thanks to more expensive cities nearby

Political coverage
(Mayor of Bordeaux, 03/2018)

"La gentrification de Bordeaux est un fantasme", assure Alain Juppé



NGO coverage
(NRDC, 06/2018)

The screenshot shows the NRDC website header with navigation links: OUR WORK, OUR EXPERTS, OUR STORIES, GET INVOLVED, ABOUT US, and a DONATE button. The article title is "When Public Transportation Leads to Gentrification" under the "onEarth" CULTURE & POLITICS section. The sub-headline reads: "Why transit-oriented development projects need to include affordable housing amid all those luxury condos and cafés." The author is Jeff Turrentine, dated June 01, 2018. The main image shows passengers waiting at a train station platform.

Social unrest about (possible) heterogeneous effects

- ◇ Whereas workers (esp. skilled) of primary cities **migrate to enjoy lower housing prices**, more space...
- ◇ ... “natives” of secondary cities are voicing **concerns about gentrifying trends** in their cities.
- ◇ Example: stickers in Bordeaux appeared in the second part of 2017



Lit: *“Parisian, go home”*

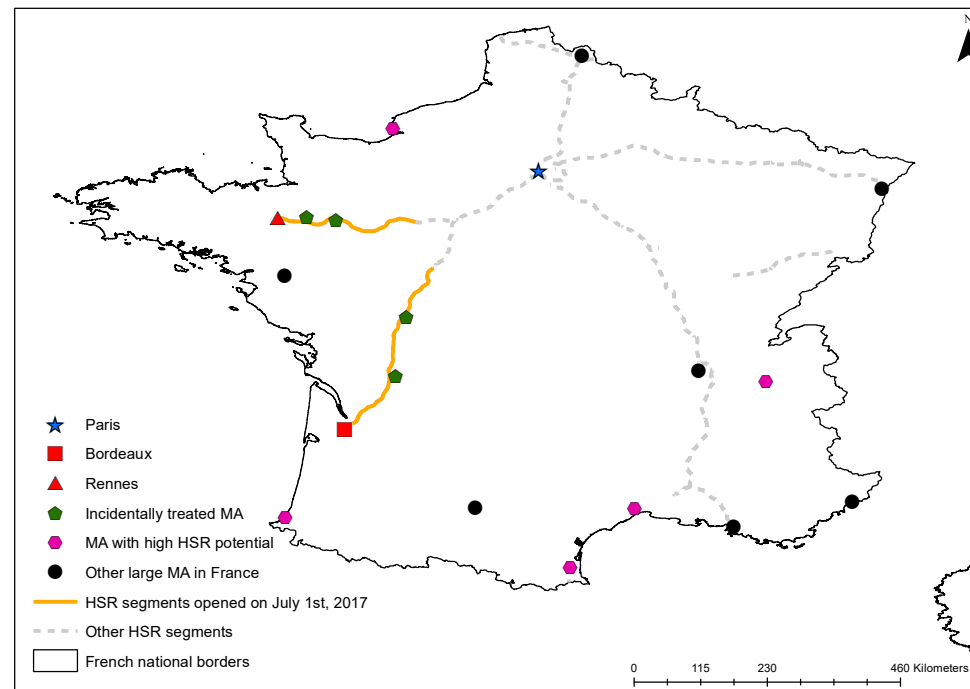
- ◇ Less intuitive effects? Reduced pressure on housing market in primary cities?
- ⇒ Yet, we know little about the **mechanisms behind this phenomenon and its distributional effects.**

This paper

- ◇ Study **whether (and how) gentrification spreads along intercity transport connections.**
- ◇ Propose a model with **two monocentric cities, heterogeneous skills, intra- and inter-city commuting**
- ◇ Exploit **2017 extension of French HSR network** from Paris to Bordeaux and Rennes to assess the theoretical predictions.
- ◇ **High-frequency and high-spatial resolution data**, including:
 - ▶ Universe of **housing transactions** between 2014 and 2020 at the unit level with geo-localization
 - ▶ Universe of **intra- and inter-city migration & commuting flows** between 2013 and 2018 at the individual level
- ◇ Confirming theoretical predictions, observe that the HSR extensions:
 - ▶ led to **housing prices increase in Bordeaux/Rennes** and **decrease in Paris**
 - ▶ increased migratory flow of **skilled parisiens to Bordeaux/Rennes**
 - ▶ **increased the share of skilled workers** in central Bordeaux/Rennes

HSR extensions in France in July 2017

- ◇ HSR extensions have led to **important reduction in inter-city travel times**:
 - ▶ Paris-Bordeaux: 35% reduction in travel time from 3h12min to 2h04min
 - ▶ Paris-Rennes: 32% reduction in travel time from 2h04min to 1h25min



▶ Local urban context: Paris

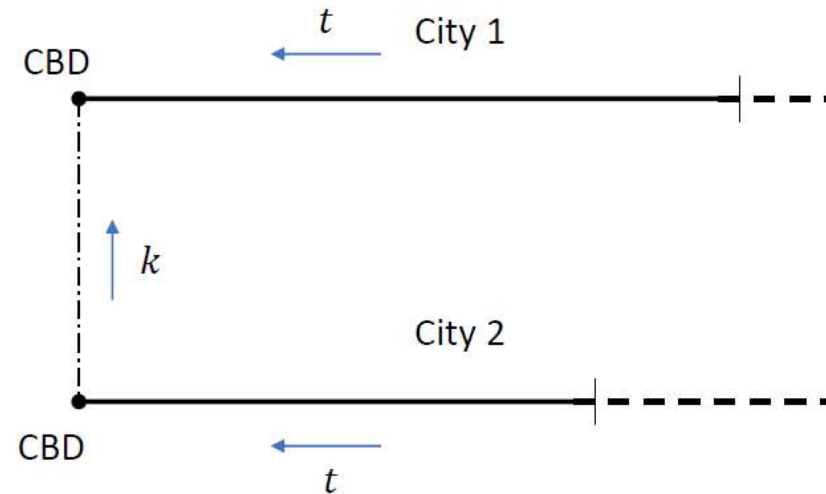
▶ Local urban context: Bordeaux

▶ Local urban context: Rennes

The Model - Overview

- ◇ **Two monocentric cities**, $i \in \{1, 2\}$. Primary (Paris) and secondary (Bordeaux/Rennes)
- ◇ Two types of individuals: **"skilled"** and **"unskilled"**, $j \in \{S, U\}$
- ◇ Population is exogenous (closed system): $N = N_S + N_U$
- ◇ Individuals choose to:
 - ▶ live in city 1 or 2
 - ▶ where to live within each city
 - ▶ work in city 1 or 2
- ◇ Wages (daily)
 - ▶ Unskilled w_U (do not depend on city)
 - ▶ Skilled $w_{1S} > w_{2S} > w_U$ (wage premium in city 1)

The Model - Work and Travel



- Individuals have time endowment (n. of workdays), normalized to one
- They can live in city i and work in \tilde{i} (possibly different and not same every day)
- If work+live in same city ($\tilde{i} = i$), at x from CBD, time cost $T_{i,\tilde{i}}(x) = tx$
- If work+live in different cities ($\tilde{i} \neq i$), time cost $T_{i,\tilde{i}}(x) = tx + k$
 - ▶ Travel to train station, then long distance to other CBD (cost k)

The Model - Work and Travel

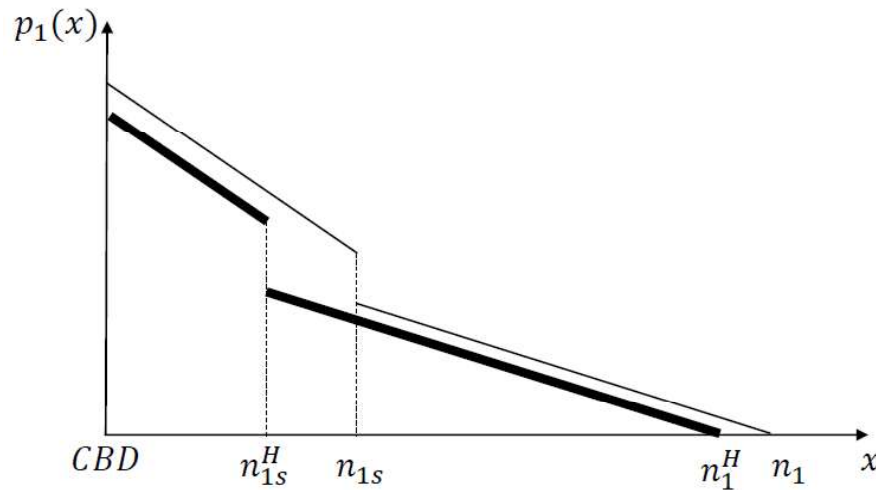
- **Unskilled:** work where they live ($\tilde{i} = i, \forall i$). No wage premium, no long-distance travel
 - ▶ Income: $w_U(1 - tx)$
- Same for **skilled living in city 1:** $\tilde{i} = 1$. No long-distance travel
 - ▶ Income: $w_{1S}(1 - tx)$
- **Skilled living in city 2:** work $1 - \alpha$ days in city 2 ($\tilde{i} = 2$), α in city 1 ($\tilde{i} = 1$) and travel long-distance
 - ▶ Income: $\alpha w_{1S}(1 - tx - k) + (1 - \alpha)w_{2S}(1 - tx)$
- Note: (i) $0 < \alpha \leq 1$ is exogenous (ii) can allow for lower wage when commuting long distance (key: $> w_U$)

Second-hand gentrification with HSR

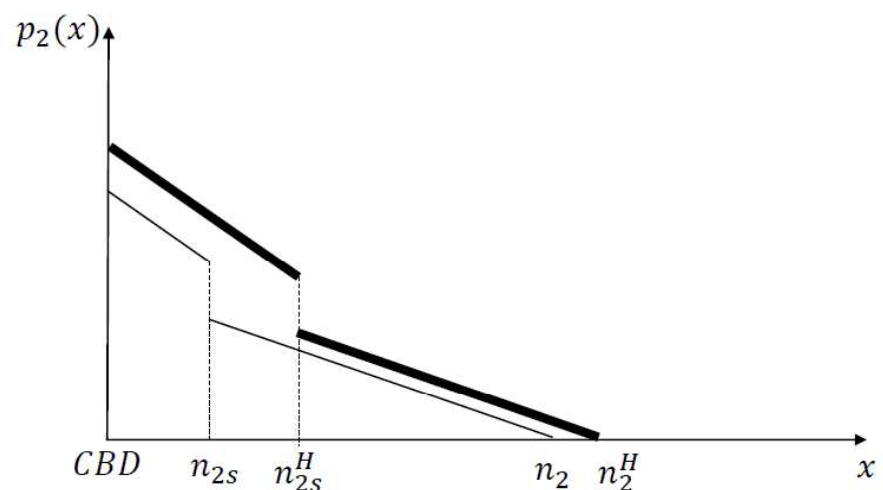
◇ HSR extension reduces k :

- ⇒ Area occupied by skilled in city 2 expands, unskilled driven towards periphery, migration by skilled from city 1.
- ⇒ Opposite effect in city 1.

(a) Primary city



(b) Secondary city



Notes: Bold lines represent the rental price of land given lower long-distance commuting costs. Variables conditional on lower long-distance commuting costs denoted with superscript "H".

Testable implications

- H1. HSR increases housing prices in secondary city**
- H2. HSR has a negative effect on housing prices in primary city (close to "treated" HSR station)**
- H3. HSR induces migration of skilled from primary to secondary city**
- H4. HSR increases share of skilled in secondary city, particularly close to CBD**

Data

- **Housing market:** housing price data on the universe of housing property sold in France between Jan 1st, 2014 and Dec 31st, 2020 - source: <https://app.dvf.etalab.gouv.fr/>
- **Residential migration:** individual location of residence at year t and $t - 1$, 2013-2018. Location defined at the municipal level (*arrondissement* in Paris). Information about individual education - source: INSEE
- **Residential commuting:** individual location of residence and workplace at year t , 2013-2018. Location defined at the municipal level (*arrondissement* in Paris). Information about individual education - source: INSEE
- **Residential density:** individual-level information about population of "neighborhoods" (IRIS) - units of 1,800 to 5,000 inhabitants. Information about individual education, but only about region (Departement) of residence in previous year - source: INSEE
- Municipality-level additional information (population count, size, age composition, etc).

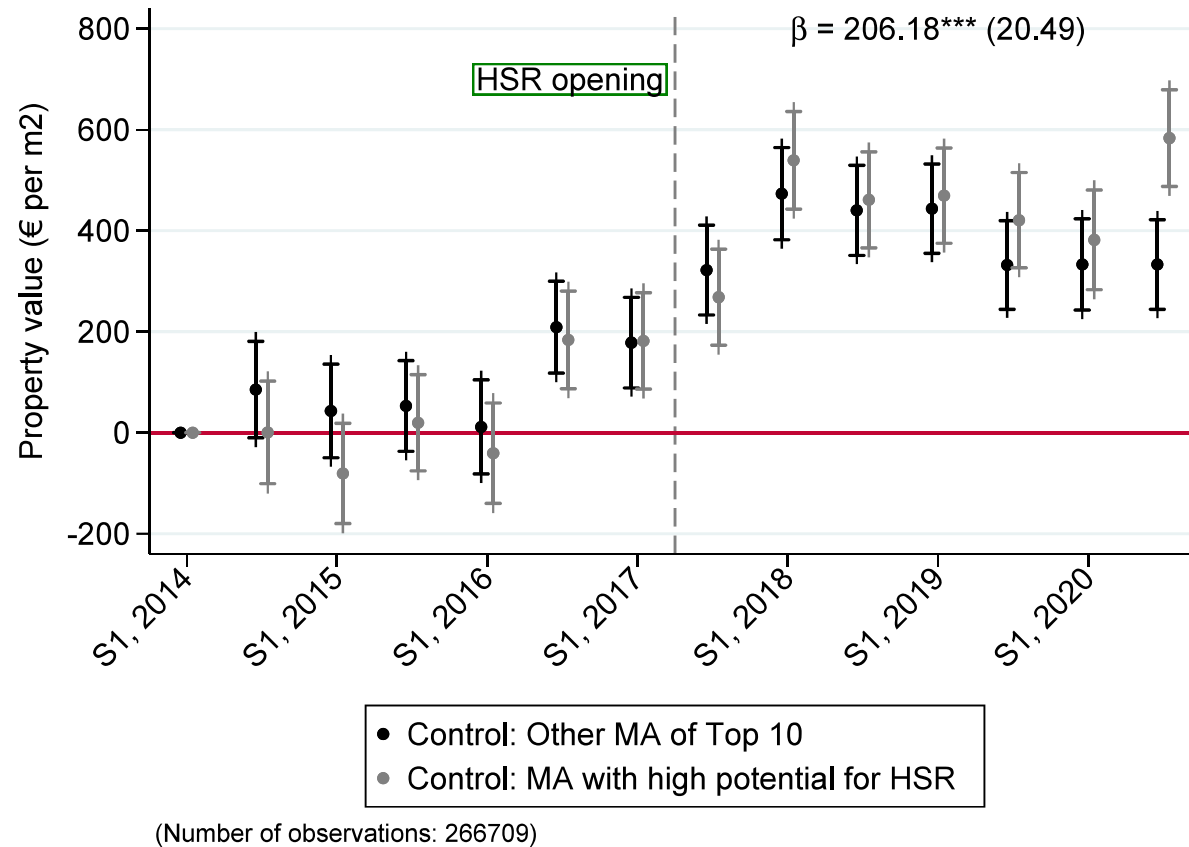
H1 and H2: Effects on housing prices. Identification

- ◇ We aim at capturing the **causal effects of the HSR extension**; focusing on both the **overall effects as well as their dynamics**.
- ◇ We adopt a **Event-Study Difference-in-Difference** approach following Schmidheiny and Siegloch (2021):

$$p_{oit} = \sum_{j=\underline{j}}^{\bar{j}} \beta_j T_{it}^j + \mathbf{X}'_{oit} \gamma + \mu_i + \theta_t + \varepsilon_{oit} \quad (1)$$

- ◇ where:
 - ▶ p_{oit} : price (per sqm) for transaction o in municipality i at semester t
 - ▶ $\sum_{j=\underline{j}}^{\bar{j}} \beta_j T_{it}^j$: Sum of year \times treatment dummies, with β_j being the parameters of interest.
 - ▶ \mathbf{X}_{oit} : housing unit controls (size, n. of rooms, etc.)
 - ▶ μ_i, θ_t : municipality- and time-fixed effects
 - ▶ ε_{oit} : error term

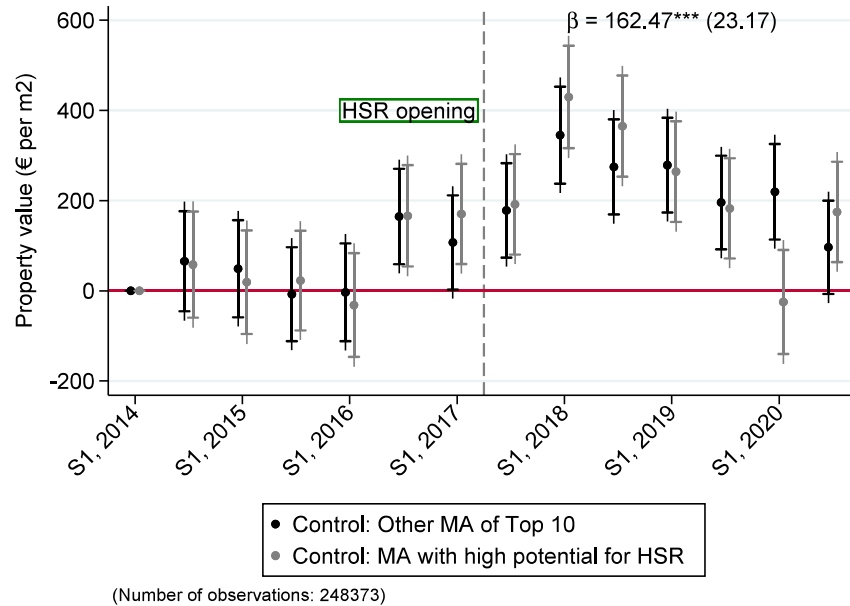
H1: Does HSR have positive effect on prices in Bordeaux/Rennes?



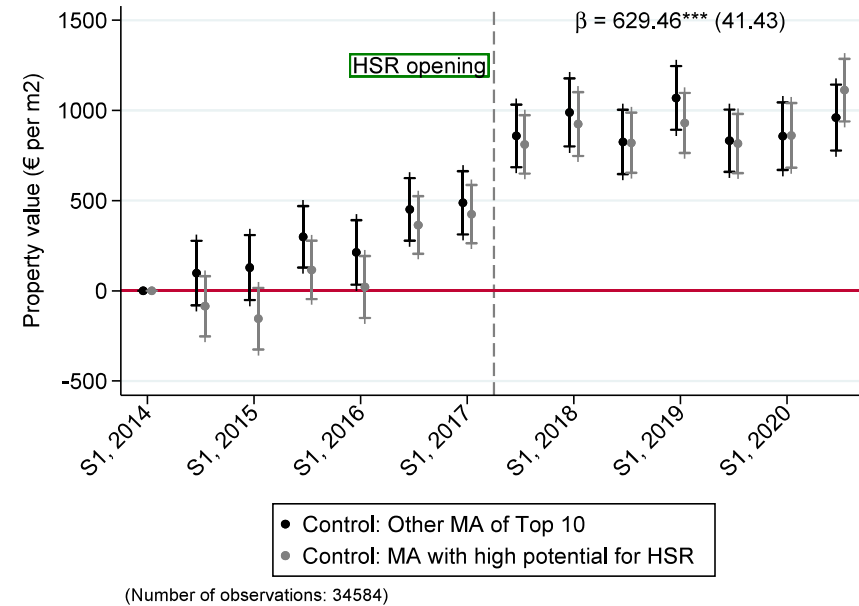
- ◇ Control group: (i) other top 10 French largest cities excluding Paris, Toulouse and Nantes, (ii) other MAs with "high potential" for HSR
- ◇ Result: approx. 206€/m² (approx. 5%), increase in property prices.

H1: Are houses and apartments similarly affected in Bordeaux/Rennes?

(a) Apartments (€ per m²)

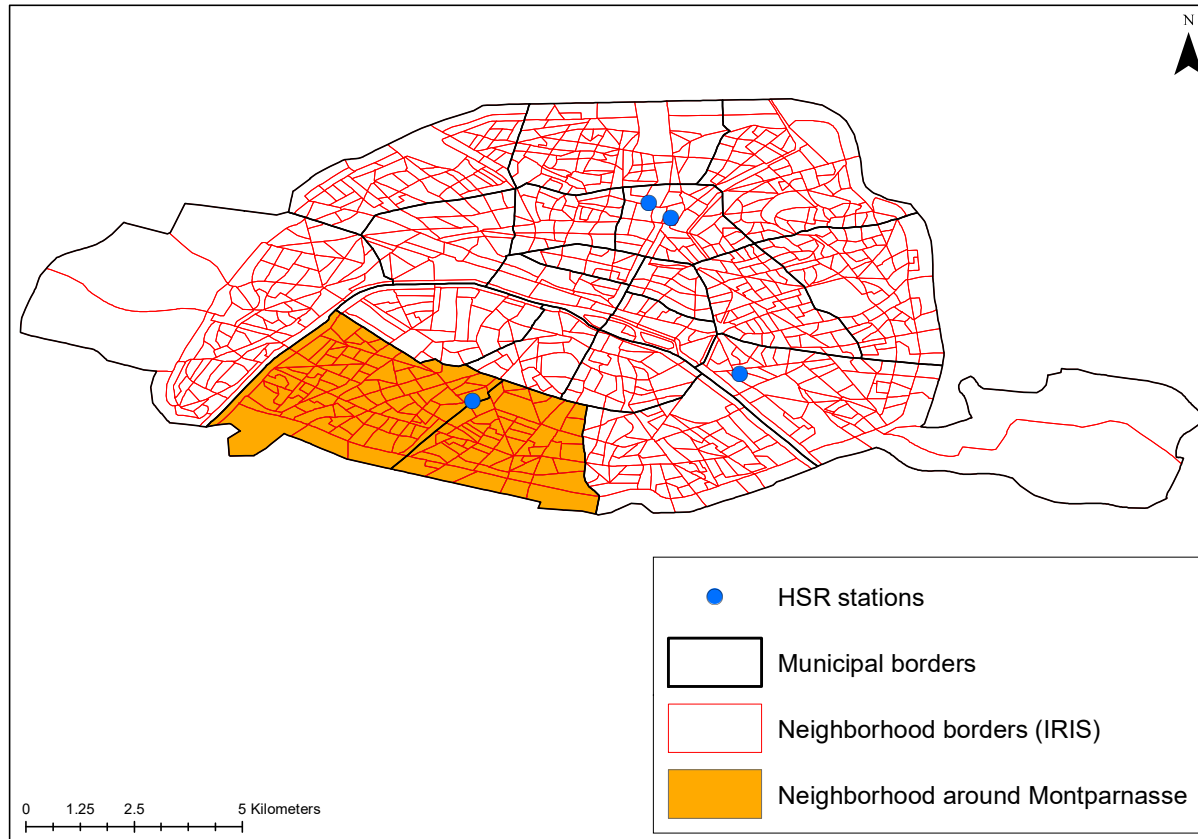


(b) Houses (€ per m²)



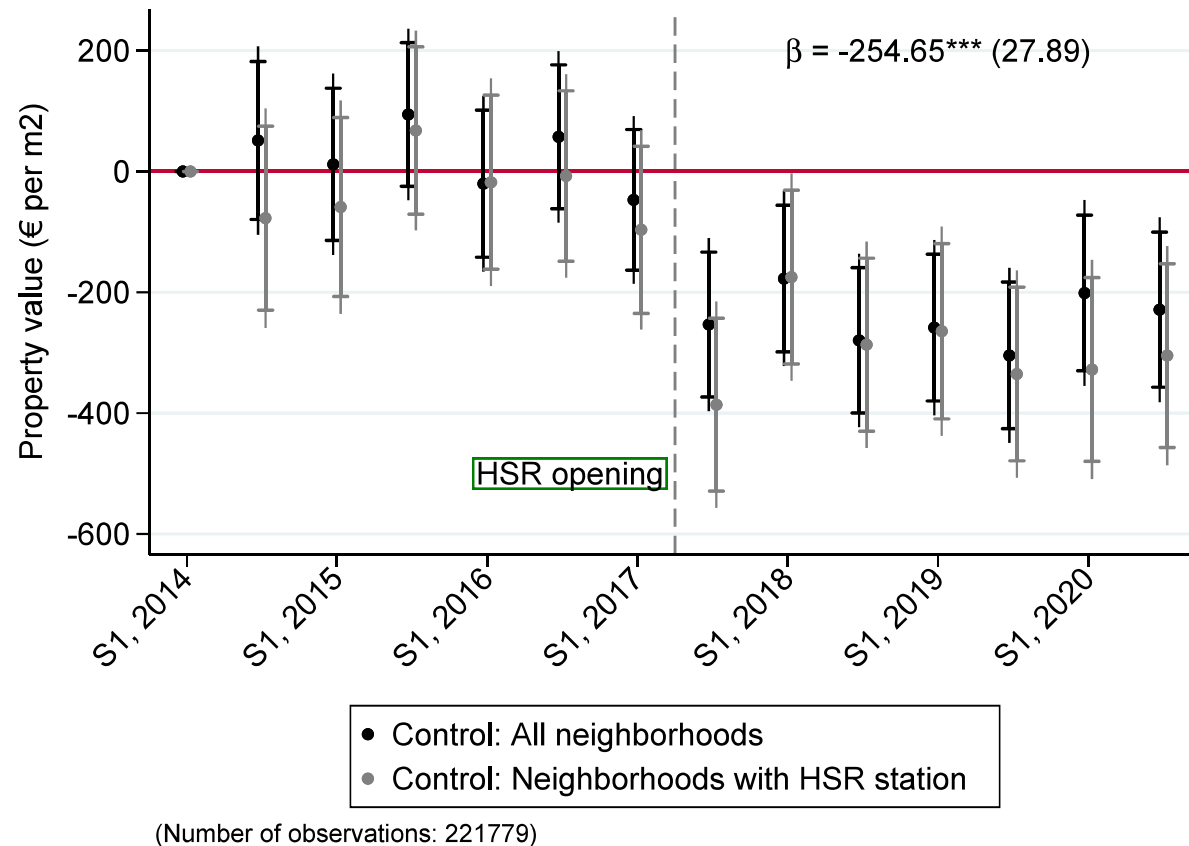
Notes: ES-DiD model (1) using 95% CIs.

H2: Does HSR have negative effect on prices close to Paris Montparnasse?



Notes: Authors' own illustration.

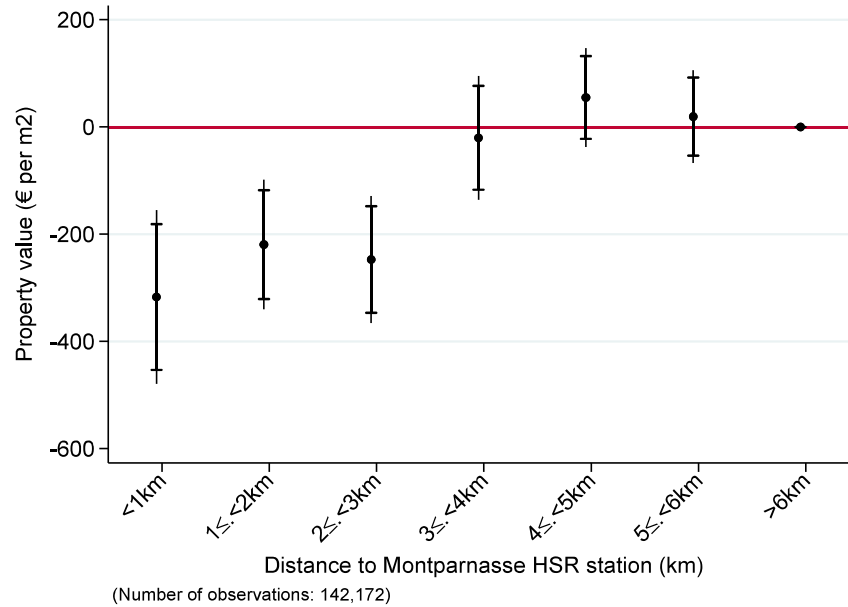
H2: Does HSR have negative effect on prices close to Paris Montparnasse?



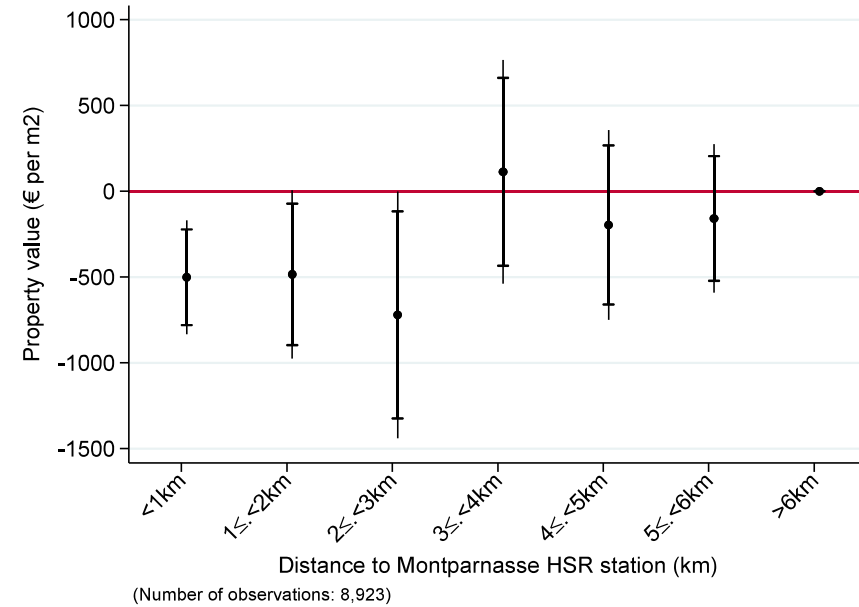
- ◇ Define the control group as (i) all other Parisian arrondissements, and (ii) all other arrondissements hosting a HSR station.
- ◇ Result: 255€/m² (approx. 3%) decrease property prices around Montparnasse (14th and 15th Arr.).

H2: How far does the effect spread from Paris Montparnasse?

(a) All transactions



(b) Within 100m of metro to HSR



- ◇ Housing price (relative) decline in Paris is driven by location within 100m of a metro station (on a direct line to Montparnasse HSR station).

H3: Are skilled Parisians more likely to move to Bordeaux/Rennes?

- ◇ We adopt a **Triple Difference** (DiDiD) approach.
 - ▶ Compare "extra" flow of Parisian skilled (around Montparnasse) to Bordeaux and Rennes (wrt non-skilled), to "extra" flow of such workers elsewhere (wrt non-skilled), over several years.

$$y_{\omega i'it} = \alpha_1(D_t \times Skill_{\omega}) + \alpha_2(D_t \times HSR_i) + \alpha_3(Skill_{\omega} \times HSR_i) + \alpha_4(D_t \times Skill_{\omega} \times HSR_i) + \mu_i + \nu_{i'} + \theta_t + \rho_{\omega} + \varepsilon_{\omega i'it}$$

◇ where:

- ▶ $y_{\omega i'it}$: flow of workers of skill ω who moved from i' to i between years $t - 1$ and t
- ▶ $Skill_{\omega}$: Indicator equal to one if individuals hold a tertiary education degree (skilled)
- ▶ HSR_i : Indicator equal to one if destination of move is Bordeaux or Rennes
- ▶ D_t : Post treatment indicator.
- ▶ α_4 : Parameter of interest.

H3: Are skilled Parisians more likely to move to Bordeaux/Rennes?

Outcome:	Migration flows		Commuting flows	
	Top 10 MA	HSR potential	Top 10 MA	HSR potential
Control:				
DiDiD (α_4)	15.206*	24.011**	2.256*	3.158*
	(8.024)	(12.060)	(1.309)	(1.773)
Obs.	494	131	2,493	977
R ²	0.78	0.83	0.37	0.49

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- ◇ Result: Increase in the flow of skilled Parisian workers moving to Bordeaux/Rennes.
- ◇ Approx. 15% commute on very frequent basis.

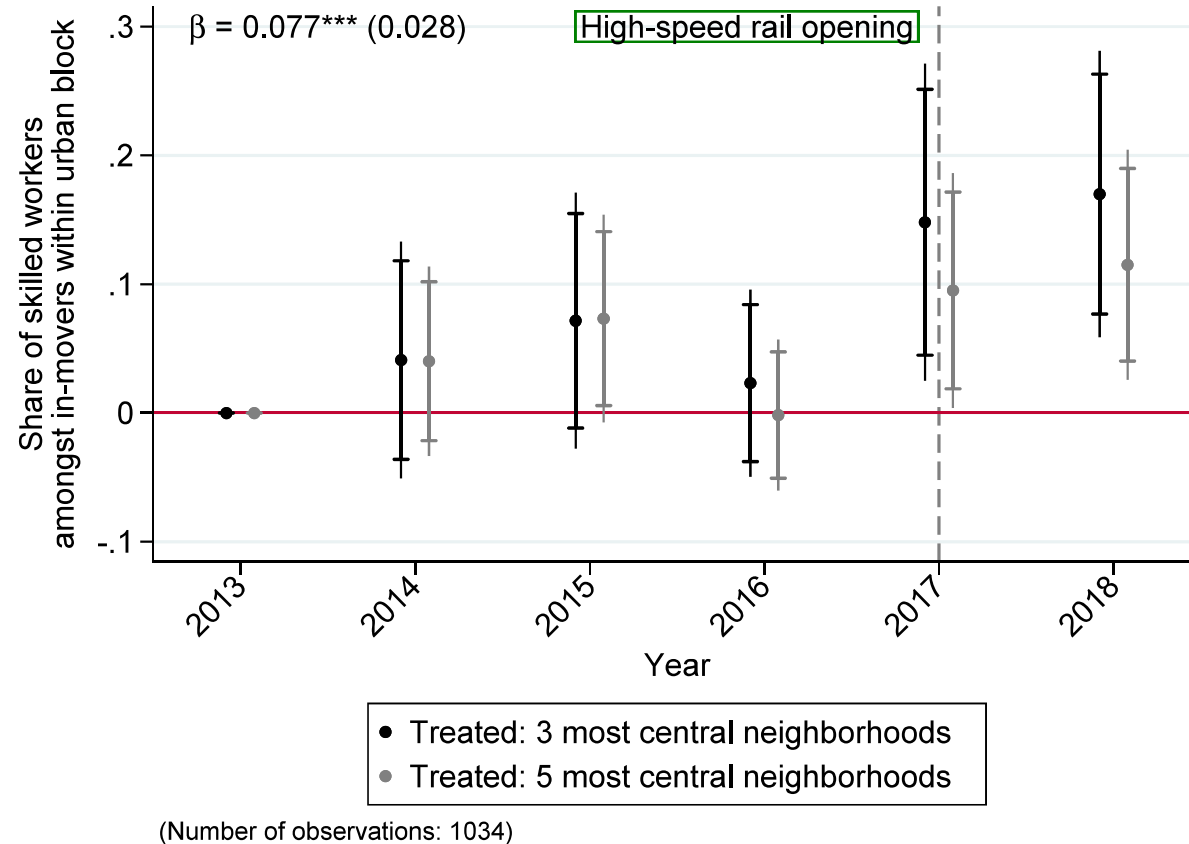
H4: Do in-moving skilled workers locate in central locations?

- ◇ We go back to the **ES-DiD** approach – but using different units of observation.
 - ▶ Compare share of skilled in-movers in the (3 and 5) most central neighborhoods in Bordeaux and Rennes to share in other neighborhoods of same cities, over several years

$$y_{it} = \sum_{j=\underline{j}}^{\bar{j}} \beta_j T_{it}^j + \mu_i + \theta_t + \varepsilon_{it}.$$

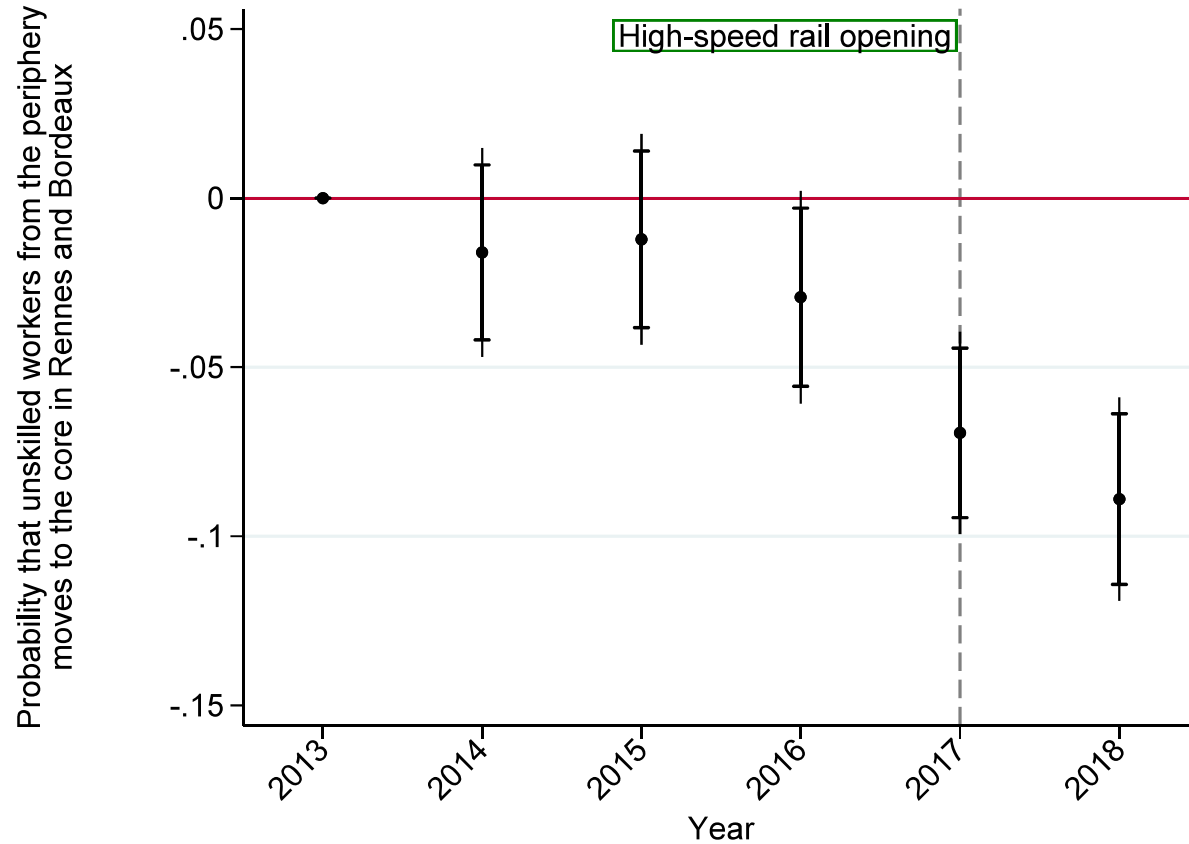
- ◇ where:
 - ▶ y_{it} share of skilled workers among in-movers into neighborhood i at year t
 - ▶ μ_i and θ_t neighborhood- and year- fixed effects
 - ▶ ε_{it} error term

H4: Do skilled moving in secondary cities locate in central locations?



- ◇ Compare central and non-central neighborhoods in Bordeaux/Rennes.
- ◇ Result: 7.7%p. increase in the share of skilled workers in central Bordeaux/Rennes.

H4bis: Are periphery locals in Bordeaux/Rennes crowded out of the center?



- ◇ Result: Unskilled workers from peripheral locations in Bordeaux and Rennes are 10%p less likely to move to the center.

Conclusion

- We developed a **model of second-hand gentrification** with heterogeneous individuals locating in a primary and a secondary city.
- Improving the **HSR network increases the accessibility of the primary city** (from treated secondary cities).
 - ▶ Skilled workers, as well as unskilled in primary city are predicted to benefit from the reform.
 - ▶ Yet, in line with media coverage, unskilled in secondary cities are harmed due to the increase in housing prices.
- Theoretical predictions are empirically validated **exploiting the extension of the French HSR in 2017**.
- Analysis confirms the **important effects in Bordeaux/Rennes**, but also evidence of **reduced housing prices in Paris Montparnasse area**.