# From Zones to Communities:

Place-based Industrial Policies, Neighborhood Change, and Gentrification in Shanghai

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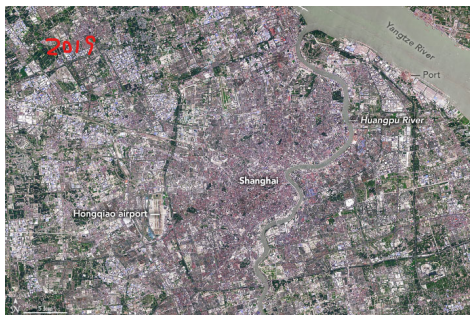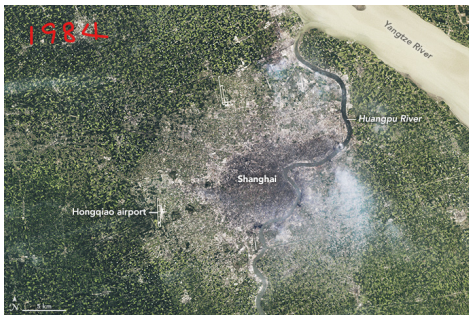
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# Shanghai: Urban Landscape Transformation



- Urban landscape reshaped by new developments since the 1980s
  - Before 1980s: The core of the city on the west bank of the river
  - After 1980s:
    - The development of urban areas from the scratch in all directions
    - The mushrooming of factories, roads, and high-rise buildings, alongside the proliferation of gated communities catering to both the wealthy and middle-class

# The suburbanization of high educated residents
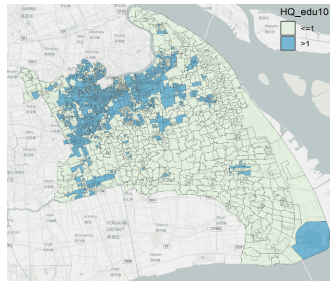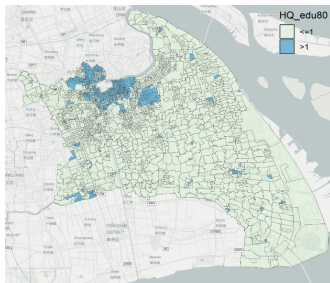


- The share of residents with college degree and above ( $Y$ )
  - Location quotients: Relative to average, $Y_i/\bar{Y}$ (*i*: *Juweihui*)
  - Middle-class neighborhoods in newly developed suburbs

# Zhangjiang High Tech Park

Our Observation:
New development of urban areas are highly concentrated around Special Economic Zones (SEZs), a typical form of place-based industrial policies in China!!!



Zhangjiang High-tech Park

ICT Industry
Other Industries
Residential Zone
Education Zone
Innovation Zone
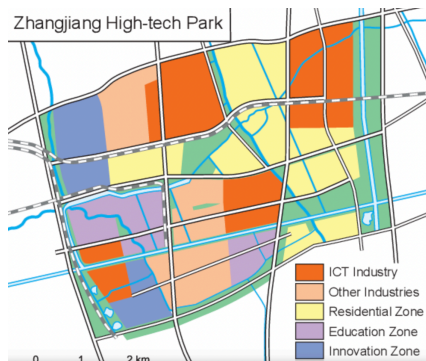
# Research Questions

In this paper, the questions we investigate:

1. Are place-based industrial policies causally linked to the emergence of middle-class neighborhoods and the socioeconomic transformation of affected areas?

2. If such effects exist, through what channels do they occur?

3. Does gentrification arise as a result of the zone shock?

# Empirical Challenges

1. The bias arising from unobserved local characteristics & trends (Baum-Snow and Ferreira 2015; Butts 2021, Kline and Moretti 2014)
   - Difference-in-Difference estimation with spatial spillovers
     - 'Near Far' approach: areas with similar locational attributes but never occupied by zones ( > 4km ) as control

2. Lack of data to measure outcomes at fine spatial scale within cities
   - Newly-digitized admin data on population, firms, housing prices, and schools
   - Using GIS to harmonize neighborhood geography
   - Geocoding the boundaries of industrial zones and neighborhoods to assess spatial distances

3. Difficult to identify sorting channel
   - Estimating the dynamic effects on neighborhoods
     - A larger long-run effect in magnitude indicating sorting potential (Similar strategy in Kline and Moretti (2014))

# Preview of findings

**Using SEZs in Shanghai since the 1980s, we find**

- Treatment effect: A significant positive effect of SEZs on the share of high-educated residents of urban neighborhoods.
  - Only visible for zones targeting skill-based industries.
- Channels: mainly caused by a clustering of skill-based jobs and residents in the zones, amplified by high-quality consumption amenities, pioneer businesses, and public services.
- Gentrification is underway: increasing housing prices and the ongoing sorting of high educated residents.

# Roadmap

# Place-based Industrial Policies in Shanghai

- Place-based Industrial Policies (SEZs below): a geographically delimited area to attract capital and talent through tax incentives and infrastructure support.
- Shanghai: One of the cities hosting the large number of SEZs in China
  - A total of 65 national and municipal level SEZs
  - Different types of SEZs with different missions
    - Skill-based industries: for example, *Lujiazui Financial District & Zhangjiang High-tech Zone*
    - Export-oriented industries: for example, *Waigaoqiao Export Processing Zone & Shanghai Free-Trade Zone*
    - Labor-intensive industries: for instance, *Minhang Economic and Technological Development Zone*
- Zone performance (for example, skill-based SEZs in 2009)
  - 44% patents
  - 42% of high-skill workers
  - 14% industrial output

# Data: Study area

Seven Districts in the core representing Shanghai:
*Huangpu,Luwan,Pudong,Xuhui, Putuo,Changning,& Minhang*
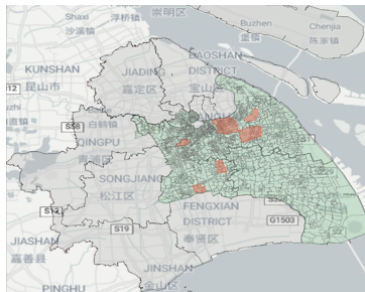


- Occupying 4/5 of core land area of the city
- A vast majority of large and prominent SEZs included
- Providing access to 1982 Pop Census data at the fine admi level

# Data Sources

- Spatial Unit: *Juweihui* (**Block** in U.S in size)
  - Average area: SEZ > **Juweihui**

- Population data:
  - Four waves of <span style="color:red">Population Censuses:</span> 1982 (7 Districts), 1990, 2000, & 2010

- Firms and businesses data:
  - <span style="color:red">Three rounds of Industrial Surveys:</span> 1993, 2004, & 2008
  - <span style="color:red">Commercial and Industrial Registration Data:</span> 1980-2010

- Zone data:
  - <span style="color:red">2018 Bulletin List for Special Economic Zones in China:</span>1980-2018.

- Housing transaction data: 2005-2015
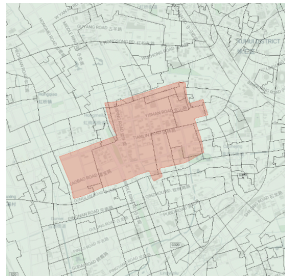  - Real estate agents: *Woaiwojia* & *Lianjia*

- Digitizing census documents



- Geocoding the boundaries of economic zones

$$Y_{i\tau} = \alpha + \beta(1_{\tau \geq t_0} \times 1_{i \in Zone}) + X_{i\tau}\gamma + \epsilon_{i\tau}^{(****)} \tag{1}$$

Tab 1: Results: Baseline Estimates

| | Share of residents with college + | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Skill-based Zones | | | Export-oriented Zones | | | Labor-intensive Zones | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | 0.1295*** | 0.1173*** | 0.1173*** | -0.0293** | -0.0364*** | -0.0364** | 0.0254** | 0.0230* | 0.0230 |
| | (0.0088) | (0.0108) | (0.0159) | (0.0121) | (0.0121) | (0.0148) | (0.0129) | (0.0128) | (0.0144) |
| Controls | NO | YES | YES | NO | YES | YES | NO | YES | YES |
| HAC | NO | NO | YES | NO | NO | YES | NO | NO | YES |
| $R^2$ | 0.7317 | 0.7328 | 0.7328 | 0.6997 | 0.7114 | 0.7114 | 0.6516 | 0.6638 | 0.6638 |
| No. of Obs. | 1,612 | 1,612 | 1,612 | 772 | 772 | 772 | 1,172 | 1,172 | 1,172 |

Notes: We examine the share of residents with college degree and above for four census years, 1982,1990,2000,& 2010. *Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km* as well as year and neighborhood fixed effects. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

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$(****)i$,Juweihui; $\tau$,census year; $t_0$,Year of zone established; $Y$, Fraction college +; $(1_{\tau \geq t_0} \times 1_{i \in Zone})$, DID

# Results: Event Study (Skill-based Zones)

$$Y_{it} = \alpha + \sum_{t=-2}^{3} \beta_t(1_{i \in Zone}) + X_{it}\gamma + \epsilon_{it} \qquad (2)$$



Event Study
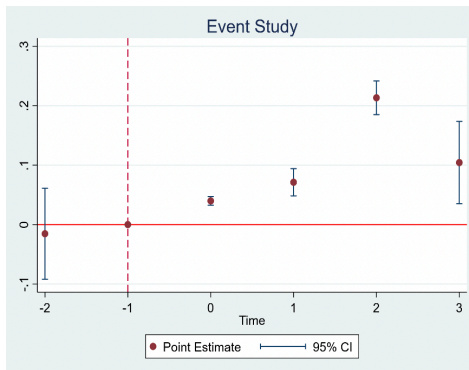
# Results: Estimates Considering Spillover Effect

Spatial Spillovers: Holmes (1998); Black (1999); Kahn (2004); Duranton et al. (2011); Ahlfeldt et al. (2015)

- Grid cells of 2 km intervals.
- 4 km as the distance threshold (Spillover effect of decay is tested.)
    - Grid cells for neighborhoods up to 4 km from their nearest zone included: 0km,0-2km,and 2-4km.
    - Neighborhoods more than 4 km from the nearest zone as the reference grid cell (4-5km grid cell in the robustness check).
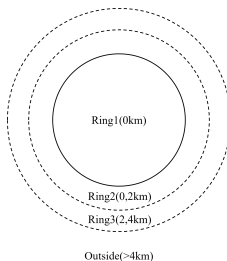


Fig 1: Grid cells: Ring1(0km),Ring2(0-2km),Ring3(2-4km), and outside(>4km)

$$Y_{i,t} - Y_{i,t-1} = \alpha + \sum_k \gamma_k \prod_{ik} + X_{i,t-1}\kappa + u_J + \epsilon_{i,t(\#)} \quad (3)$$

Tab 2: Results：Spillover effects

| | Change in share of residents with college + | | | | | | | | | |
| | Skill-based Zones | | | | Export-oriented Zones | | | Labor-intensive Zones | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | 0.1147*** | 0.0974*** | 0.0974*** | 0.0899*** | -0.0122 | -0.0063 | -0.0063 | 0.0194 | 0.0180 | 0.0180 |
| | (0.0088) | (0.0109) | (0.0160) | (0.0156) | (0.0100) | (0.0107) | (0.0146) | (0.0125) | (0.0126) | (0.0138) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(0-2km)})$ | 0.0560*** | 0.0435*** | 0.0435*** | 0.0374*** | 0.0029 | 0.0099 | 0.0099 | 0.0213** | 0.0175* | 0.0175 |
| | (0.0082) | (0.0088) | (0.0127) | (0.0122) | (0.0082) | (0.0094) | (0.0138) | (0.0091) | (0.0097) | (0.0115) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(2-4km)})$ | 0.0431*** | 0.0433*** | 0.0433** | 0.0371** | 0.0086 | 0.0164 | 0.0164 | 0.0138 | 0.0121 | 0.0121 |
| | (0.0088) | (0.0087) | (0.0168) | (0.0166) | (0.0111) | (0.0115) | (0.0163) | (0.0105) | (0.0105) | (0.0124) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(4-5km)})$ | | | | -0.0133 | | | | | | |
| | | | | (0.0135) | | | | | | |
| Controls | NO | YES | YES | YES | NO | YES | YES | NO | YES | YES |
| HAC | NO | NO | YES | YES | NO | NO | YES | NO | NO | YES |

Notes: We examine the change in the share of residents with college degree and above for three periods, 1982-1990,1990-2000,& 2000-2010. *Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km*. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

[#] $\prod_{ik}$: a dummy variable proxying for whether a neighborhood $i$ belongs to a distance grid cell $k$ from the nearest zone.

# Results: Other Robustness Checks (Skill-based Zones)
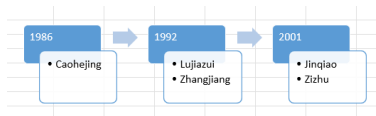


1. Treatment effect heterogeneity in the TWFE model
   - Callaway and Sant'Anna (2021): $ATT = 0.0743$, significant at 1%.

2. Non-randomness of zone location
   - In-space placebo test
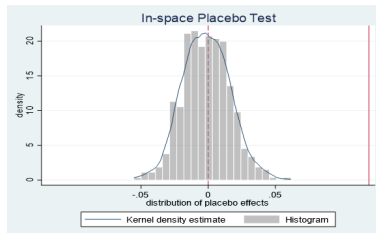
# Mechanism: What Channels

**Sorting channels or inequality channels (initial shock)?**

- The effects of SEZs intensifying over time
    - Job opportunities
    - Demand of amenities (Consumption amenities)
    - Supply of amenities (Pioneer businesses)
    - Public services
- Specification (short run vs. long run effects)

$$Y_{i,\tau} - Y_{i,c} = \alpha + \beta 1(i \in Zone) + X_{i\tau}\gamma + \epsilon_{i\tau} \qquad (4)$$

where, $c$ is the initial census year.

Tab 3: Results: Job Opportunities Channel

| | Change in skill-based jobs (in logs) | | | | | | |
| | Registration data(Skill-based Industries ) | | | Industry Survey data (Skill-based Manu) | | | |
| | New Establishments | | | Stock of firms | | The number of employees | |
| | 1980-1990 | 1990-2000 | 2000-2010 | 1993-2004 | 1993-2008 | 1993-2004 | 1993-2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | -0.1684** | 0.6309*** | 0.8522*** | 0.7108*** | 1.3160*** | 1.9711*** | 1.9254*** |
| | (0.0735) | (0.1493) | (0.1826) | (0.1779) | (0.1820) | (0.4465) | (0.4247) |
| | | | | | | | |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(0-2km)})$ | -0.0384 | 0.3982*** | 0.5529*** | 0.4044*** | 0.8674*** | 0.6197 | 0.6257* |
| | (0.0619) | (0.1394) | (0.1704) | (0.1413) | (0.1533) | (0.3860) | (0.3614) |
| | | | | | | | |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(2-4km)})$ | 0.0524 | 0.3370** | 0.5059*** | 0.3181** | 0.3077 | -0.0169 | -0.2159 |
| | (0.0660) | (0.1417) | (0.1752) | (0.1615) | (0.2025) | (0.4242) | (0.3959) |
| | | | | | | | |
| Controls | YES | YES | YES | YES | YES | YES | YES |
| | | | | | | | |
| $R^2$ | 0.1195 | 0.3237 | 0.3055 | 0.1094 | 0.4930 | 0.2480 | 0.4159 |
| No. of Obs. | 403 | 403 | 403 | 502 | 501 | 502 | 501 |

Notes:*Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km*. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

Tab 4: Results : Amenities Channel

| | Change in establishments | | | | | |
|---|---|---|---|---|---|---|
| | Pioneer Businesses | | | High-quality Consumption Amenities | | |
| | 1980-1990 | 1990-2000 | 2000-2010 | 1980-1990 | 1990-2000 | 2000-2010 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | -0.1571*** | 0.2719** | 0.4321*** | -0.0146 | 0.0672 | 0.2104*** |
| | (0.0409) | (0.1070) | (0.1262) | (0.0157) | (0.0566) | (0.0746) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(0-2km)})$ | -0.0816*** | 0.1997** | 0.2779** | 0.0027 | 0.1160** | 0.1041* |
| | (0.0310) | (0.0965) | (0.1120) | (0.0111) | (0.0462) | (0.0592) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(2-4km)})$ | -0.0422 | 0.1764* | 0.1965* | -0.0012 | 0.1077** | 0.1412** |
| | (0.0375) | (0.1000) | (0.1131) | (0.0125) | (0.0475) | (0.0640) |
| Controls | YES | YES | YES | YES | YES | YES |
| $R^2$ | 0.1482 | 0.2822 | 0.2272 | 0.0353 | 0.1598 | 0.1558 |
| No. of Obs. | 1,305 | 1,305 | 1,305 | 1,305 | 1,305 | 1,305 |

Notes: *Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km*. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

Tab 5: Results : Public Services

|  | Star Schools | |
|---|---|---|
|  | 1980-2000 | 1980-2010 |
|  | (1) | (2) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | 0.0429** | 0.1260*** |
|  | (0.0177) | (0.0297) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(0-2km)})$ | 0.0374** | 0.1195*** |
|  | (0.0161) | (0.0285) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(2-4km)})$ | 0.0282 | 0.0727*** |
|  | (0.0179) | (0.0239) |
| Controls | YES | YES |
| $R^2$ | 0.0153 | 0.0341 |
| No. of Obs. | 1,305 | 1,305 |

Notes: *Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km*. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

Tab 6: Results: Gentrification

| | Changes in housing prices (log) | | Changes in share of College + | | |
|---|---|---|---|---|---|
| | 2005-2010 | 2005-2015 | 1982-1990 | 1982-2000 | 1982-2010 |
| | (1) | (2) | (3) | (4) | (5) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone})$ | 0.0839* | 0.2126*** | 0.0297** | 0.0715*** | 0.2107*** |
| | (0.0429) | (0.0794) | (0.0117) | (0.0138) | (0.0233) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(0-2km)})$ | 0.0359 | 0.1802*** | 0.0053 | 0.0463*** | 0.1125*** |
| | (0.0361) | (0.0698) | (0.0114) | (0.0131) | (0.0178) |
| $(1_{\tau \geq t_0} \times 1_{i \in Zone(2-4km)})$ | 0.0526 | 0.1541** | 0.0184 | 0.0459*** | 0.0918*** |
| | (0.0380) | (0.0705) | (0.0120) | (0.0142) | (0.0199) |
| Controls | YES | YES | YES | YES | YES |
| $R^2$ | 0.0379 | 0.0263 | 0.4076 | 0.2705 | 0.2950 |
| No. of Obs. | 526 | 382 | 1,291 | 1,305 | 1,305 |

Notes: *Controls* are a set of neighborhood-level attributes including *Access to subway with 5km* and *Access to green land within 5km*. Standard errors are in in parentheses. In Column (3), (6) & (9), we use Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors . * significant at 10%, ** significant at 5%, *** significant at 1%.

# Related Literature

1. **The determinants of neighborhood change and spatial sorting:** Transportation technology(Baum-Snow 2007; Balboni et al. 2020; Fretz et al. 2021; LeRoy and Sonstelie 1983; Glaeser et al. 2008; Tsivanidis 2022);Income distribution (Counture et al. 2023); Wartime destruction(Redding and Sturn 2024); High-tech cluster (Berkes and Gaetani 2023)
   - Use variations from place-based industrial investment.

2. **Local effects of Place-based Policies:**
   Creating employment and wage growth ( U.S cities (Atkins et al. 2022; Busso et al. 2013; Freedman et al. 2023; Neumark and Kolkko 2010); Chinese cities (Zheng et al. 2017))
   - Investigate the distributional effects of such policies on local neighborhoods.

3. **The geography of amenities:**
   The demand of amenities (Baum-Snow and Hartely 2020; Counture et al. 2023; Counture and Hardbury 2023; Glaeser et al. 2001; Hausaman et al. 2023); the supply of amenities (Almagro and Domínguez-Iino 2021 ; Behrens et al. 2024)
   - Test the channels of both endogenous demand and supply of amenities.

# Sum Up

This paper investigates the neighborhood effects of place-based industrial policies using the evidence from Shanghai since 1980s.

- This paper finds that there is a positive effect of SEZs on the fraction of well-educated residents.
- This effect is more significant for zones with skill-based industries.
- The effect of skill-based zones works through the availability of high-skill jobs and endogenous amenities.
- Further analysis presents the evidence of gentrification.

# Sum Up

- General equilibrium effect?
- The public good provision channel?
- Urban planning literature?

Many thanks. Comments really welcome.