‘The Connected city’: Public Transit and Broader Impacts

BREAD-IGC Virtual PhD course on urban economics

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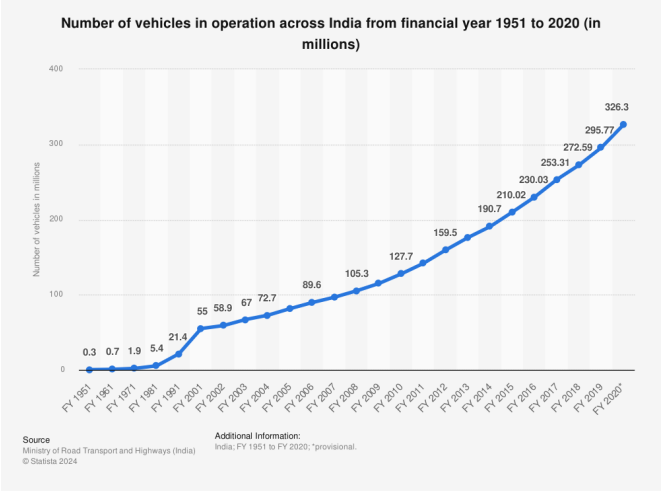
Outline Today

Public Transport in Low- and Middle-Income Countries

Broader Impacts of Urban Mobility

Context: Rapidly Growing Stock of **Private** Motorized Vehicles



In US, growth ≈ 0

Public Transportation: Public / Private

- Two “technologies” for providing public (shared) transportation:
  1. **Privately** provided
     - Used by hundreds of millions of urban residents in poor countries
     - Typical: One owner renting the vehicle to one driver
     - Organized into associations that aim to act as local monopolies
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  2. **Publicly** provided by the city government
     - Often Bus Rapid Transit (buses with dedicated lanes)
     - Also metro/MRT/LRT

Private Public Transport. Mexico City: pesero, combi, micro or microbús

Private Public Transport. Senegal: Care Rapide

Private Public Transport. Kenya: Matatus

Private Public Transport. Lagos: Danfos

Private Public Transport. South Africa: Minibus

Private Public Transport. Jakarta: Angkot

What Do We Know about **Private** Public Transit?

- We still know very little!
  1. Contracting issues between owners and drivers because revenue is not observable
     - Nairobi: experiment giving owner better data on drivers (Kelley et al 2024)

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  2. Sub-par safety because passengers and driver may have different preferences
     - Simple “sticker” intervention encouraging passengers to speak up works to increase safety in Nairobi matatus (Habyarimana and Jack 2015)

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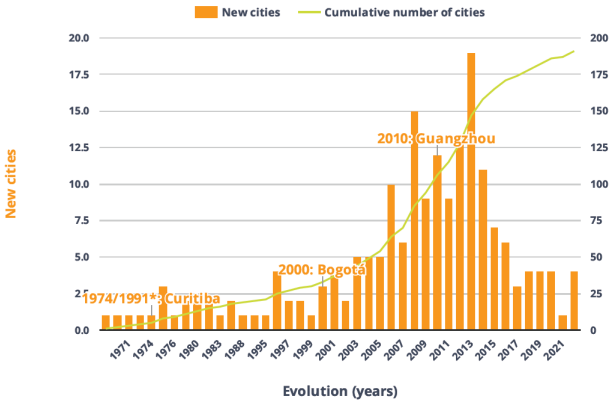
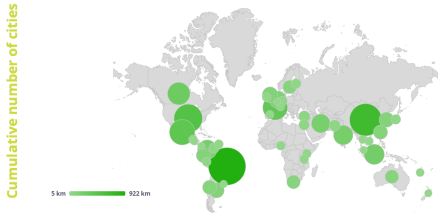
  4. Need more work on the (fascinating, complex) market structure!

Public Public Transport: Growing

LMIC: from 14 cities in 2000 to 100 cities in 2020 with Bus Rapid Transit (BRT) Systems





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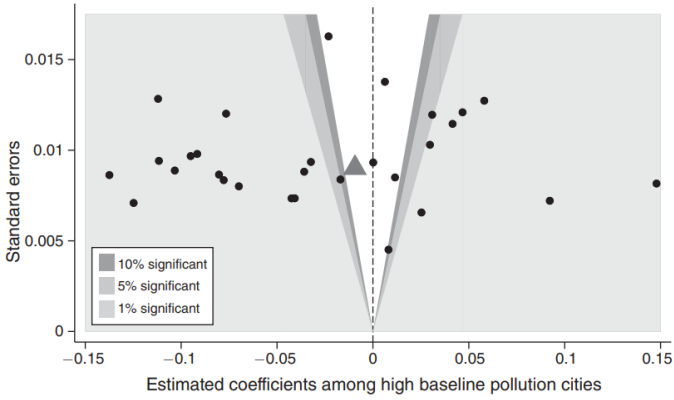
  - Measure air pollution using satellite data



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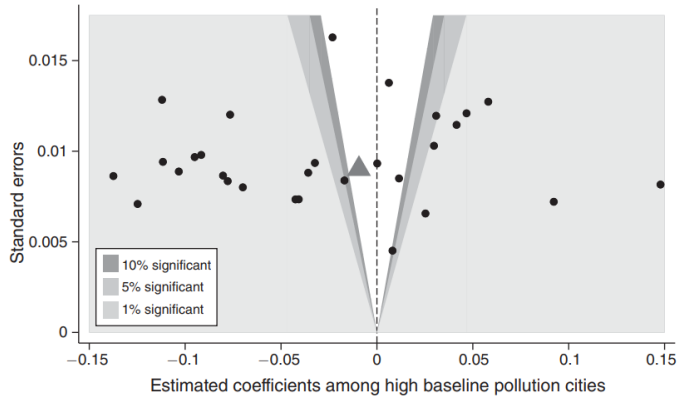

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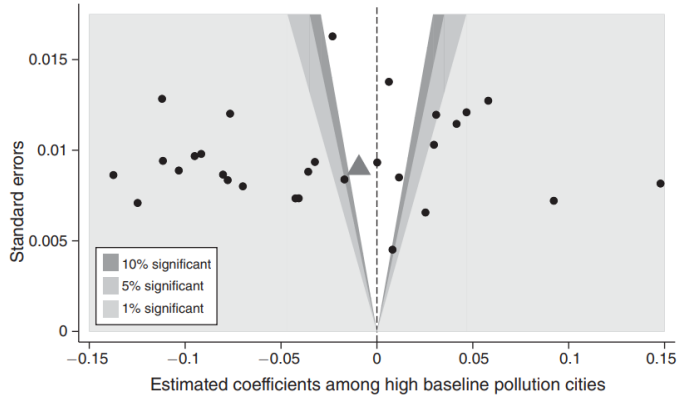
  - Value due to health effect can be enormous: 1pp modal shift 100m USD/year in Jakarta



But No Effect of Subways on Growth

- Gonzalez-Navarro and Turner (2018) Subways and Urban Growth: Evidence from Earth
  - Measure growth using nighttime lights satellite data, UN World Cities for population

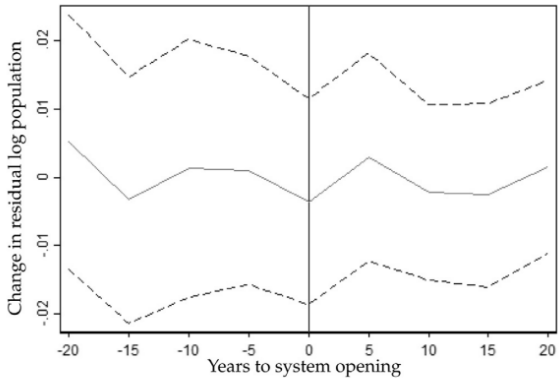


Fig. 5. Subway system opening and population growth (constant sample).

Bus Rapid Transit (BRT) Can Transform A City...

TransMilenio in Bogota, Colombia. 57% modal share of all motorized trips in 2022.

From: Tsivanidis (2023)

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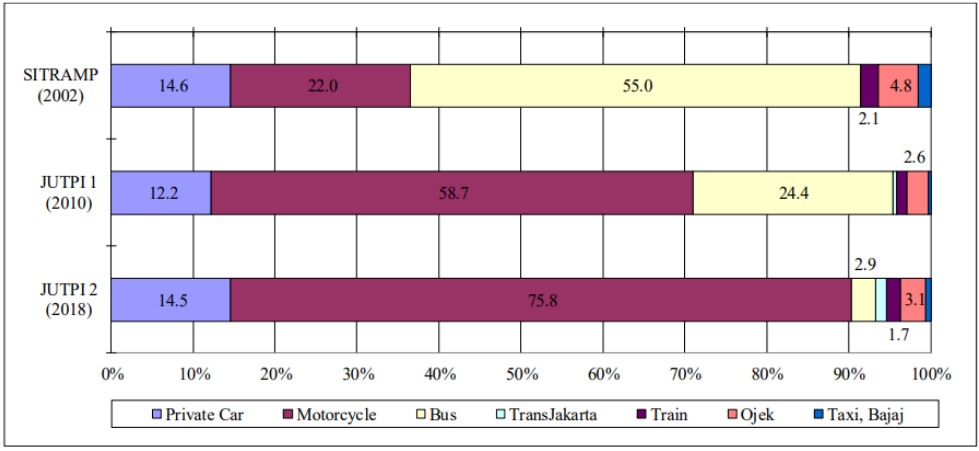
- Suggests how these systems are designed matters

Context: Jakarta's Massive Shift Toward Motorcycles



Data source: JICA household surveys in the broader JaBoDeTaBek region

Optimal Public Transport – Prices

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- Lucas W. Davis (2021) estimates price elasticity of demand for subways in Mexico
  - Price elasticity around 0.2-0.3 identified from fare changes over time

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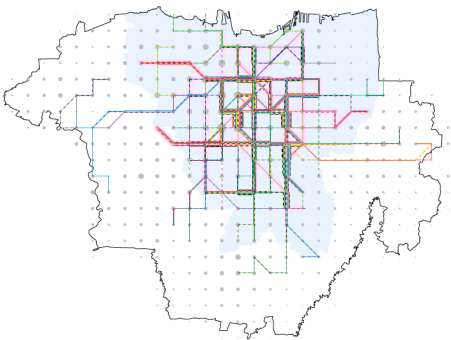
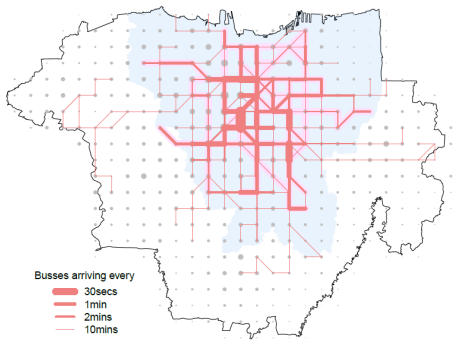
(a) The Current TransJakarta Network



(b) Edge-level Bus Frequency (Current)



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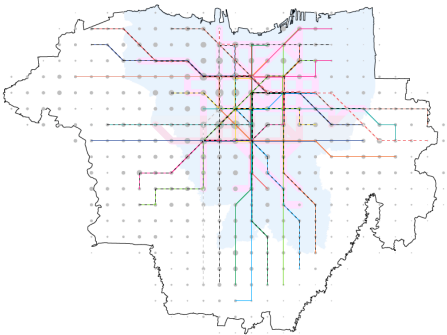
(c) Optimal Network $N \sim \pi$ (Single SA Run)



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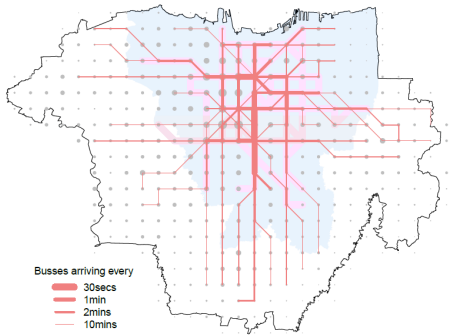

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  - Difficult to estimate aggregate effects (e.g. with RCT saturation design)

Credit, Motorcycles, and Labor Market Outcomes

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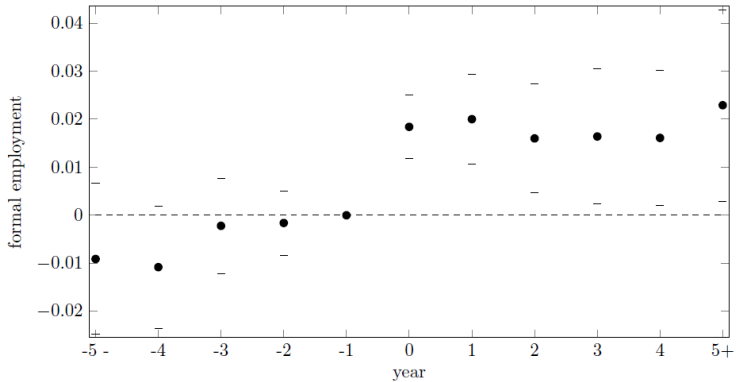
- Use random variation induced by rotating credit groups for buying motorcycle
  - 3.4 million “consorcios” participants: credit groups for buying motorcycles
  - Data: link to employer-employee (RAIS, only *formal* work)
  - Timing of credit receipt determined by lottery
  - Staggered differences in difference

Lottery Winners More Likely to Work in Formal Sector

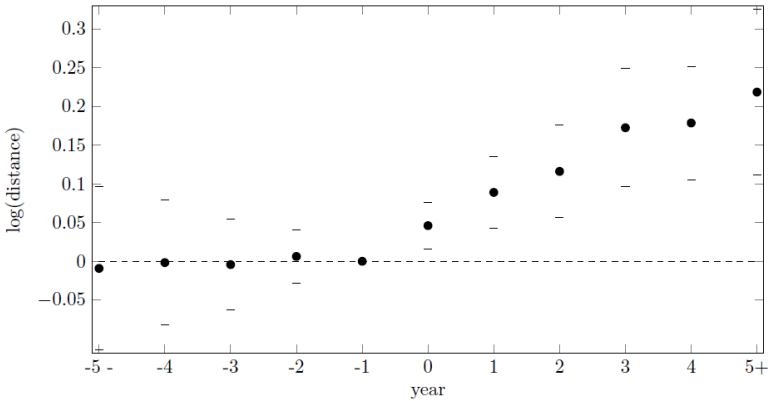
Figure 3: **Formal Employment**



This figure depicts the estimates from equation (4b) with a dummy variable that takes the value of one if an individual is formally employed and zero otherwise as the dependent variable with 95 percent confidence bounds.

Lottery Winners Commute Farther

Figure 1: **Commuting Distance**

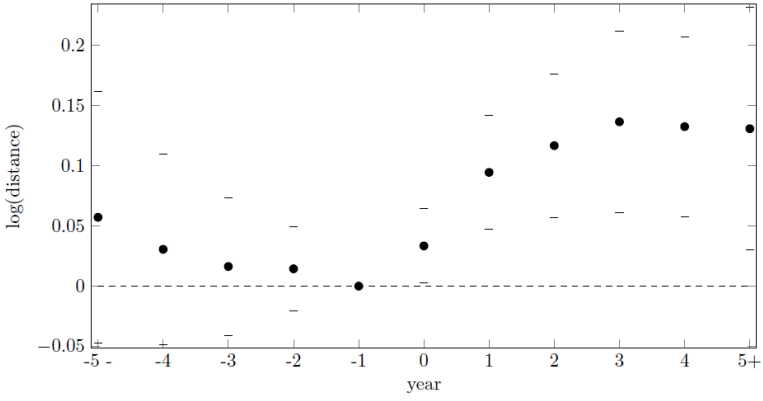


This figure depicts the estimates from equation (4b) with the log distance between an individual's workplace and their home as the dependent variable with 95 percent confidence bounds.

Lottery Winners Work Farther from Public Transport

Conclusion: mode substitution.

Figure 2: **Distance to Public Transportation**

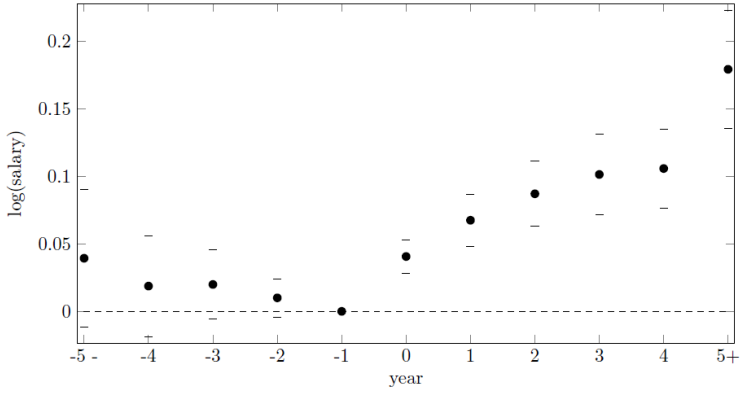


This figure depicts the estimates from equation (4b) with the log distance between an individual's workplace and the nearest bus stop as the dependent variable with 95 percent confidence bounds.

Lottery Winners Earn More (in the Formal Sector)

Over/under-estimate?

Figure 4: **Salary**



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- See also Alba-Vivar (2024) in Lima, Peru

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- Dean et al (2024): casual workers in Nairobi reluctant to visit places for the first time

Discussion: Q & A