

An aerial night view of a city street. The street is illuminated by streetlights, and several cars are visible. Buildings line both sides of the street, and the overall scene is a dense urban environment.

The Direct and Indirect Effects of Transit Infrastructure

Román D. Zárate

Rapid pace of urbanization

Cities are engines of economic growth



Big challenges in developing countries

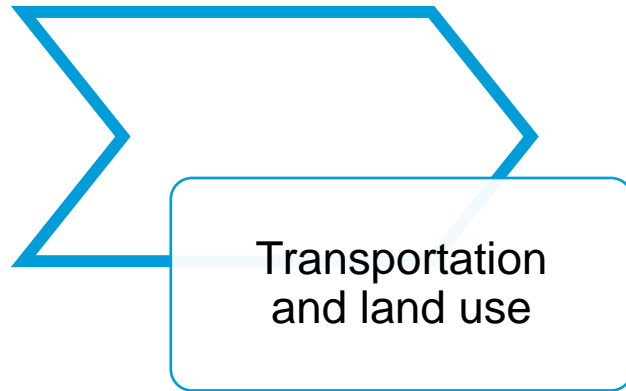


Congestion

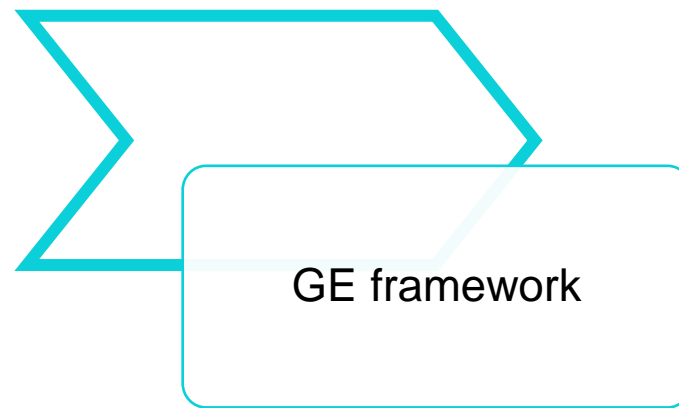


Informal Housing

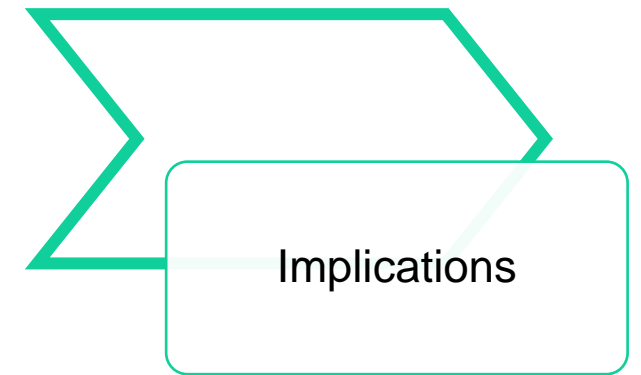
What are the effects of urban interventions?



- BRT or subways
- New roads
- Land use regulations
- Housing or transport subsidies



- Classic approach: Demand
- Not GE effects
- Externalities and spillovers



- Housing prices
- Wages and prices
- Reallocation of workers
- Aggregate welfare

Outline of the talk

1. New Quantitative Model

- GE effects: wages, prices, quantities
- Externalities

2. What are the effects of infrastructure?

- Informality and spatial misallocation – Mexico City
- Labor market power – Santiago de Chile

3. Toolkit of the basic model:

- Policymakers
- Cape Town

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The New Urban Quantitative Model



* Ahfeldt et al., (2015)

The model*

Residential and employment choices
Land developers
Externalities

Minimum data requirements

Employment and population by spatial unit
Housing prices
Size of each spatial unit
Travel times across locations

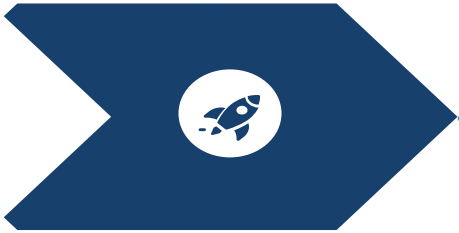
Extensions

Multiple groups of workers and sectors
Distortions and wedges: taxes or markups
Crime
Pollution and emissions

Intuition of the model

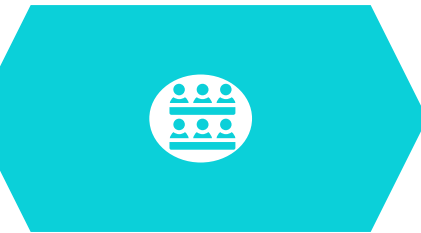
Transport innovation

Suppose that a new transport infrastructure reduces travel times across locations. (e.g., BRT or metros)



People move across places

The more productive locations will receive more workers since these places have a comparative advantage in production.



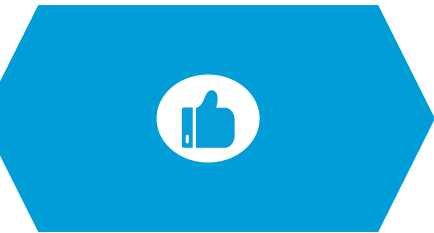
Prices adjust

Prices of floor space, and the number of workers and residents from each location change



Some places become more attractive

Amenities and salaries positively affect people's utility levels, while commuting costs and housing prices negatively affect them.

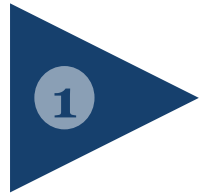


Markets out of steady state equilibrium

When people move, the demand and supply of labor and housing markets can be affected. For instance, there can be an increase in the housing demand that exceeds the current supply.

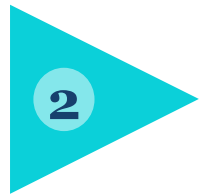


The model proceeds in two steps



Matching the model with the data:

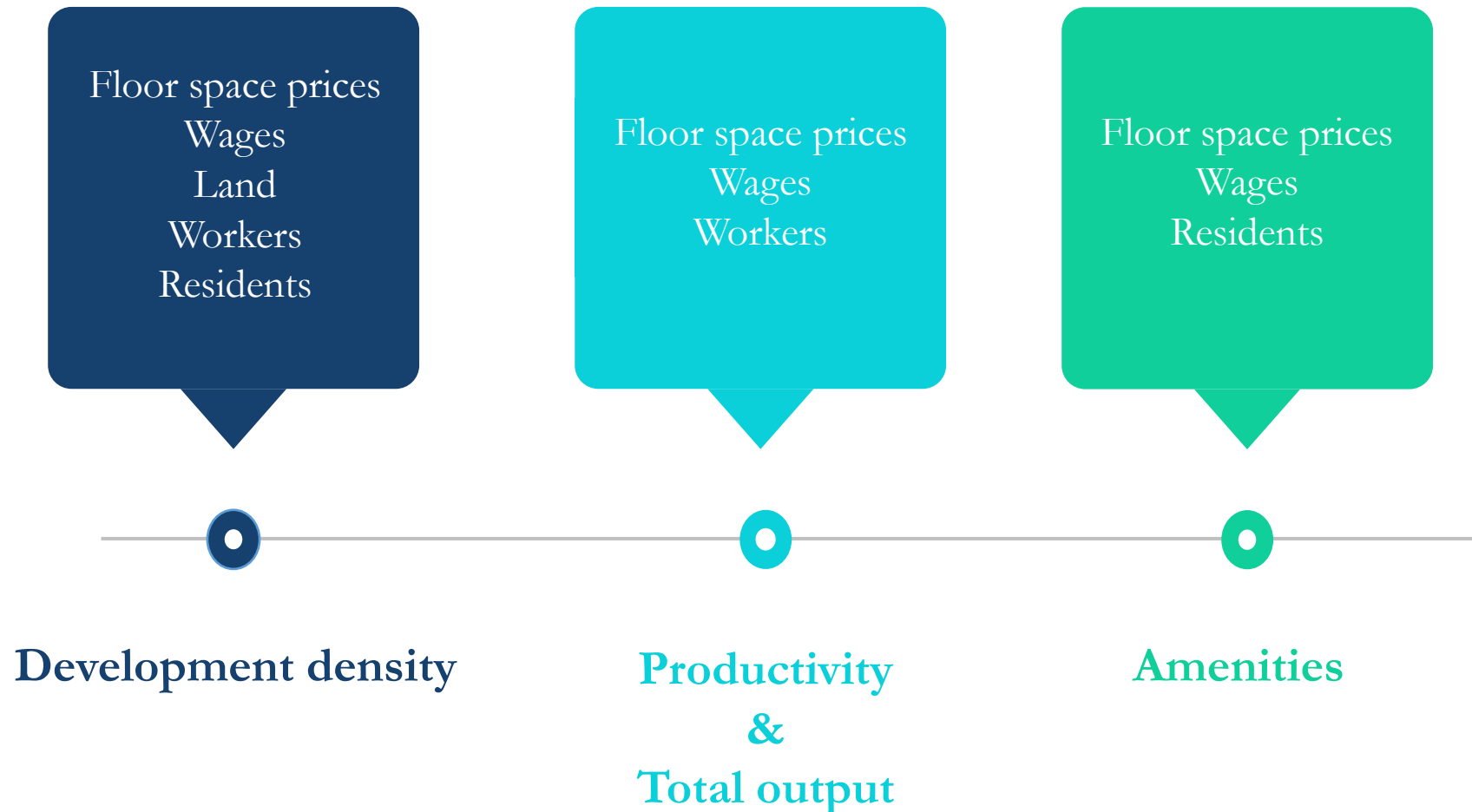
- Amenity distribution: how attractive is a location
- Productivity distribution: how efficient is a location
- Density of development: how much land is developed



Explore different counterfactuals:

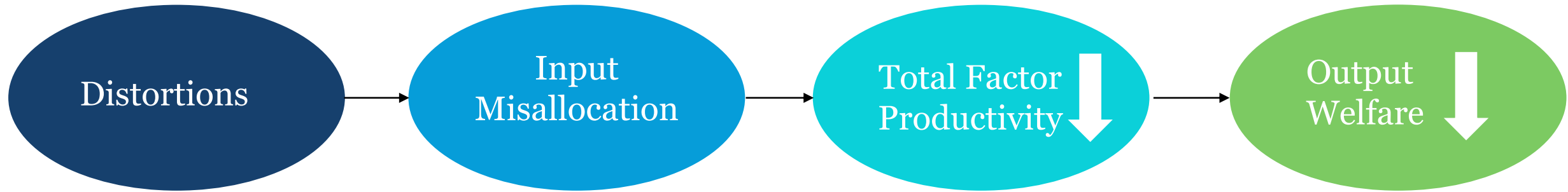
- Transportation infrastructure
- Housing subsidies
- Productivity shocks

Main Intuition to recover scale parameters



Evaluating infrastructure

- Distortions: taxes, subsidies, crime, markups



- Informality: taxes and subsidies
 - Labor market power: Berger et al. (2020), Felix (2021), McKenzie (2019)
 - Crime: Khana et al. (2021)
-
- Indirect effects of transit infrastructure

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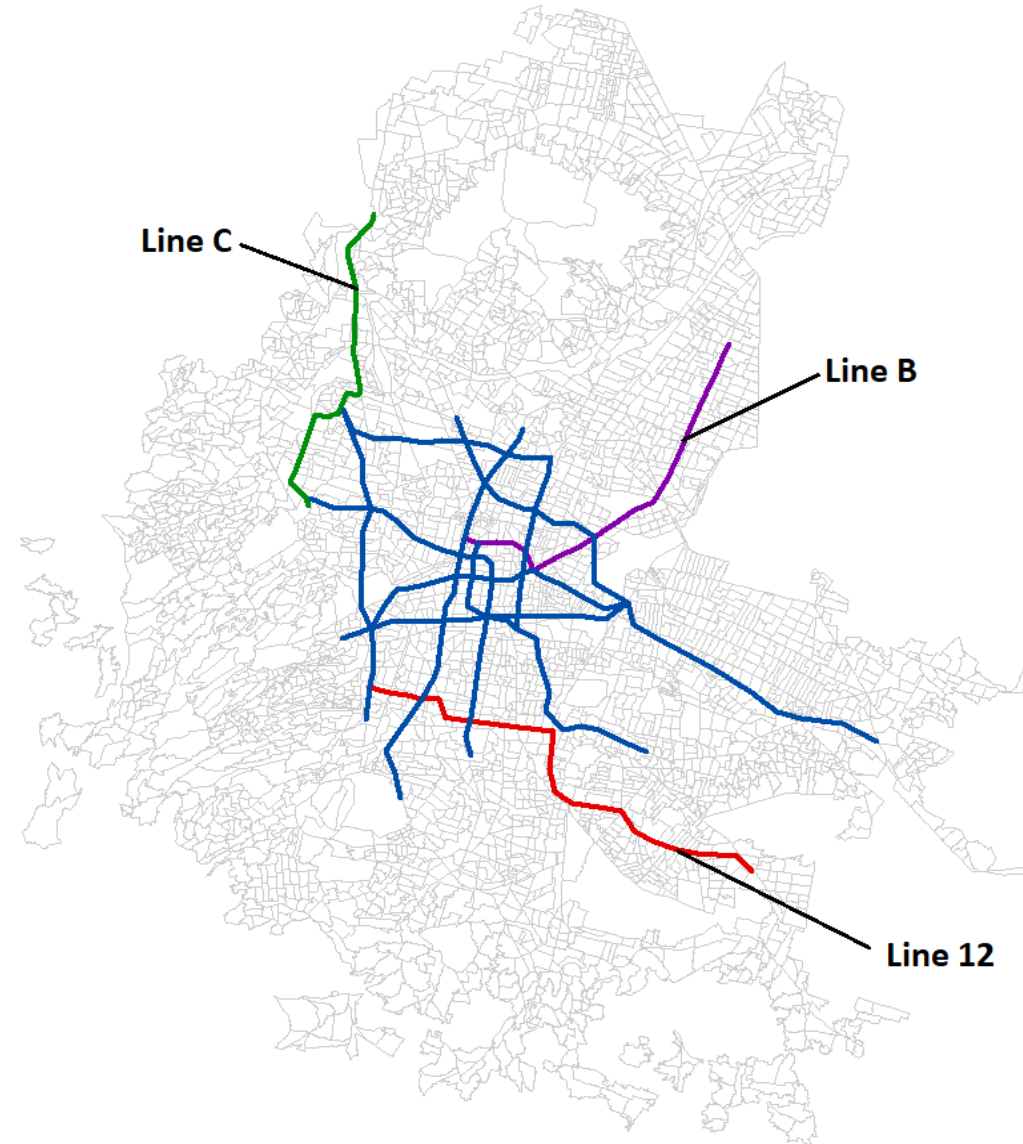
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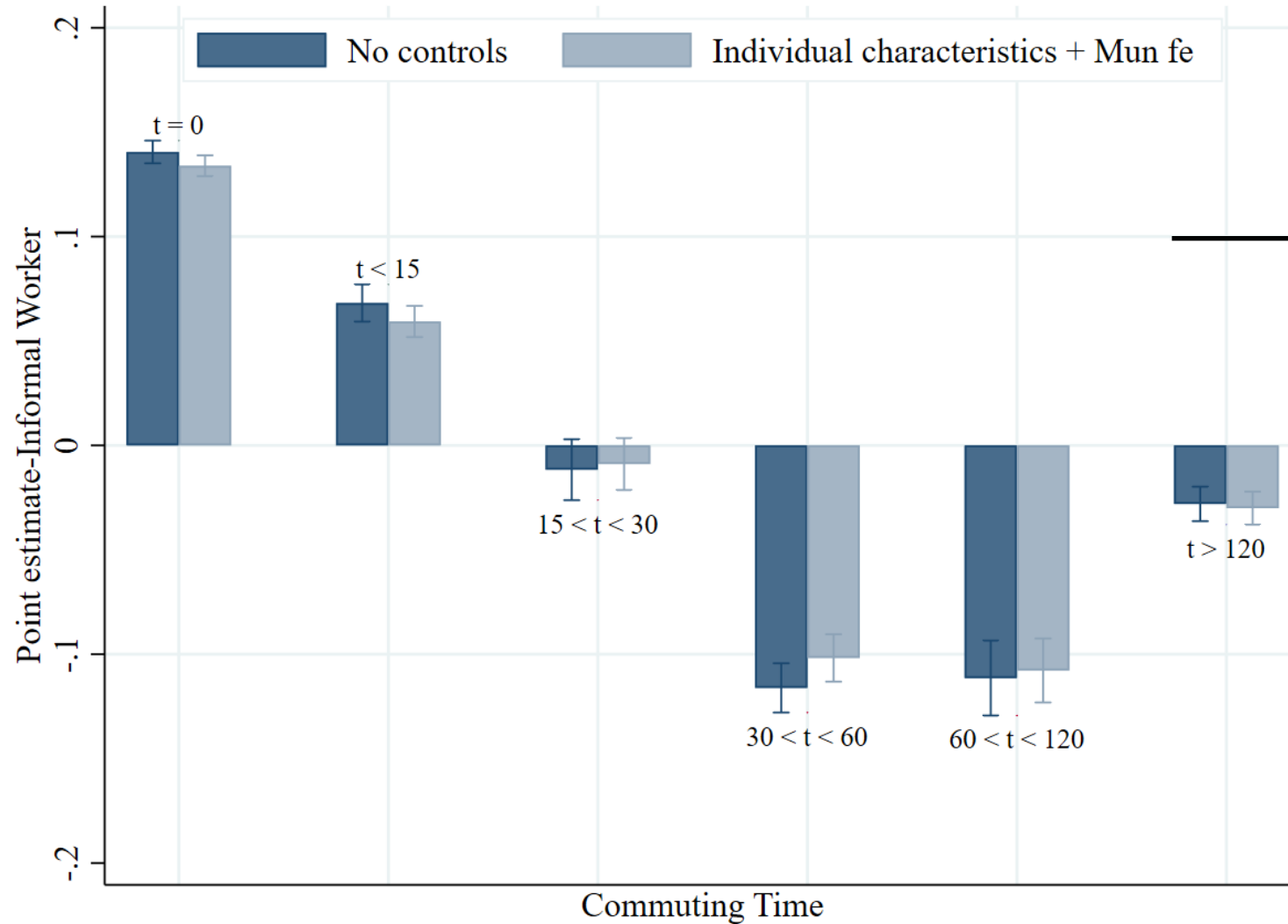
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Line B in Mexico City connected remote areas



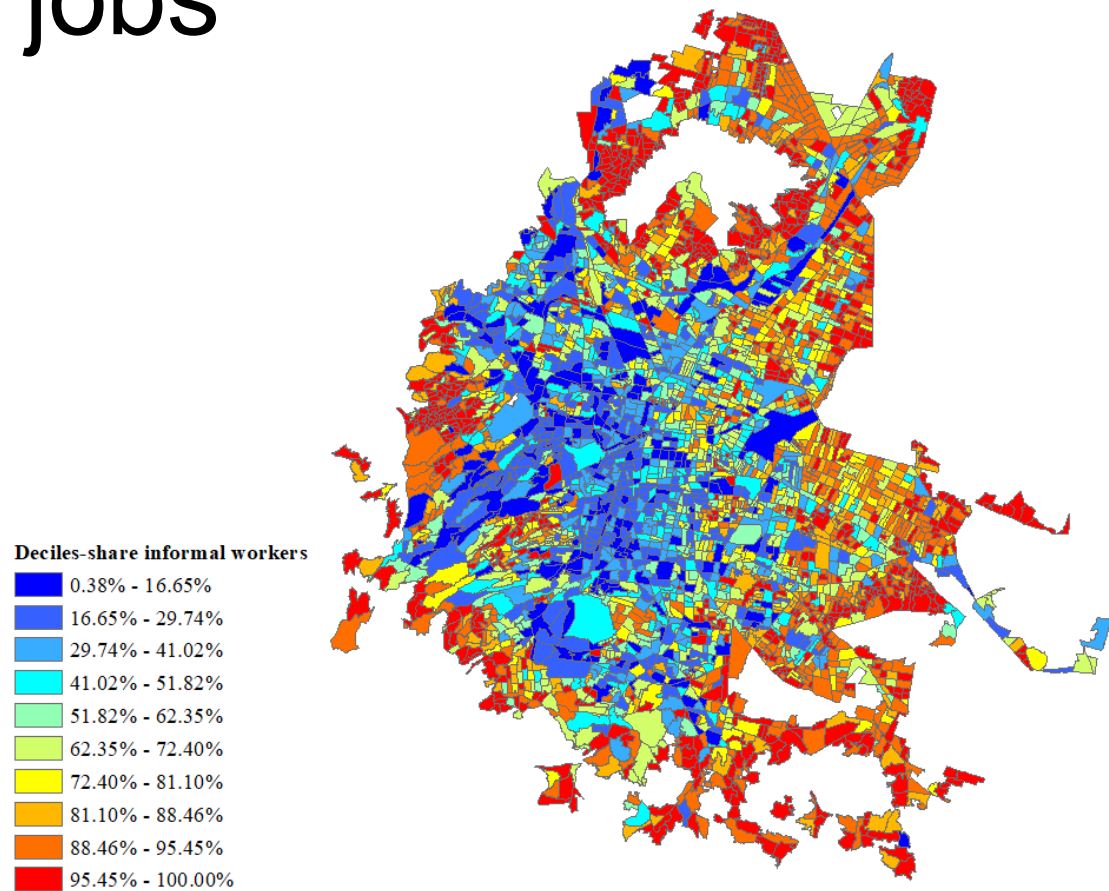
1. Informal workers spend less time commuting



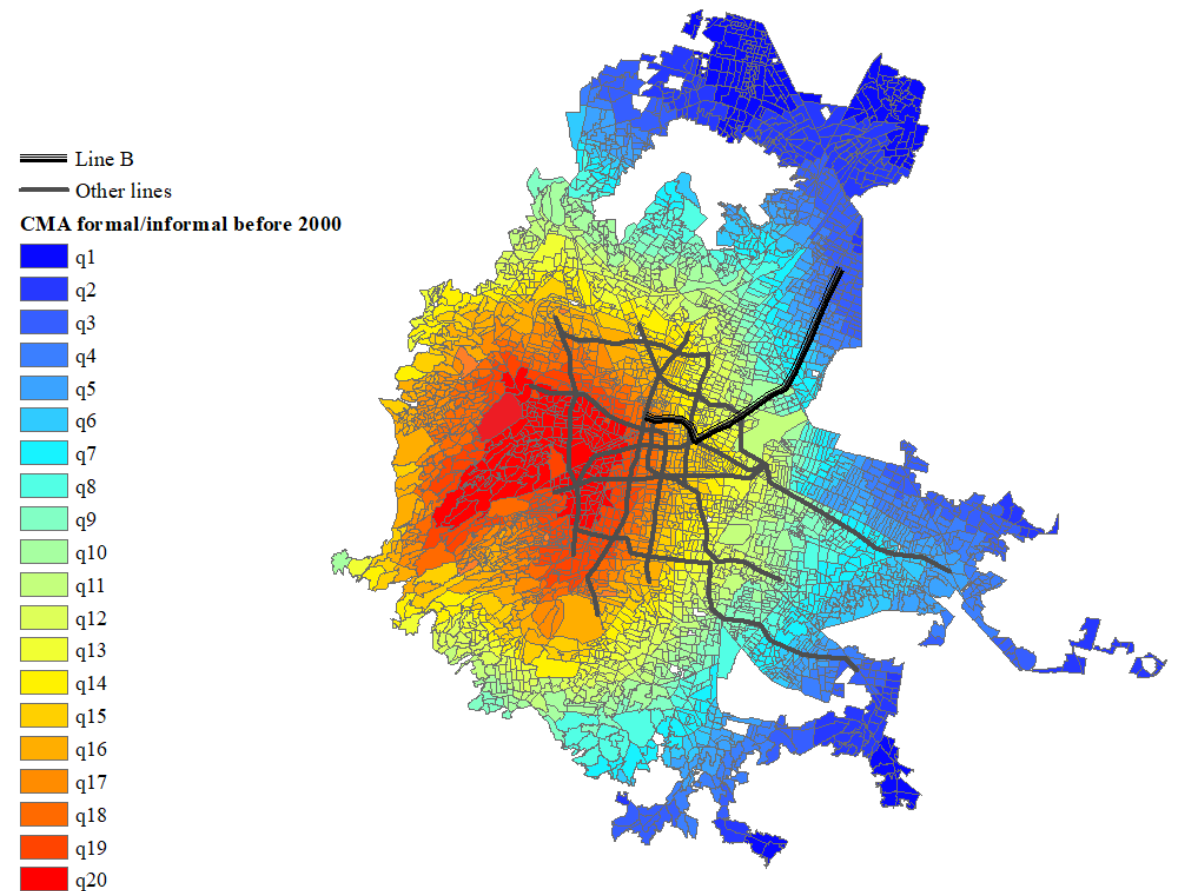
Higher commuting elasticity
Informal sector

- Informal jobs easier to substitute across locations
- Informal workers work closer to home

2. Remote locations have poorer access to formal jobs

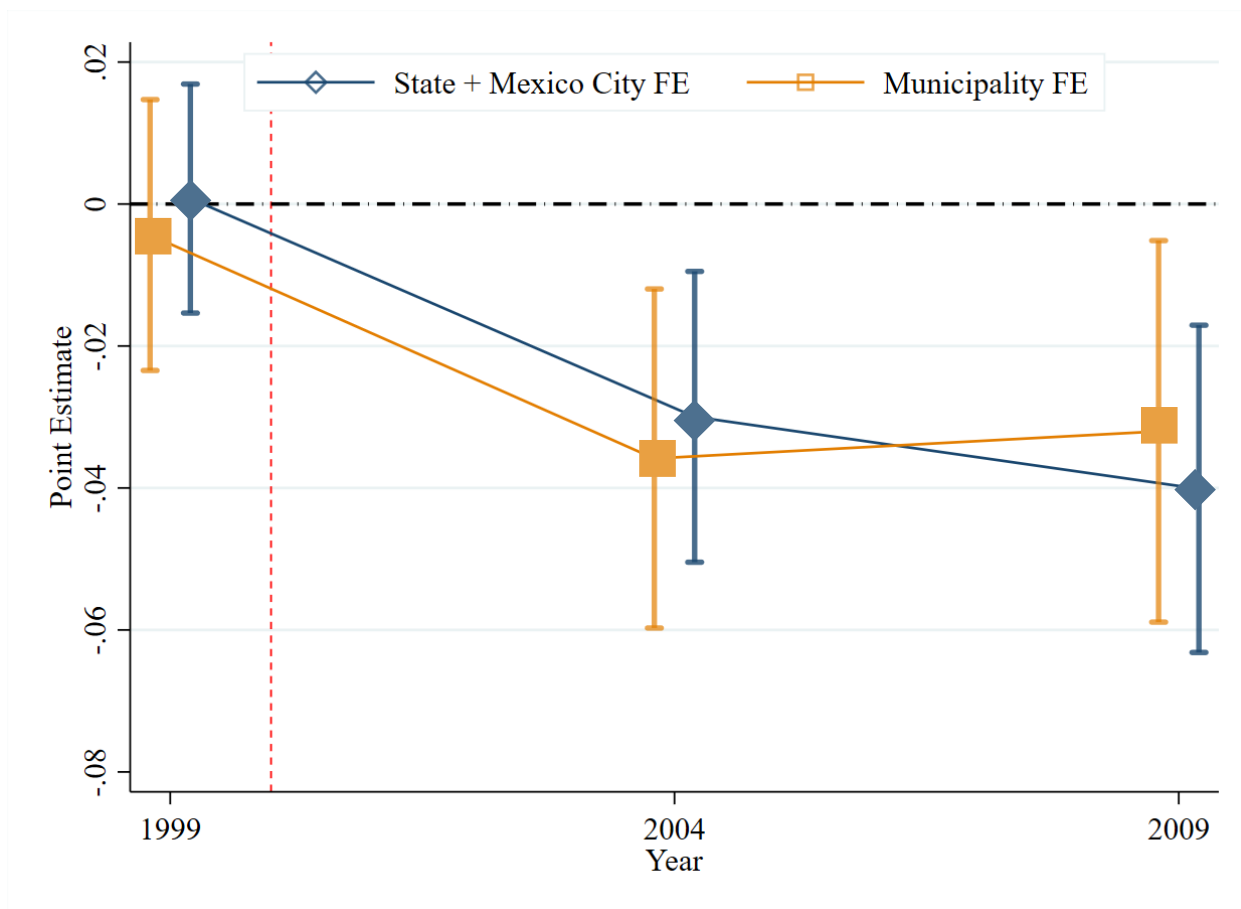


a) Informality rates (jobs)

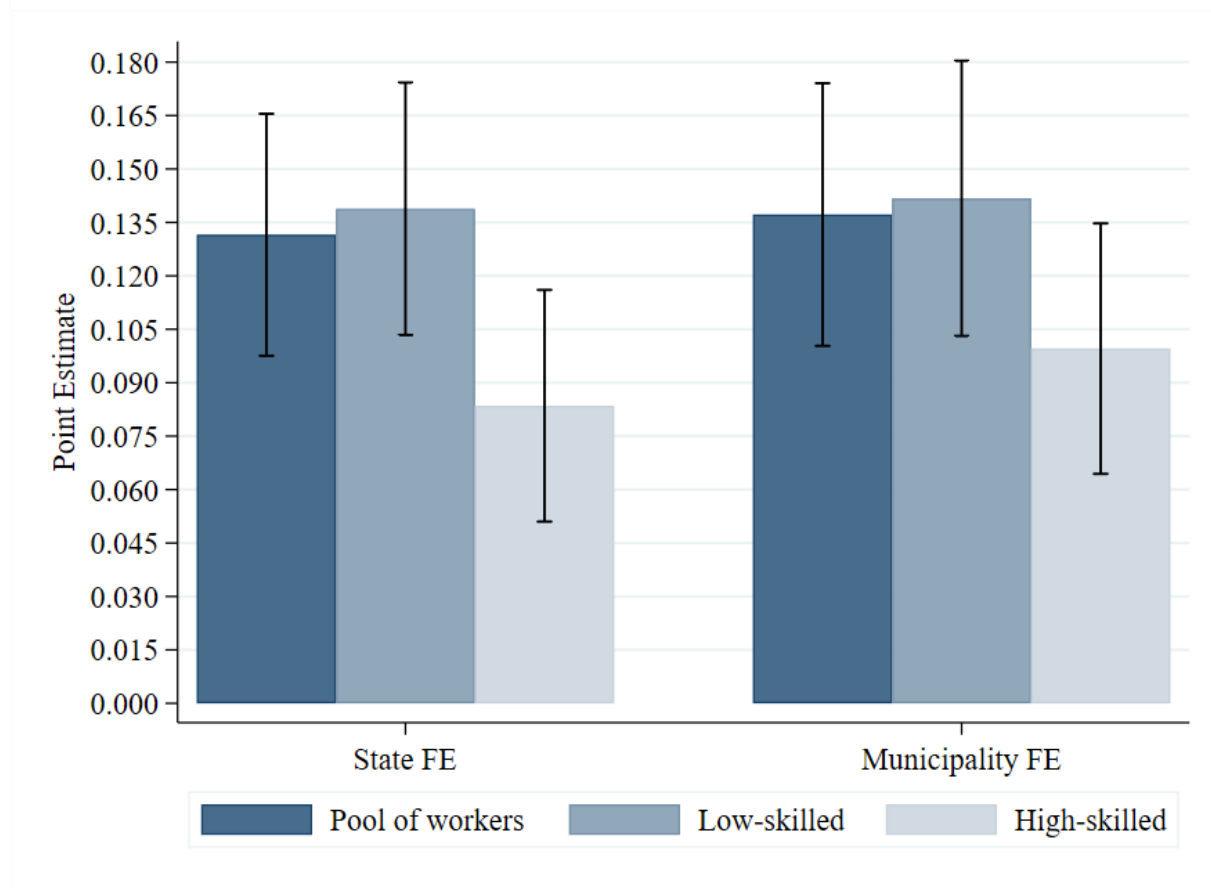


b) Market access index (formal-informal)

3. Transit Improvements decrease Informality

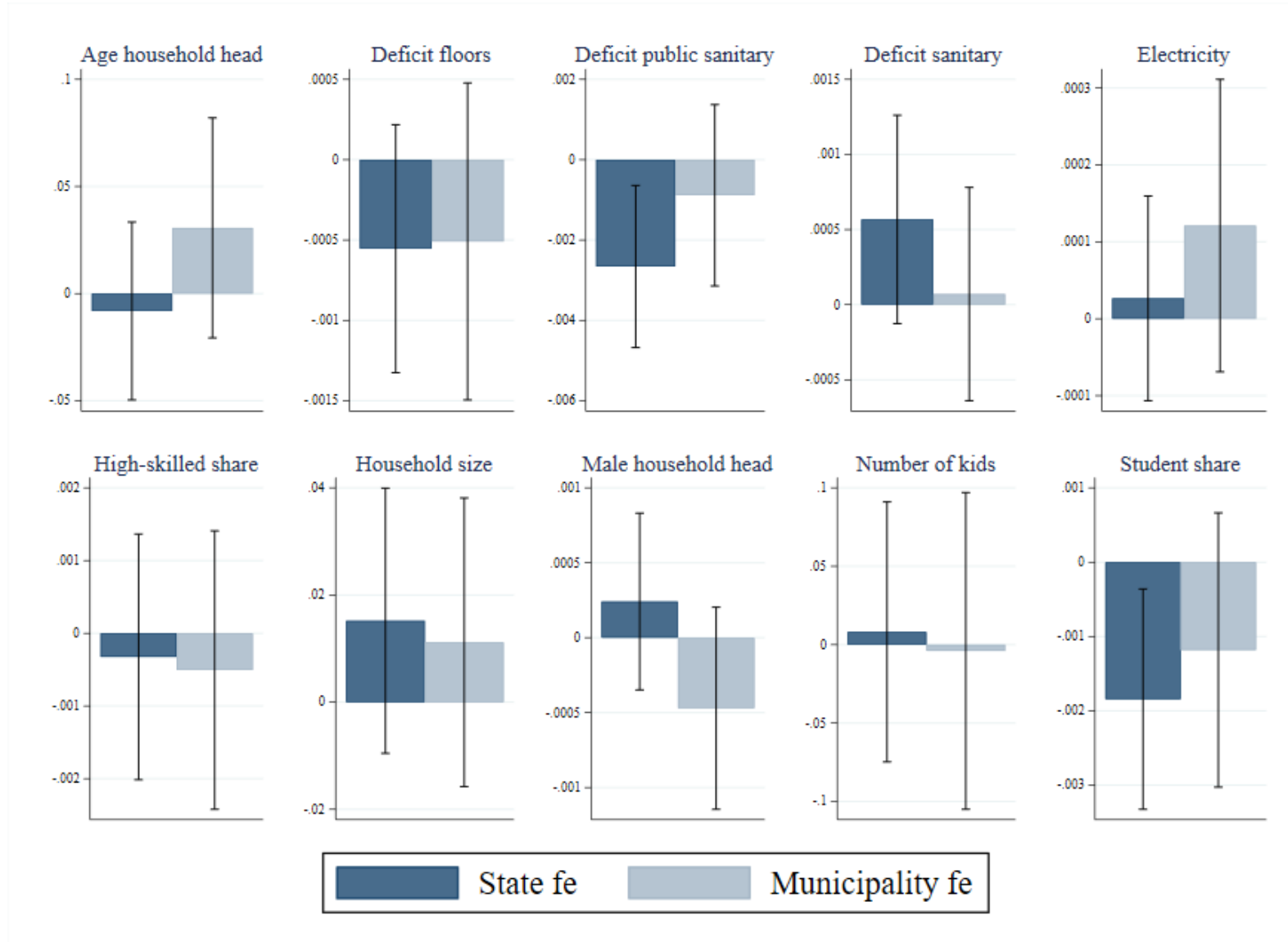


a) Workers (informality rate)

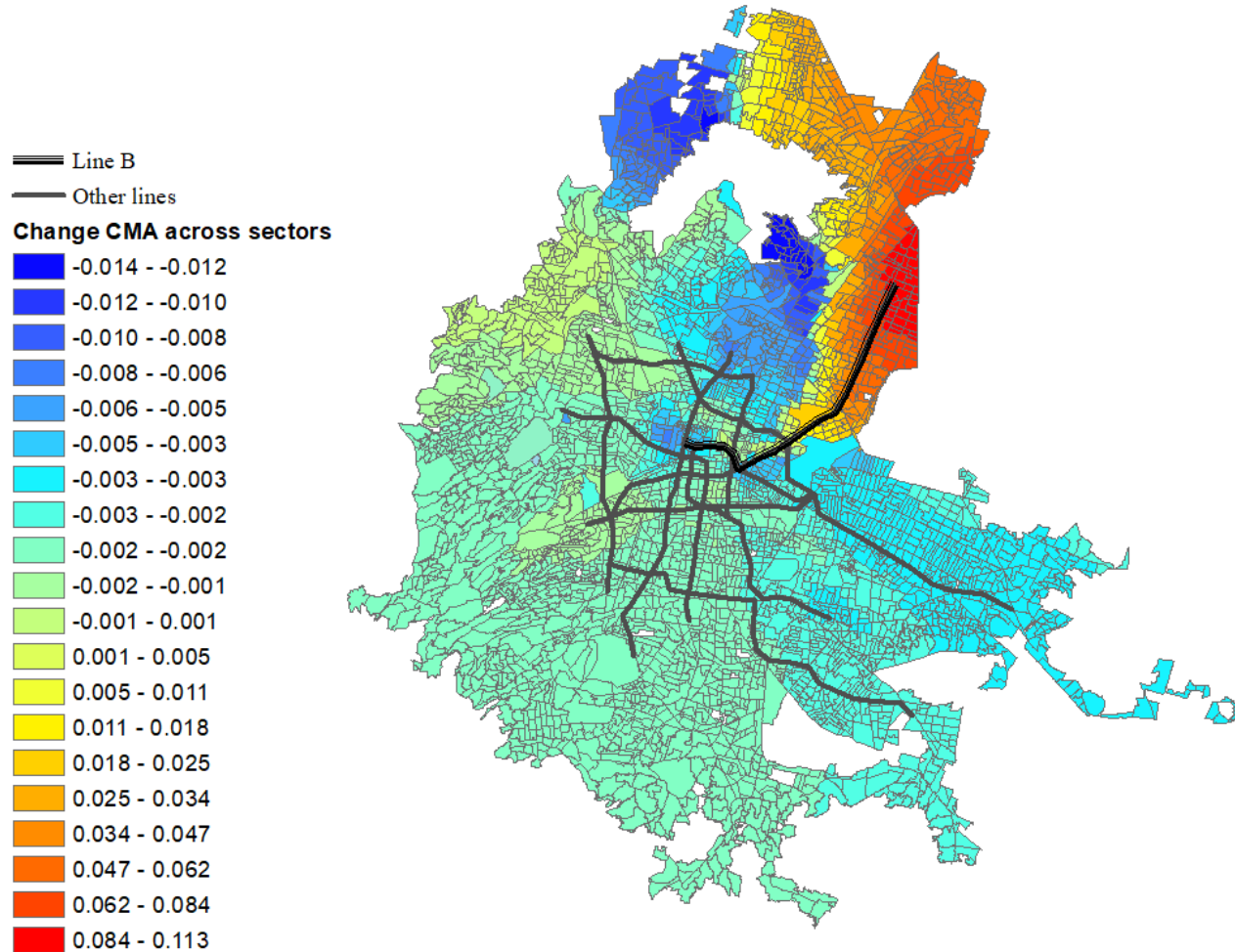


b) Population (formal-informal ratio)

4. Household composition does not change

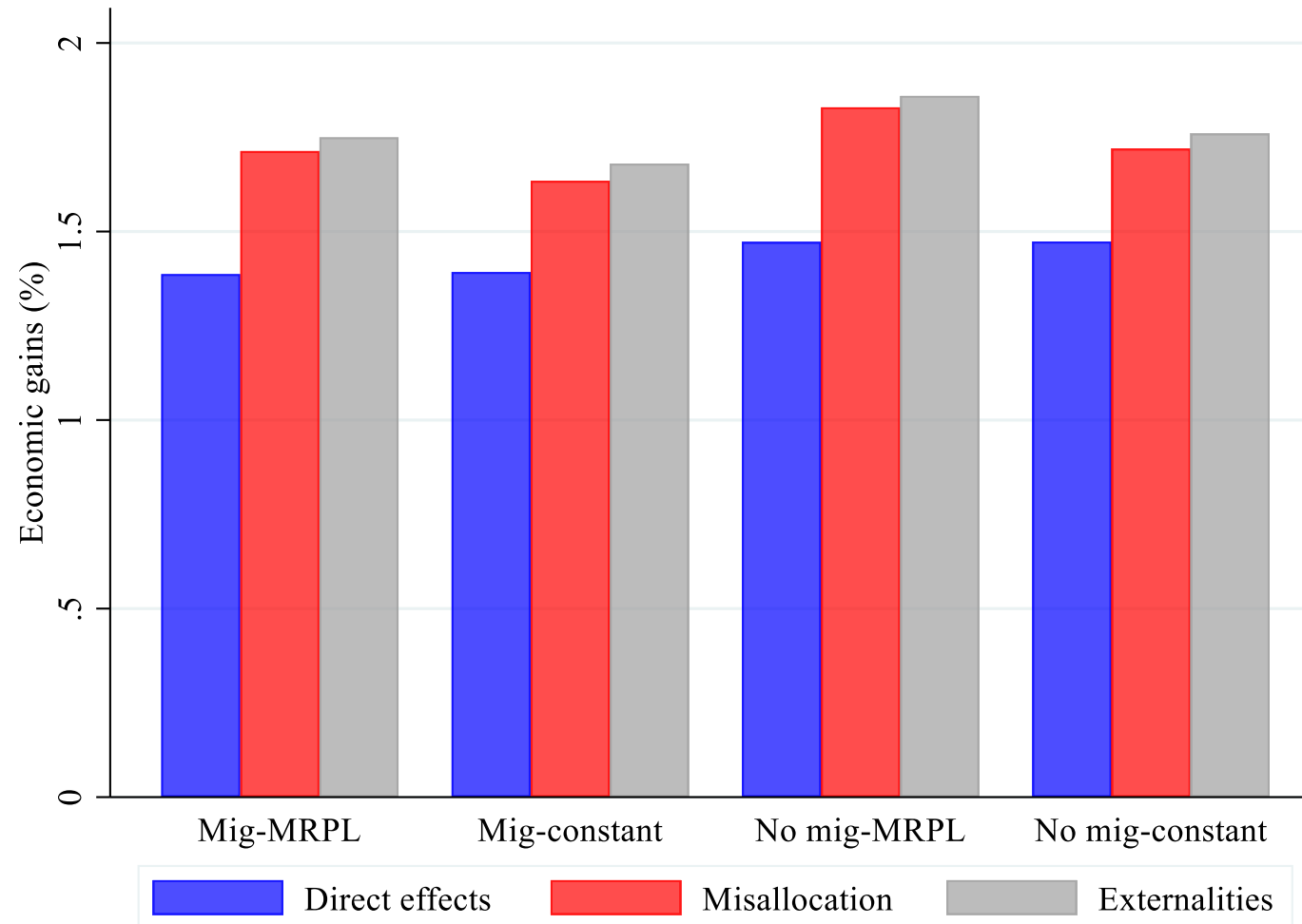


Market access to formal jobs improve relative to informal jobs



- Market access is a wage index
- Workers reallocate to the formal sector
- Parameter that governs this reallocation:
 - Labor supply elasticity across sectors

The interaction between transit improvements and informality amplifies the welfare gains



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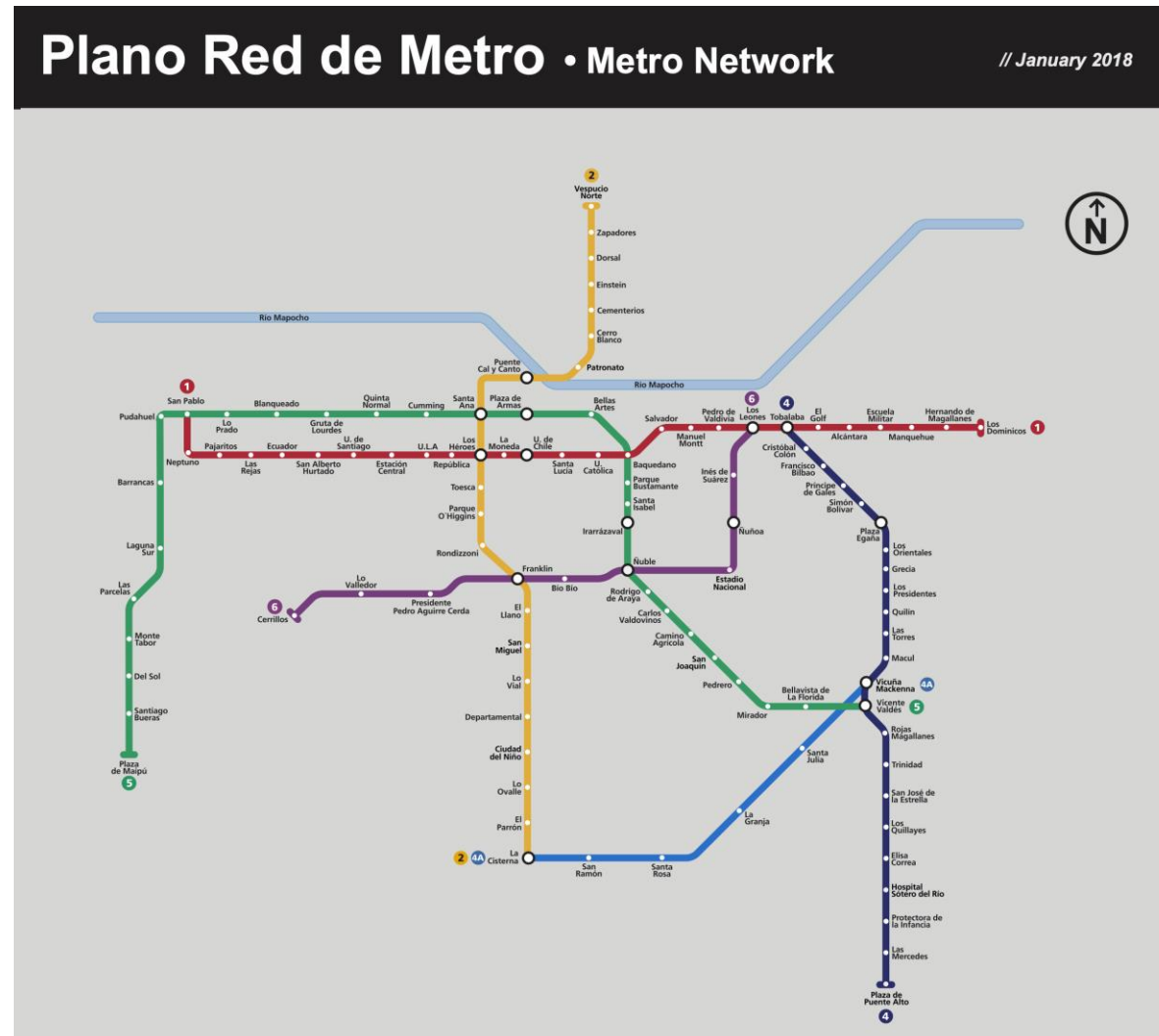
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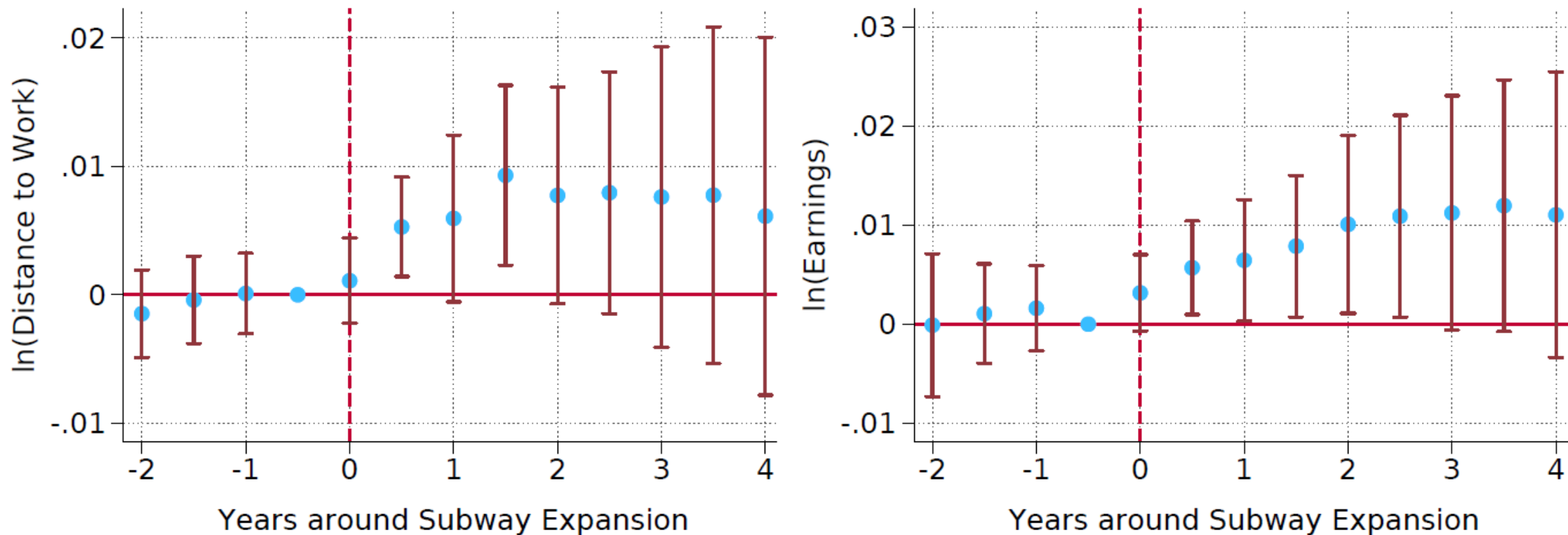
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Expansion of the metro in Chile

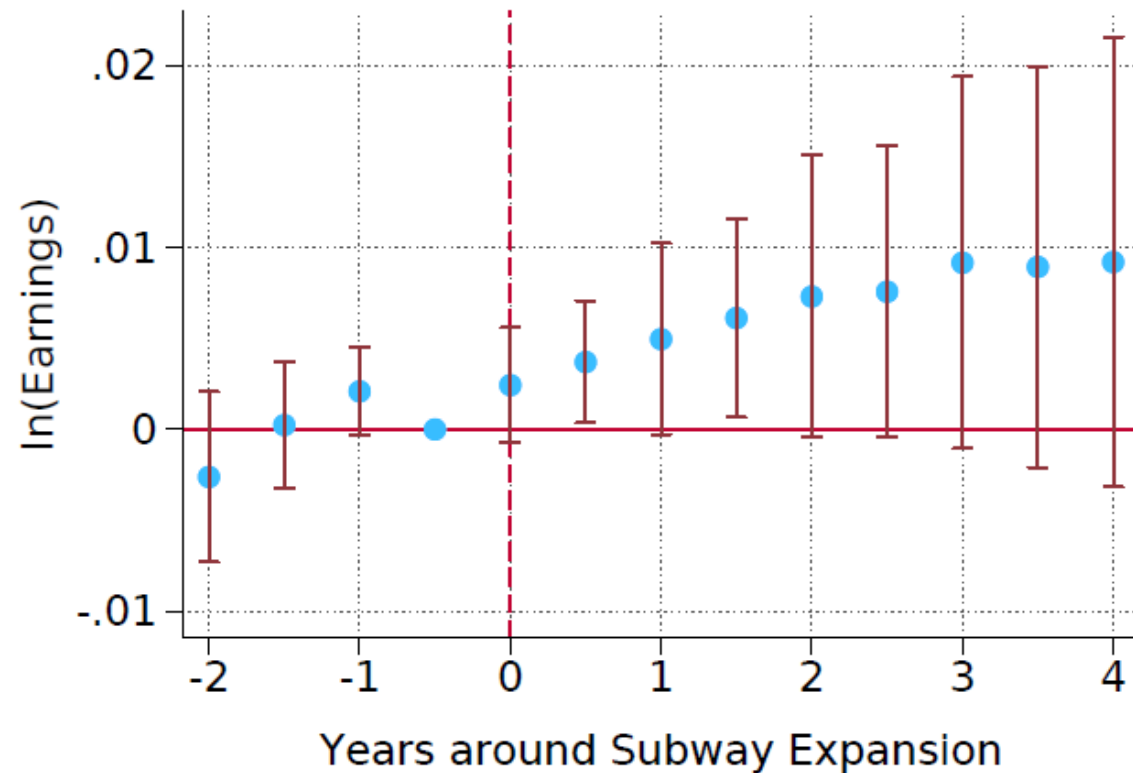


1. Workers work further away and earn more



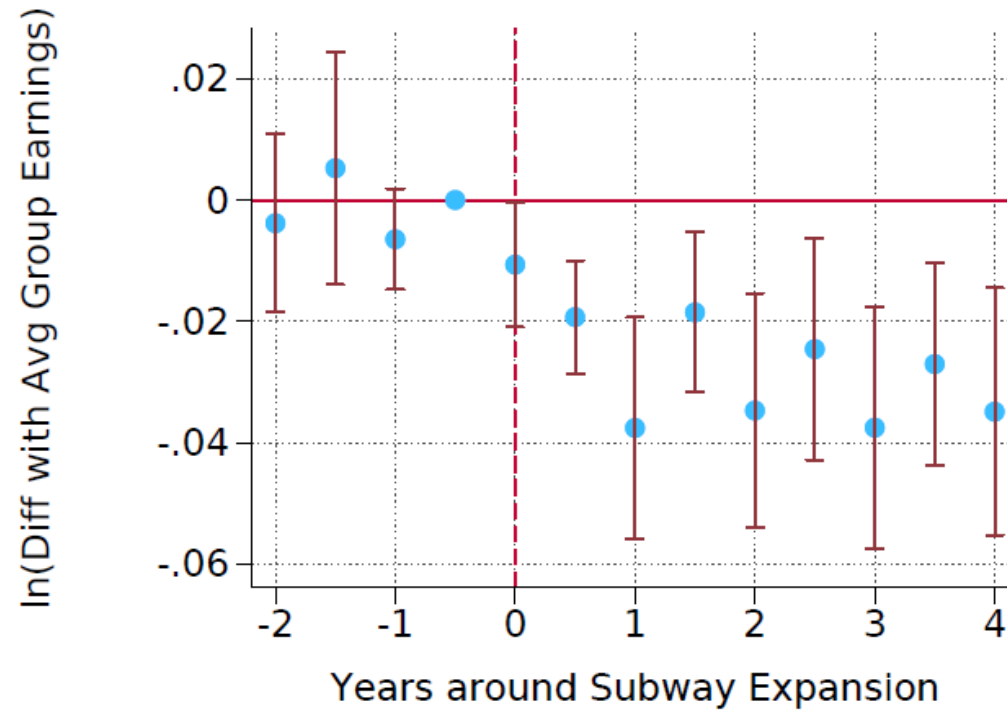
Notes: Event Study results on distance to work. Coefficients are scaled by 0.42 to represent the effect on the average worker

2. Workers in the same firm also earn more



Notes: Event Study results on earnings using worker-firm fixed effects. Coefficients are scaled by 0.42 to represent the effect on the average worker

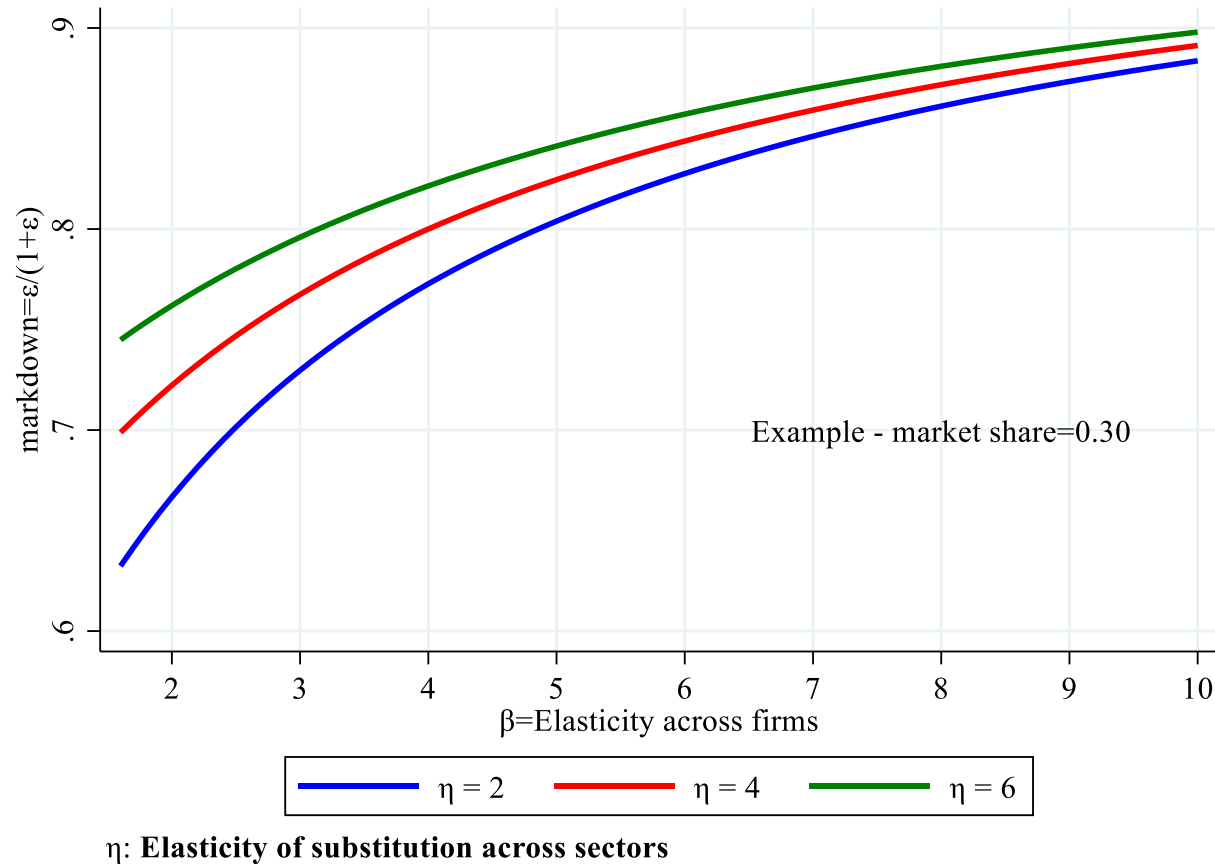
3. Earnings converge across space



Notes: The dependent variable is the log absolute value of the difference between each worker's monthly earnings and the average earnings for the worker's sector-education-age bin average wage. Event Study with firm fixed effects. Coefficients are scaled by 0.42 to represent the effect on the average worker

Model of infrastructure and labor market power

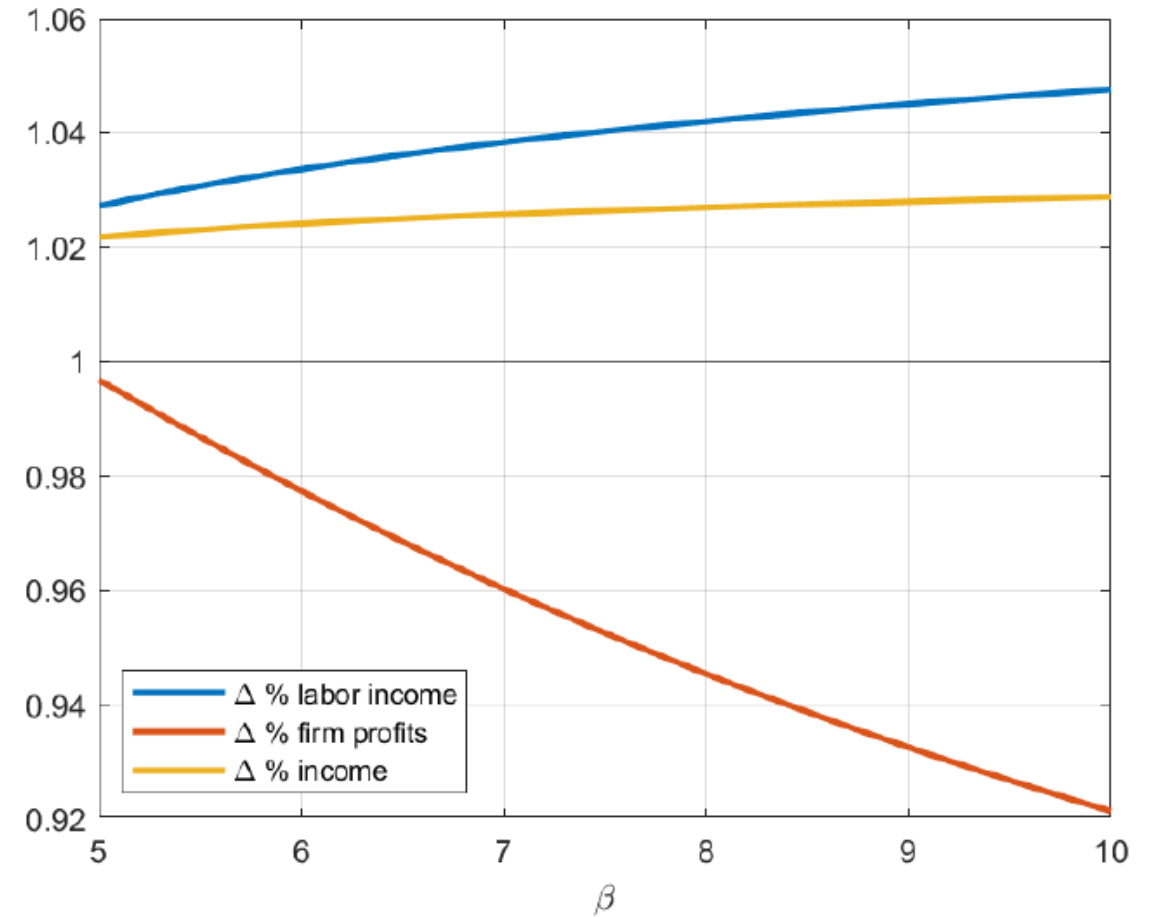
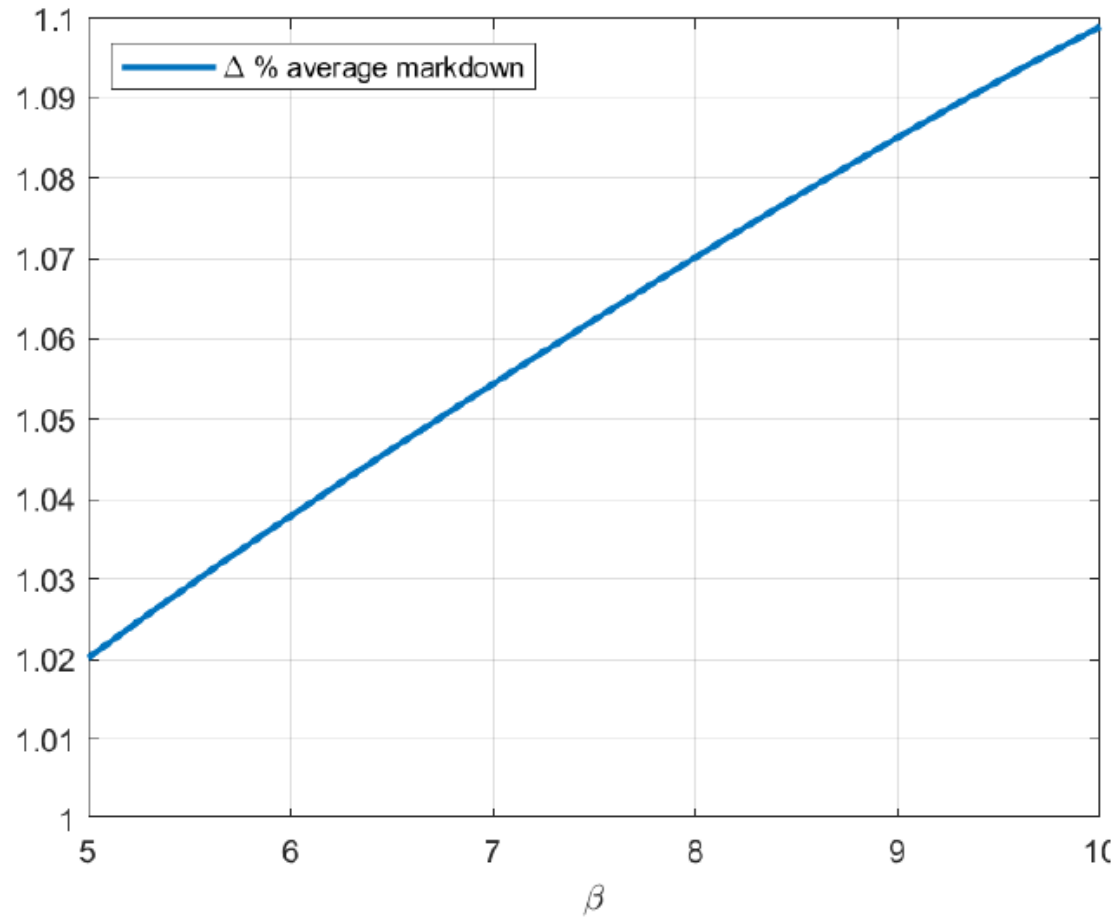
Wage posting model*



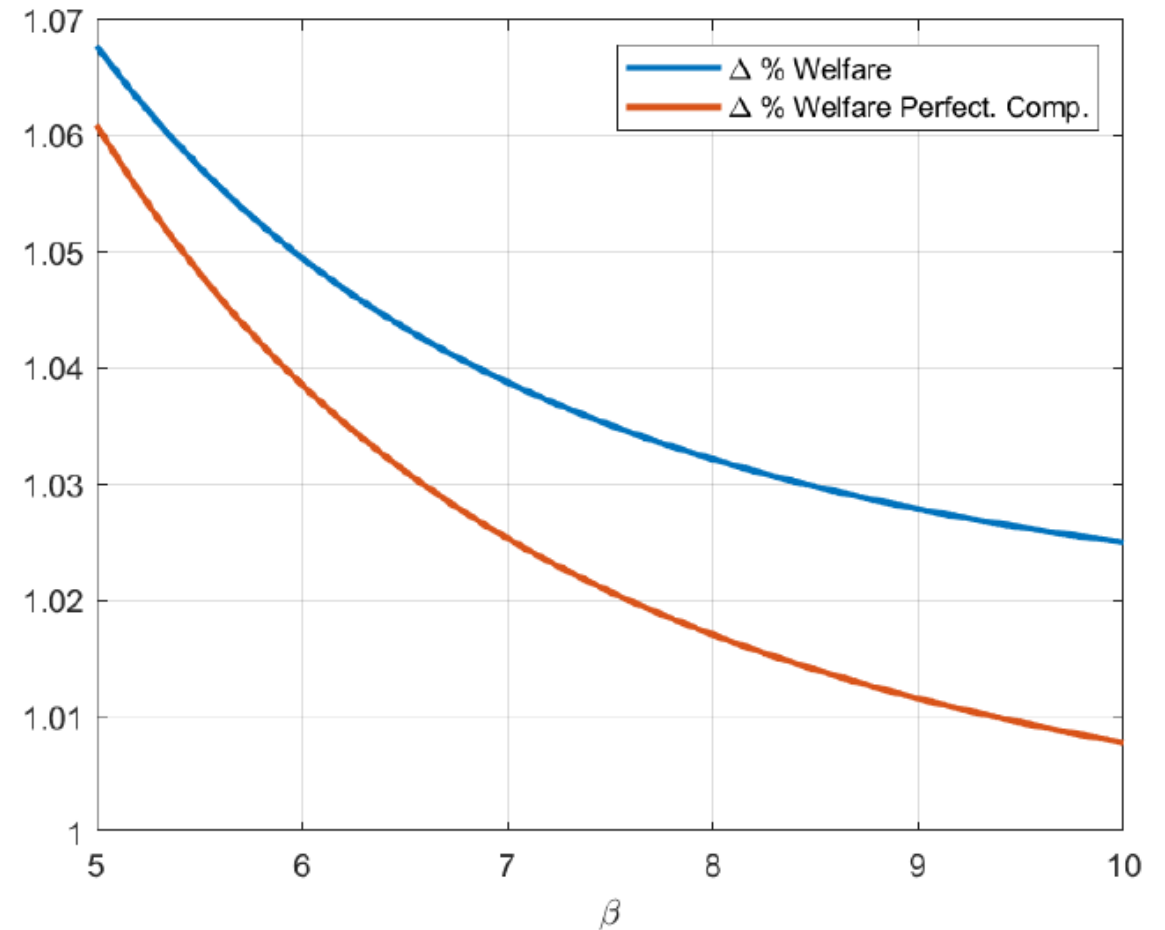
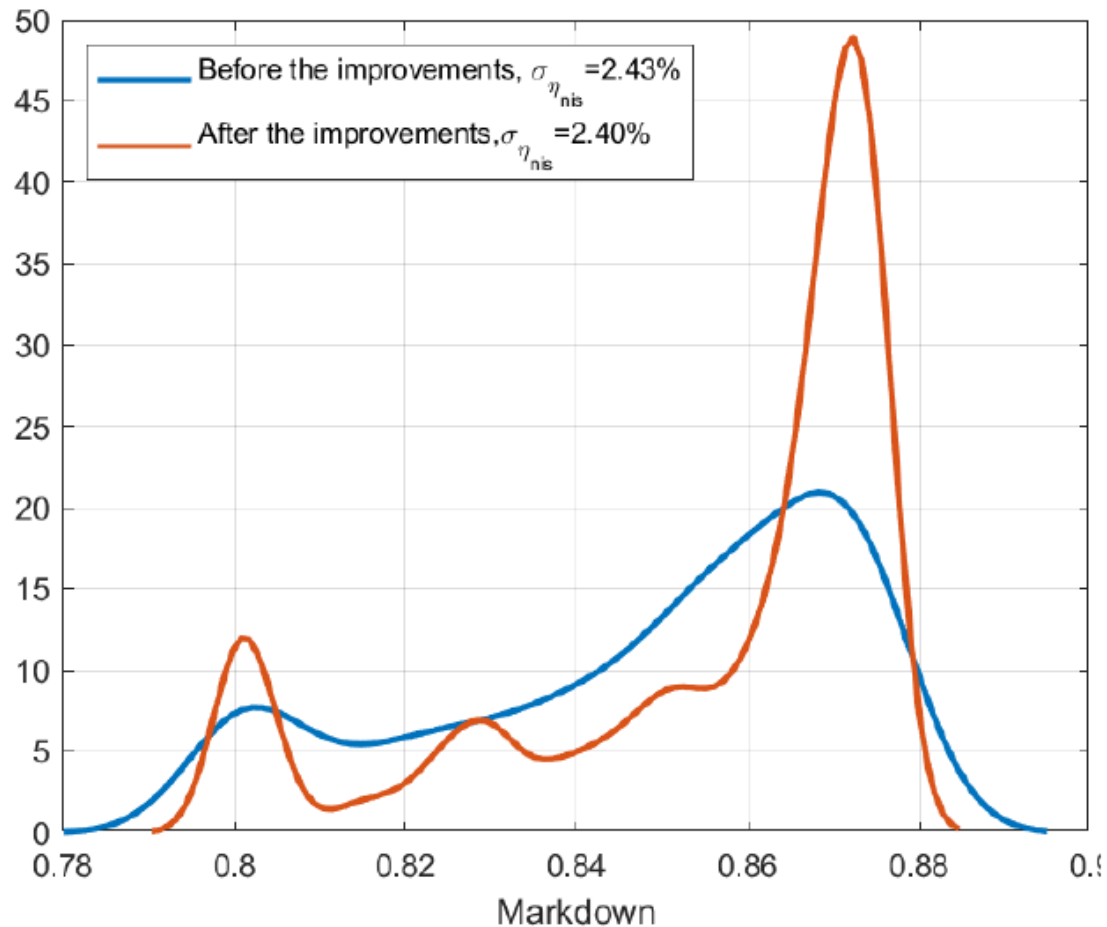
- Markdown=1 \rightarrow Perfect competition
- As $\beta \rightarrow \infty$, perfect competition
- Larger firms exert more market power
- What are the effects of market integration?

*Card et al. (2018); Berger et al. (2020)

1. Labor market power and profits decrease



2. The dispersion of markdowns decreases, amplifying the welfare gains



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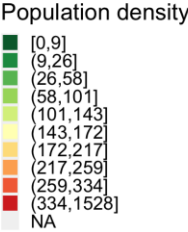
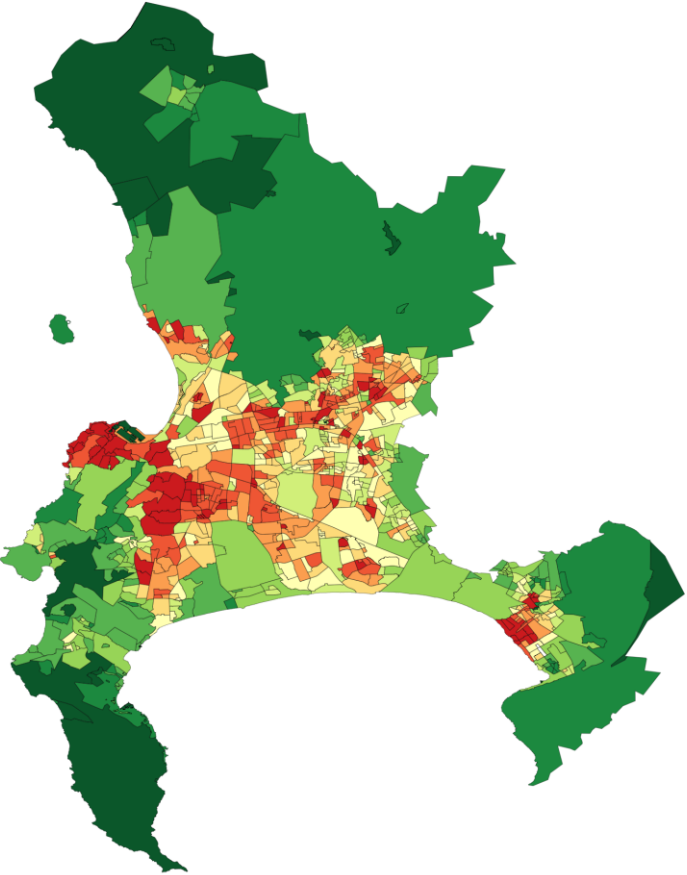
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Toolkit to evaluate transit infrastructure

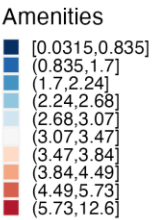
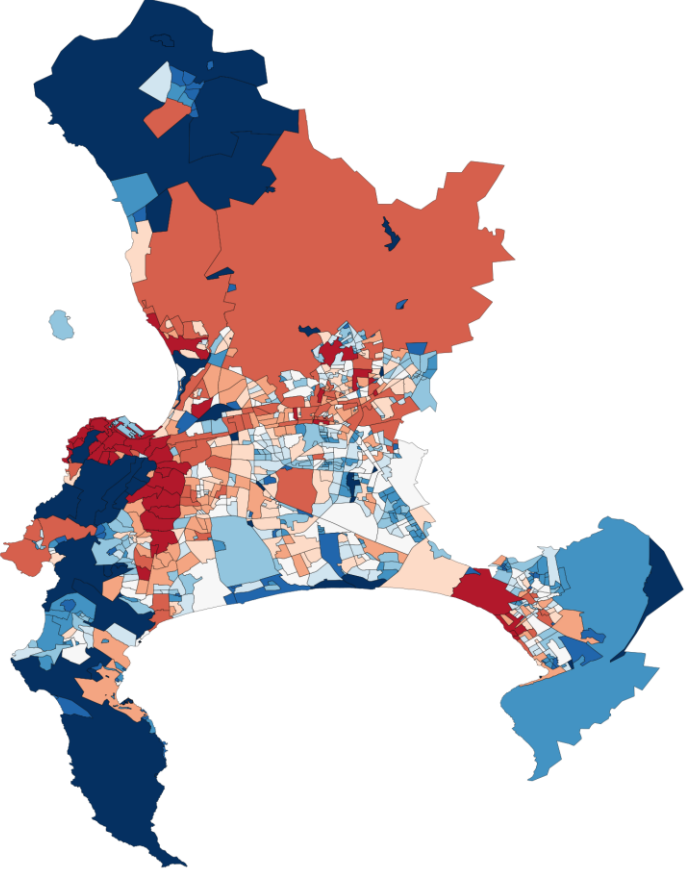
- In collaboration with [The IGC](#): R package for the basic model
 - Version 0 is called IGCities
 - You can download all the documentation [here](#)
- Policymakers can estimate the effect urban policies:
 - Minimum data requirements
 - Transit improvements, roads, housing policies
- We want to include other extensions to the toolkit:
 - Multiple sectors or groups of workers



Population and Amenities

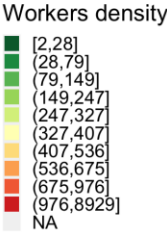
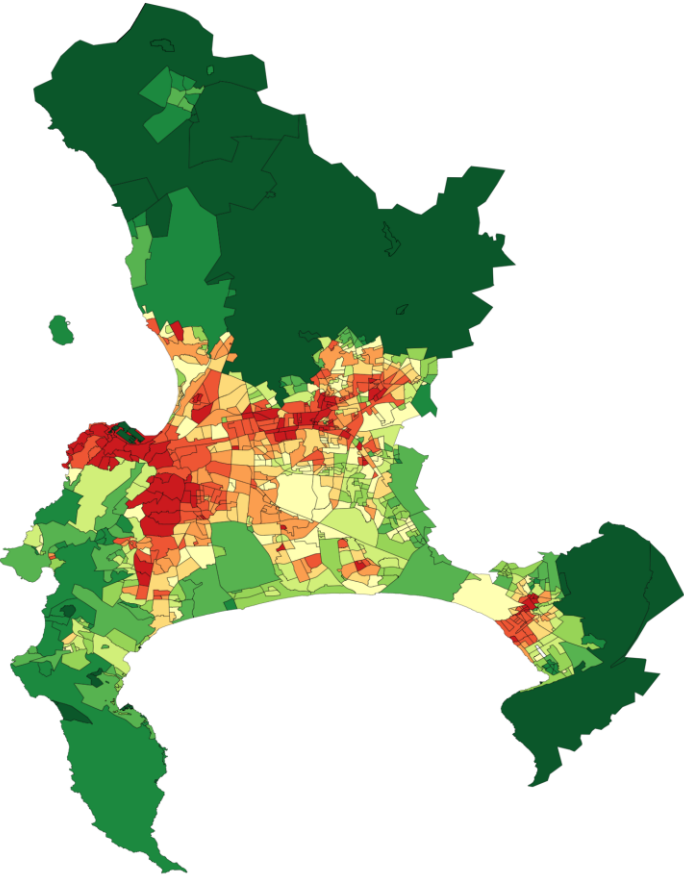


Population density

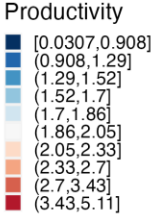
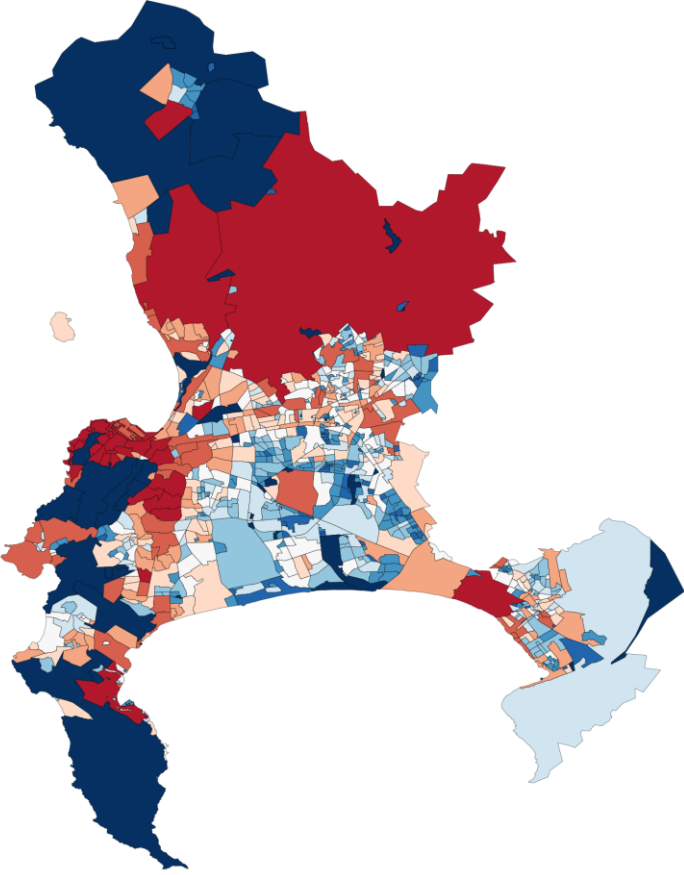


Amenities

Workers and Productivity

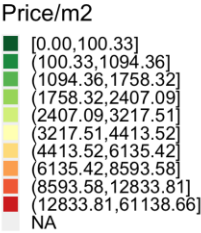
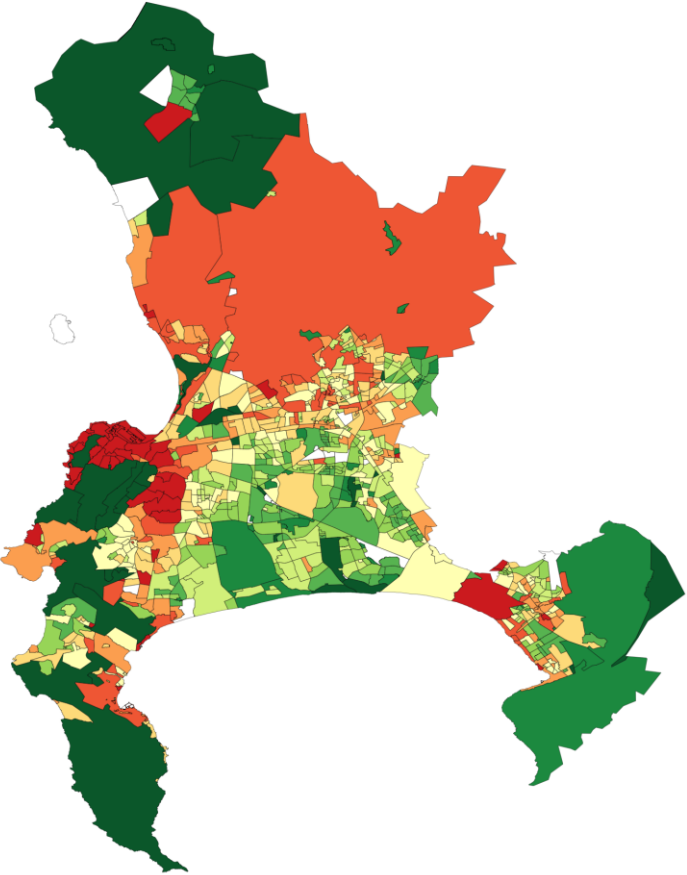


Worker density

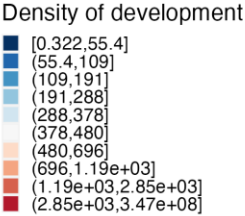
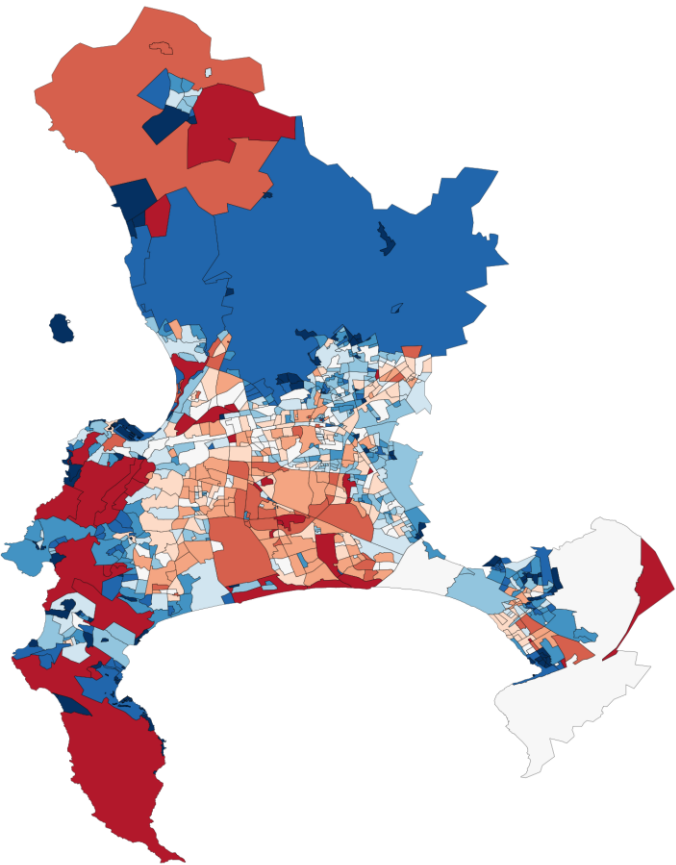


Total factor productivity

Housing Prices and Land Development

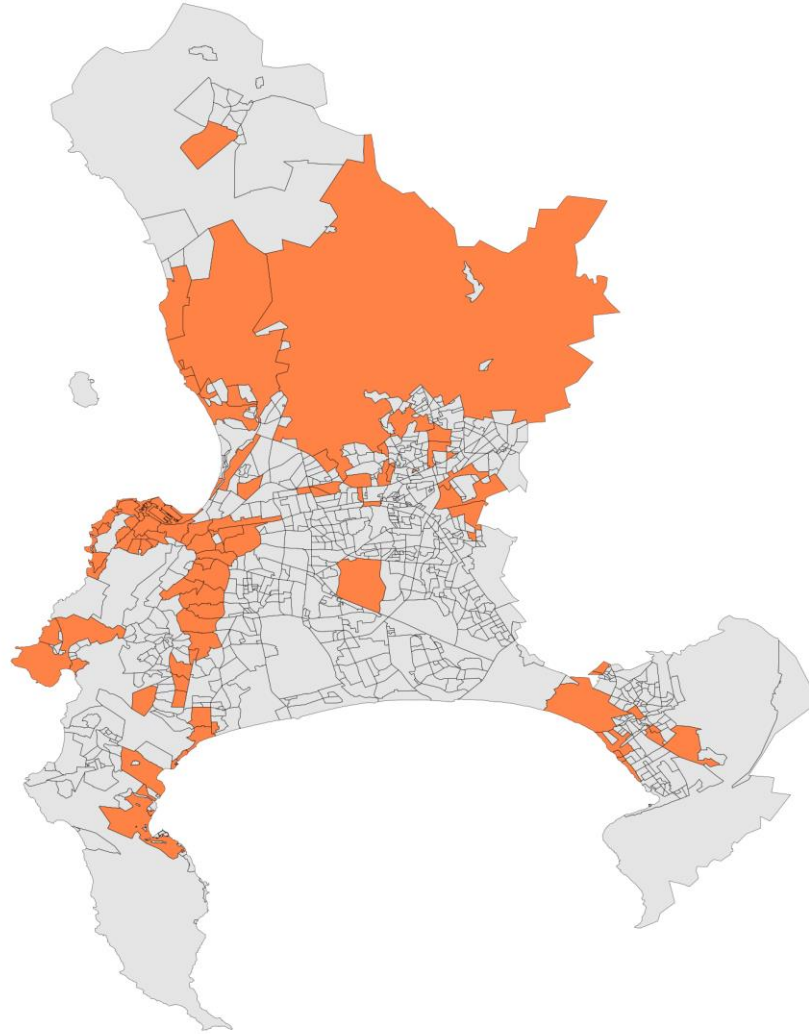


Housing prices

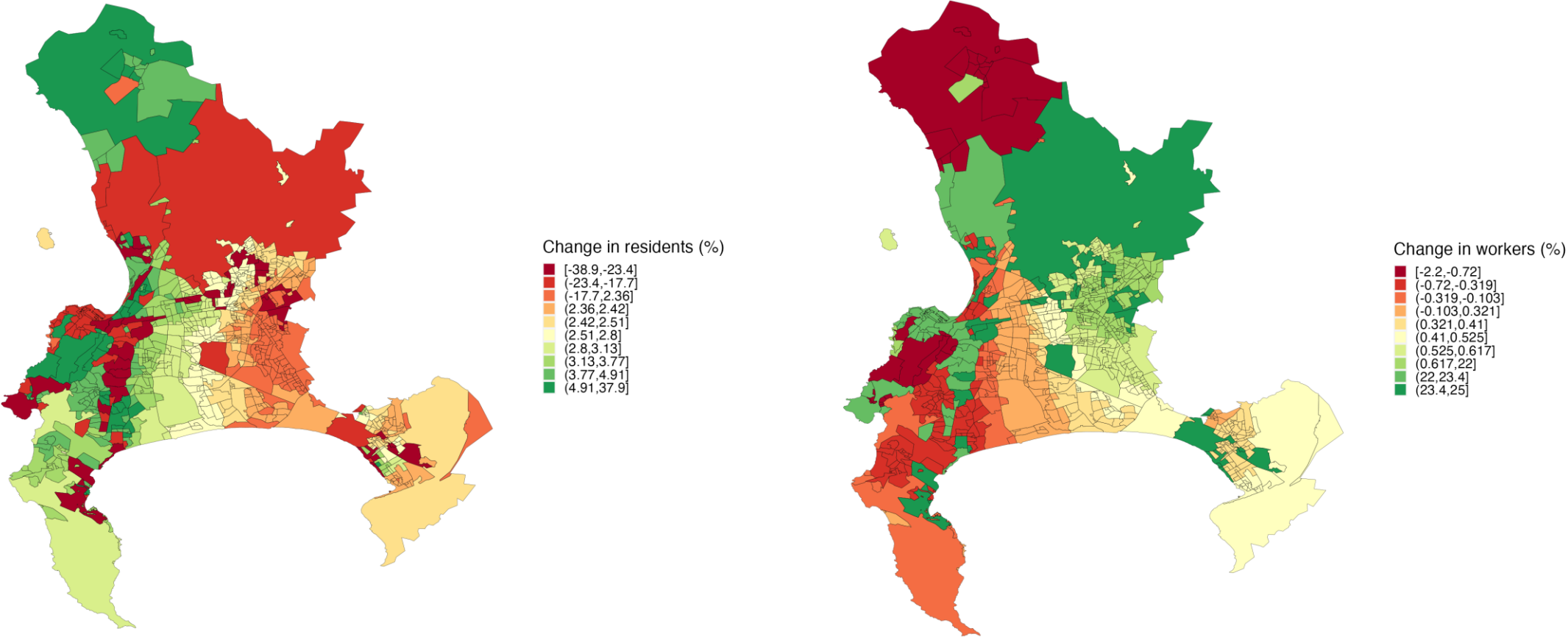


Density of development

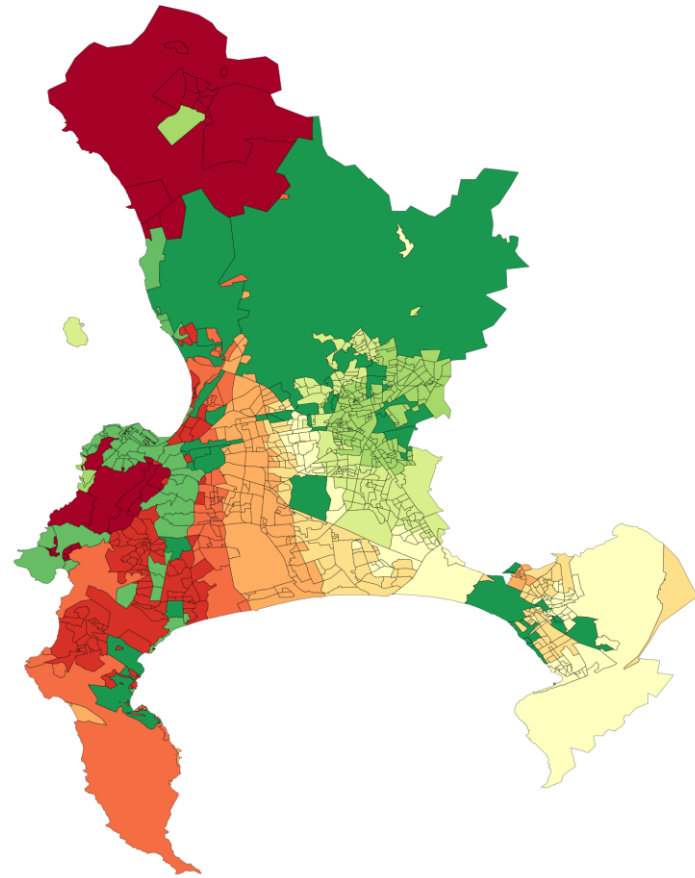
Floorspace subsidies – 10%



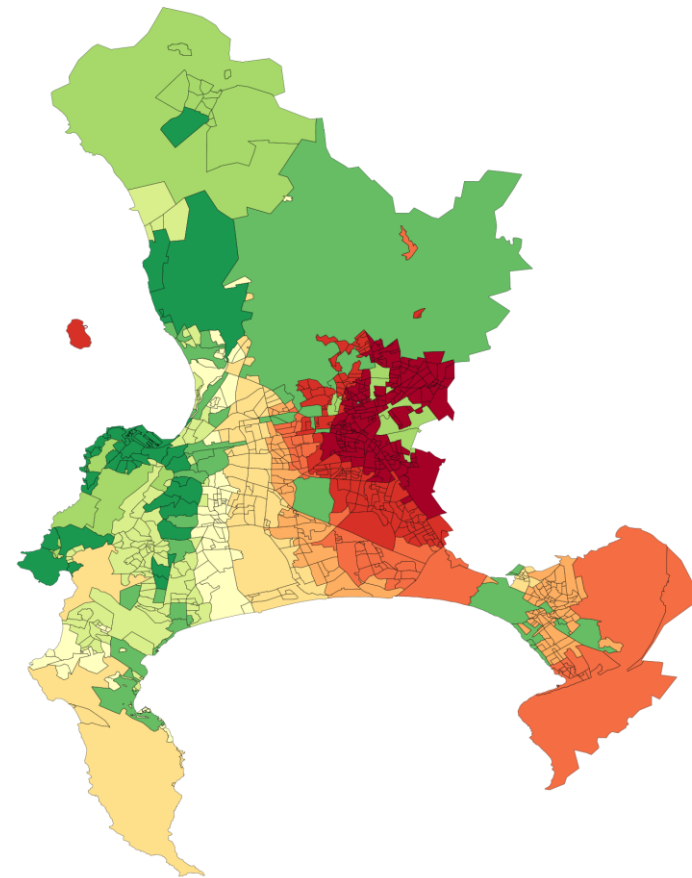
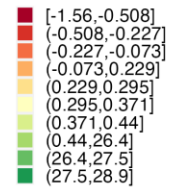
Employment increases in the treated locations



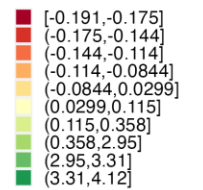
Prices increase in the treated locations



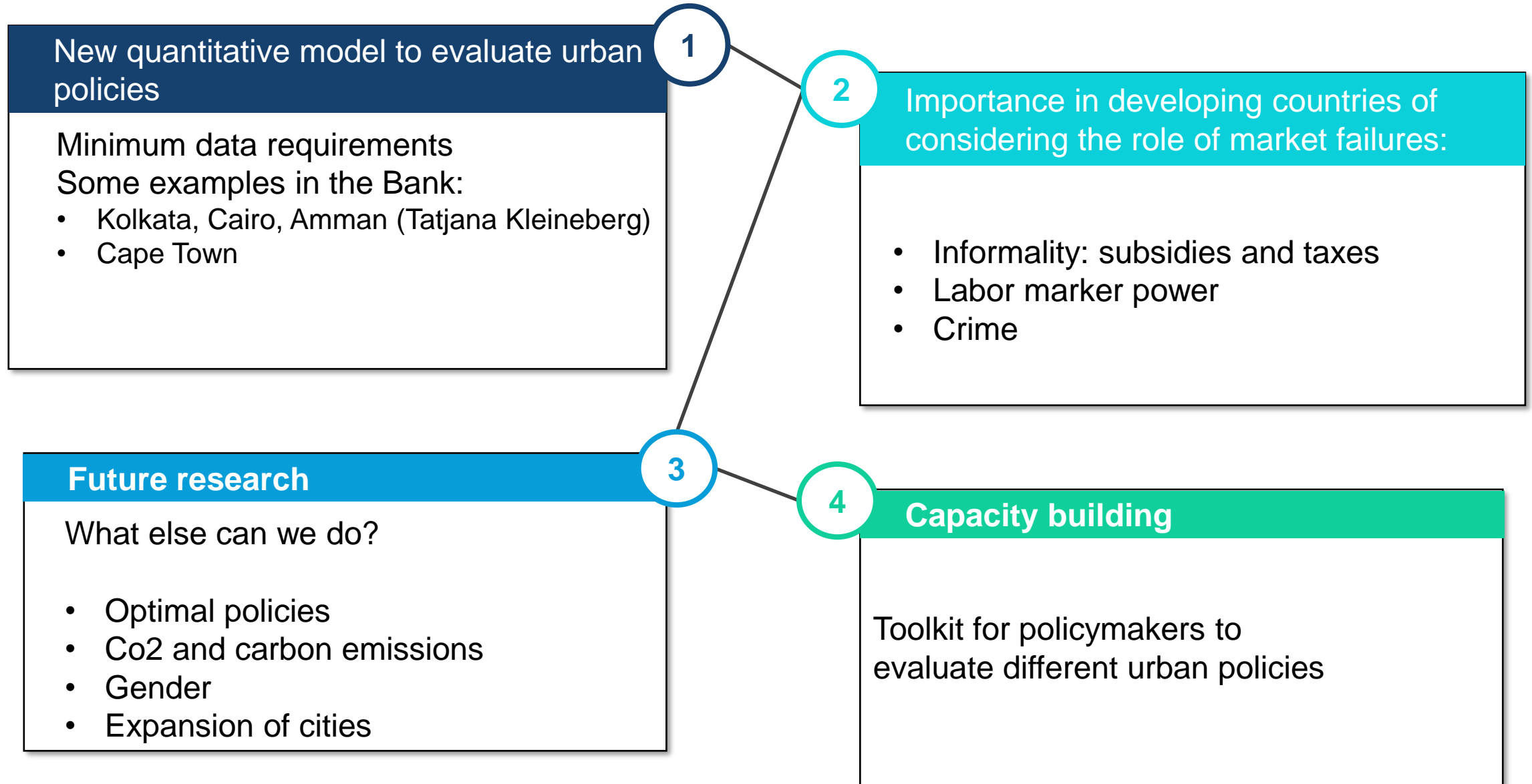
Change in prices (%)

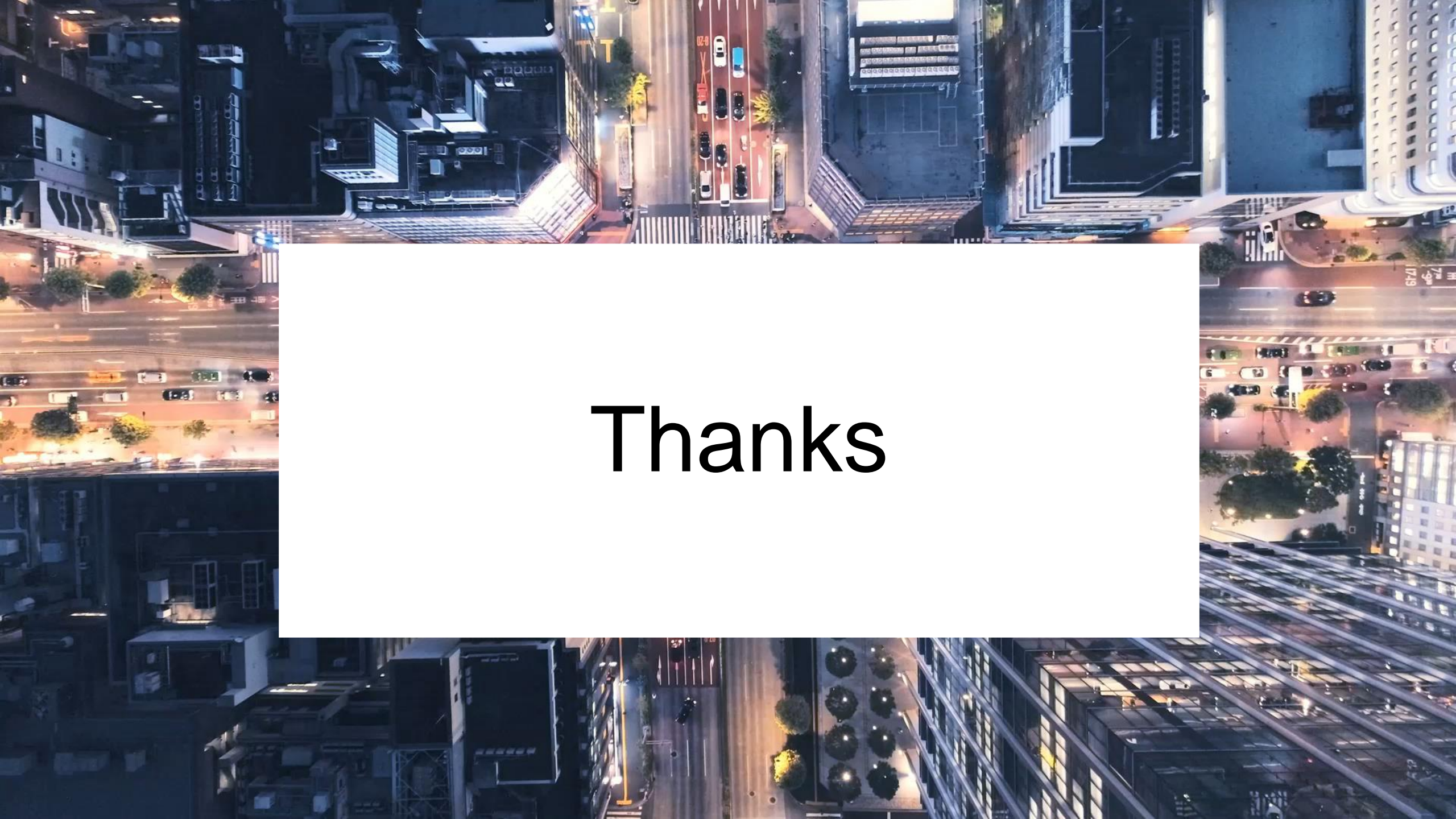


Change in wages (%)



Conclusion





Thanks