

# Behavioral Impact of the Financing Collection Mechanism on Accessibility: Two Cases from Chinese Cities

David Block-Schachter

Based on research w Jinhua Zhao & Drewry Wang

October 22, 2013

# Plan

A dialogue: ASK QUESTIONS!

15 minutes: Framework of impacts of collection mechanism on accessibility

15 minutes: Vehicle ownership

- » Empirical work based on surveys in Beijing & Shanghai

- » Use information on location and travel behavior

15 minutes: Land sales (land grabbing)

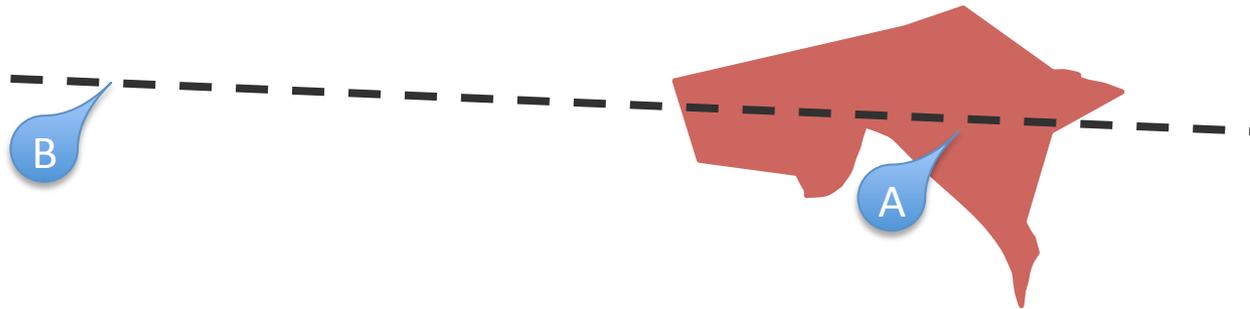
- » Examine data on where and when land grabbing took place in Shanghai for a single point in time

20 minutes: Distributive impacts by income, hukou, vehicle ownership

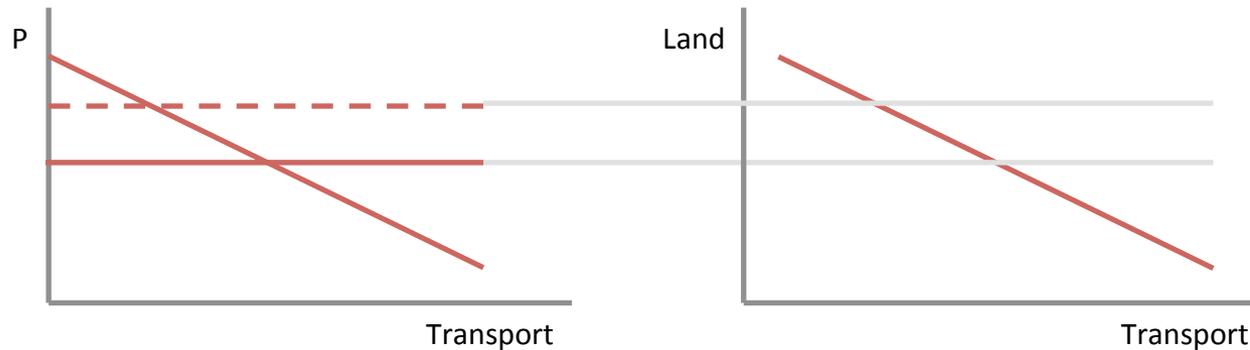
5 minutes: Wrap up

# Framework

- Evaluate policies in terms of accessibility: the potential for opportunities



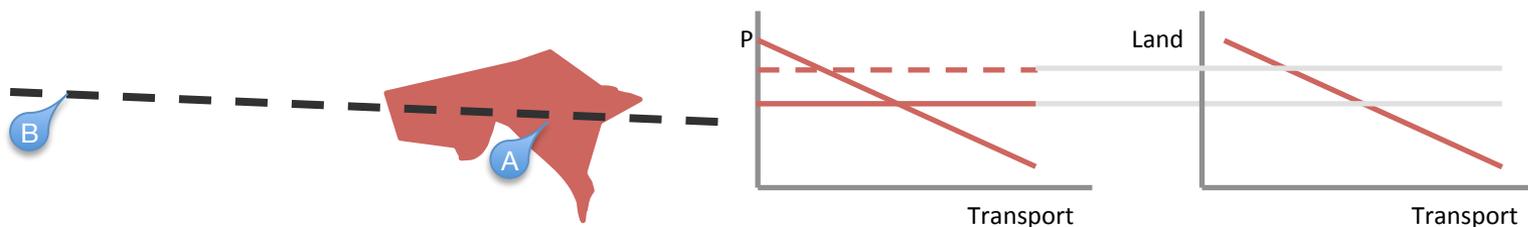
- Collection mechanism (prices) influence behavior



- The goal: financing as part of the solution set

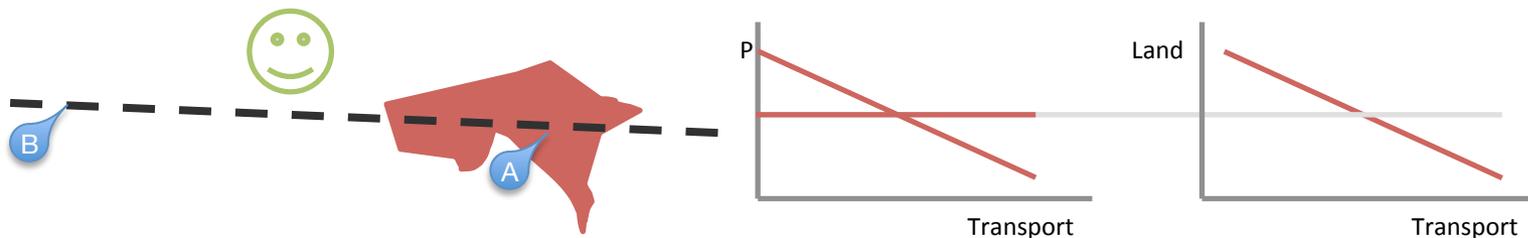
# Framework

- Consumers, developers, and other governmental agencies respond to costs
  - by modifying their choices of what and where to build and locate
  - by changing how, when, and where to travel
- Three affected groups
  - General public and indirect users
  - Direct users
  - Land holders
- General principle: if something costs more, people do it less
  - Tax bads not goods
  - Tax recipients of benefits (user pays principle)



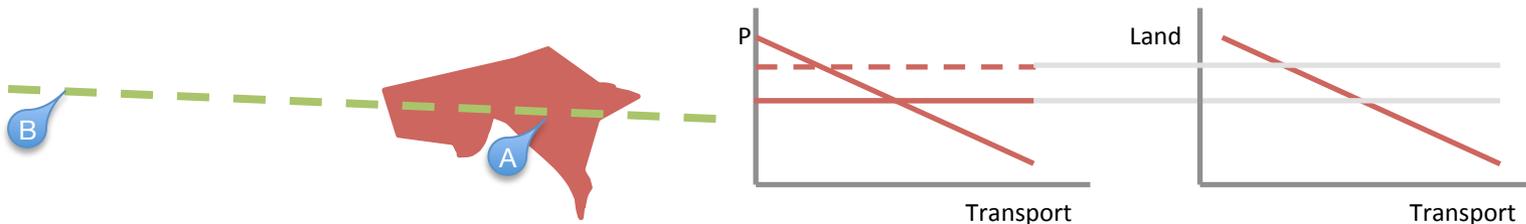
# General Public and Indirect Users

- Income, sales, payroll, business taxes
- Hypothecated or general revenue
- No direct impact via collection mechanism
- Except
  - Introduce inefficiencies by substituting for optimal taxation policy
  - May effective function as land tax in multi jurisdiction settings
  - Price an unpriced externality, e.g. employers' agglomeration benefits



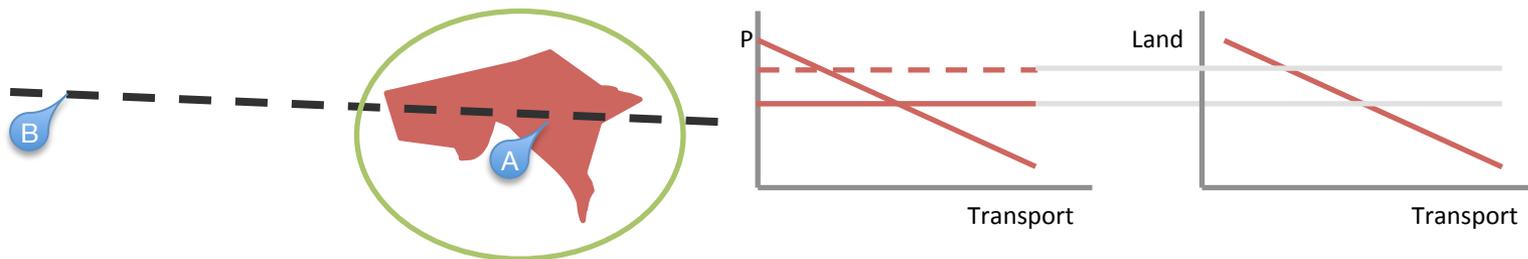
# Direct Users: use of roads

- Tolls, gas or VMT tax
- Discourage use, but indiscriminate as to where
- Contribution of fuel to operating costs generally low, except for buses



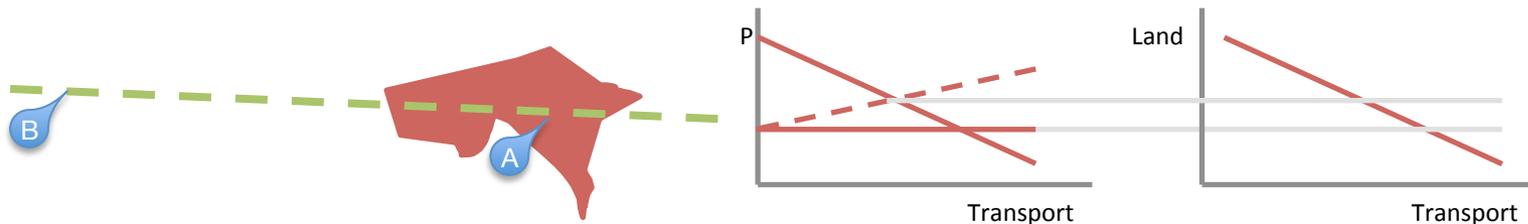
# Direct Users: restricted area vehicle use or storage

- Congestion pricing, parking taxes
- Decrease vehicle usage in given area, increasing accessibility for continuing users
- May effect location choice of auto oriented businesses, residents
- Increase accessibility by mass transit, since more effected by congestion
- Increase central area accessibility → denser urban forms and faster travel by all vehicles
- But, distribution issues, and dependence on elasticity of demand for travel



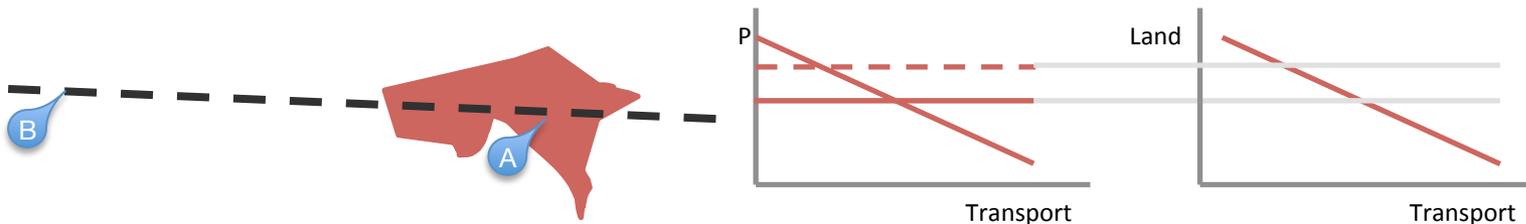
# Direct Users: use of mass transit

- Fares
- Second best pricing: correct underpriced externalities in autos
- Flat fares may encourage transit-oriented sprawl
- Distributive effects depend on affordability, which varies wildly by context



# Direct Users: purchase or existence of vehicles

- Vehicle sales, excise taxes, wheelage (vehicle storage) taxes, auction prices
- Increase costs and thus decrease overall levels of ownership
- Restrict value of land inaccessible by other forms of transport → increase density, and centralize accessibility
- Influence on usage depends on length of entitlement, user treatment of sunk costs
- Distribution: windfalls to existing owners if grandfathered; may bifurcate accessibility based on income

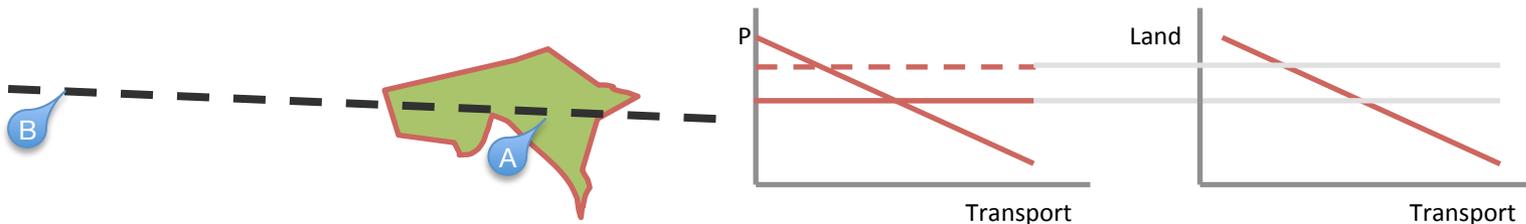


# Land Owners: variations

- Before (e.g. impact fees or valorization) or after (e.g. special assessments)
- Related to an infrastructure improvement in a specific area, or on an ongoing basis in a municipality or region
- On an annual or semi-annual basis, or on sales transaction
- Apply to entire property, or differ land v. structures (e.g. Land Value Taxes)
- Differential based on groups or uses (homeowners, commercial, vacant)
- Vary in base (e.g. on owners equivalent rent), on capital, or on the increment in value (e.g. Tax Increment Financing)
- Include non-monetary transactions (e.g. land readjustment or takings)

# Land Owners: effects

- In general lower taxed areas (uses) will see increased demand, depending on magnitude, but magnitude matters
- To improve accessibility, tax
  - Land rather than improvements
  - Entire value rather than the increment
  - Whole area rather than just that adjacent to a piece of infrastructure
  - Do not treat uses differentially
  - Additional increment on vacant land



# Therefore

- If density costs more than it otherwise would, there will be less of it
- If the private cost of auto usage is taxed in order to equal the social cost, there will be less auto travel
- Indirect effects because of allocation between budgets for location and transportation

## Questions

- How practical is this in the real world?
- Is China “different”?
- ...

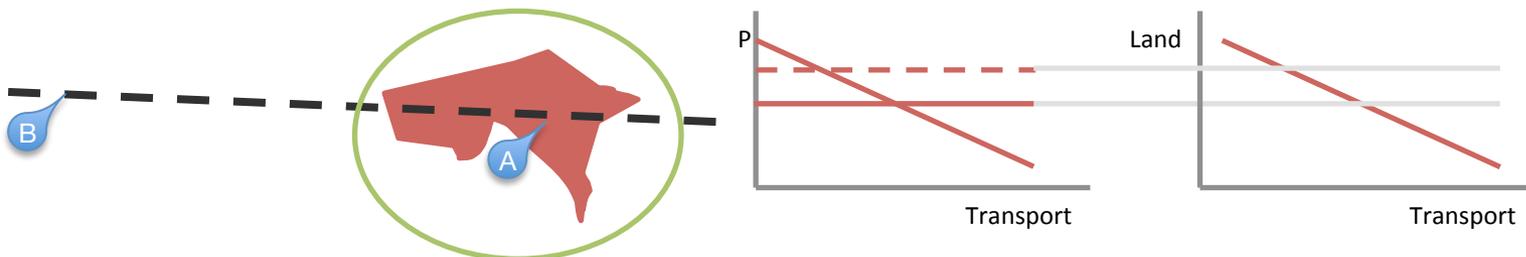
# Vehicle Ownership Policies

# Recap

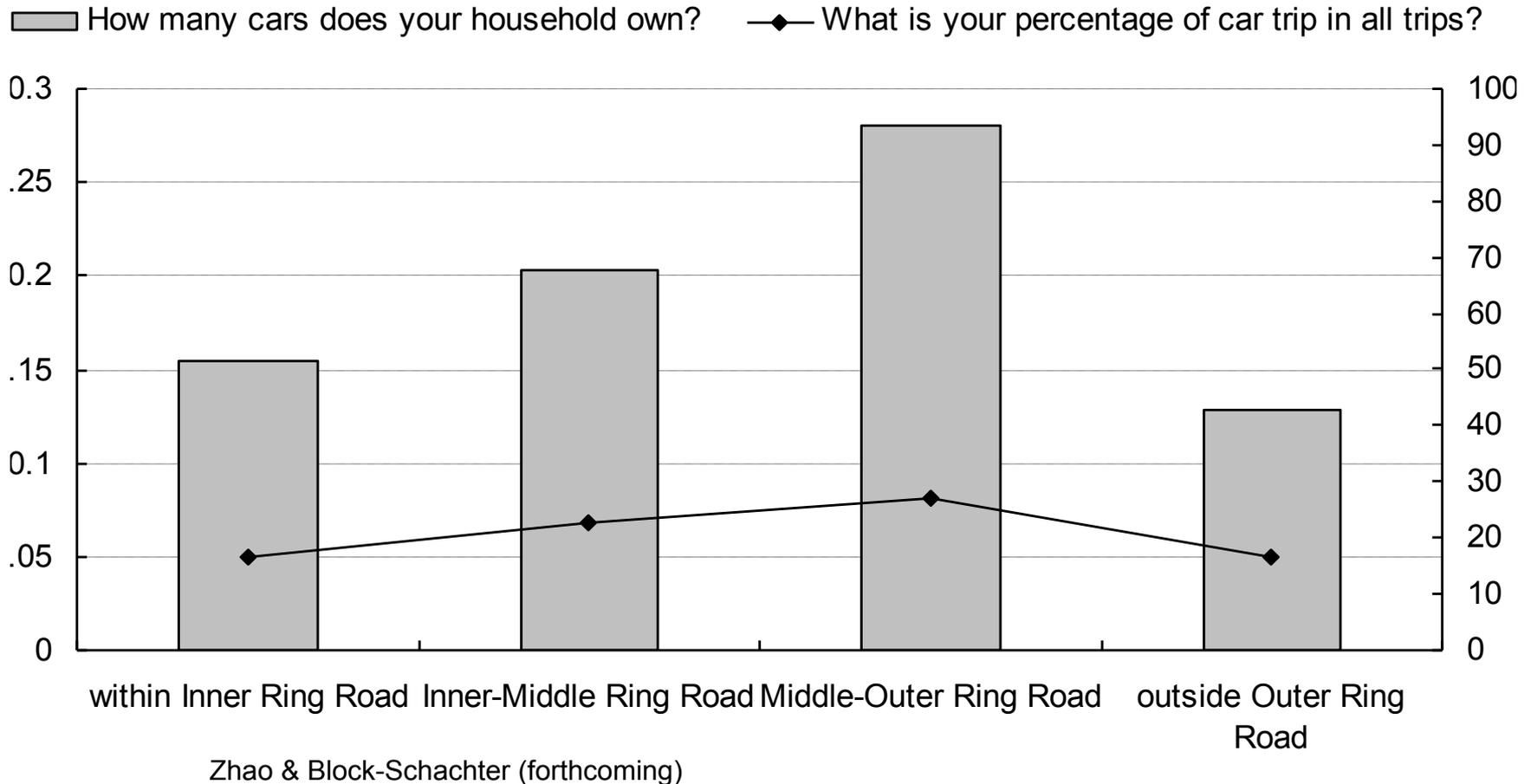
- Beijing + Shanghai both have ~2m vehicles in 2004, in 2010 Shanghai 3.1m, Beijing 4.8m
- Shanghai raised CNY 7.1b in 2012 vs. total expenditure on transport of 8b
- Social public fund to hypothecate revenues to transportation in the form of capital expenditure, fare reductions for elderly, transfers
- Shanghai has plate C license outside 3<sup>rd</sup> ring

# Expectations

- Policies that impose costs on areas differentially will modify travel behavior and urban form in those areas → less auto ownership inside third ring
  - Premium on both workplace accessibility and accessibility to public transit w/in third ring
  - People with lower incomes would live farther from public transit, because higher demand and a fixed supply will increase prices adjacent to PT
  - Increased density near PT as a result of vehicle ownership restrictions – whether in the form of auction or lottery.

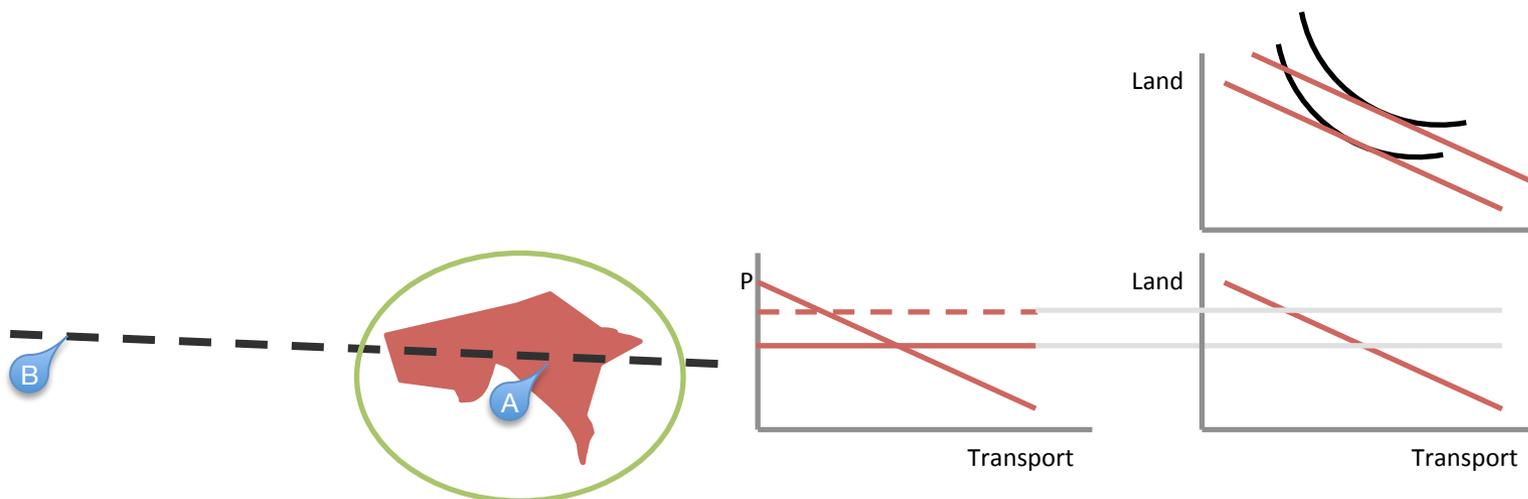


# Car ownership and usage by distance to central Shanghai

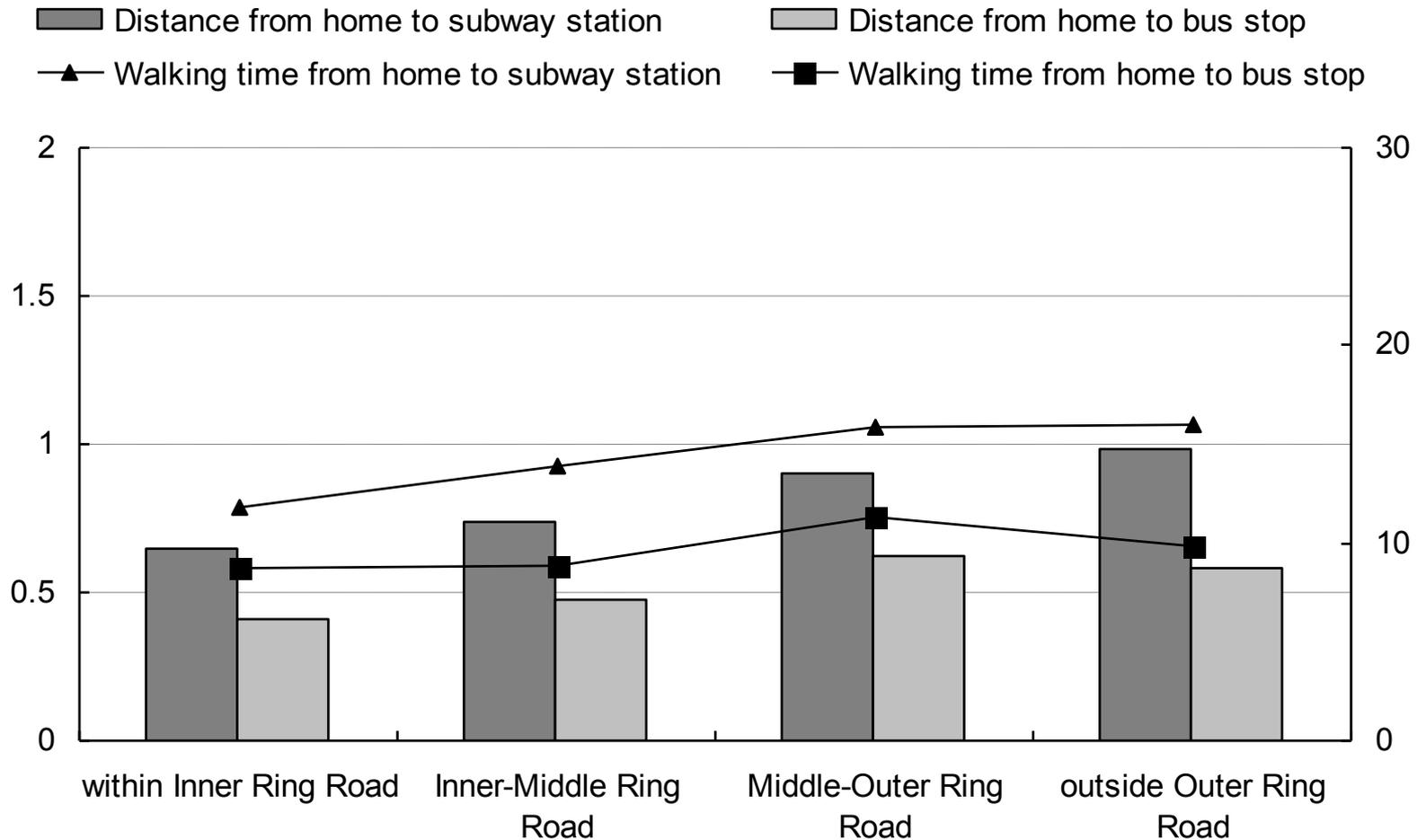


# Expectations (2)

- People with lower incomes would live farther from public transit, because higher demand and a fixed supply will increase prices adjacent to PT
  - Premium on both workplace accessibility and accessibility to public transit w/in third ring
  - Increased density near PT as a result of vehicle ownership restrictions – whether in the form of auction or lottery.

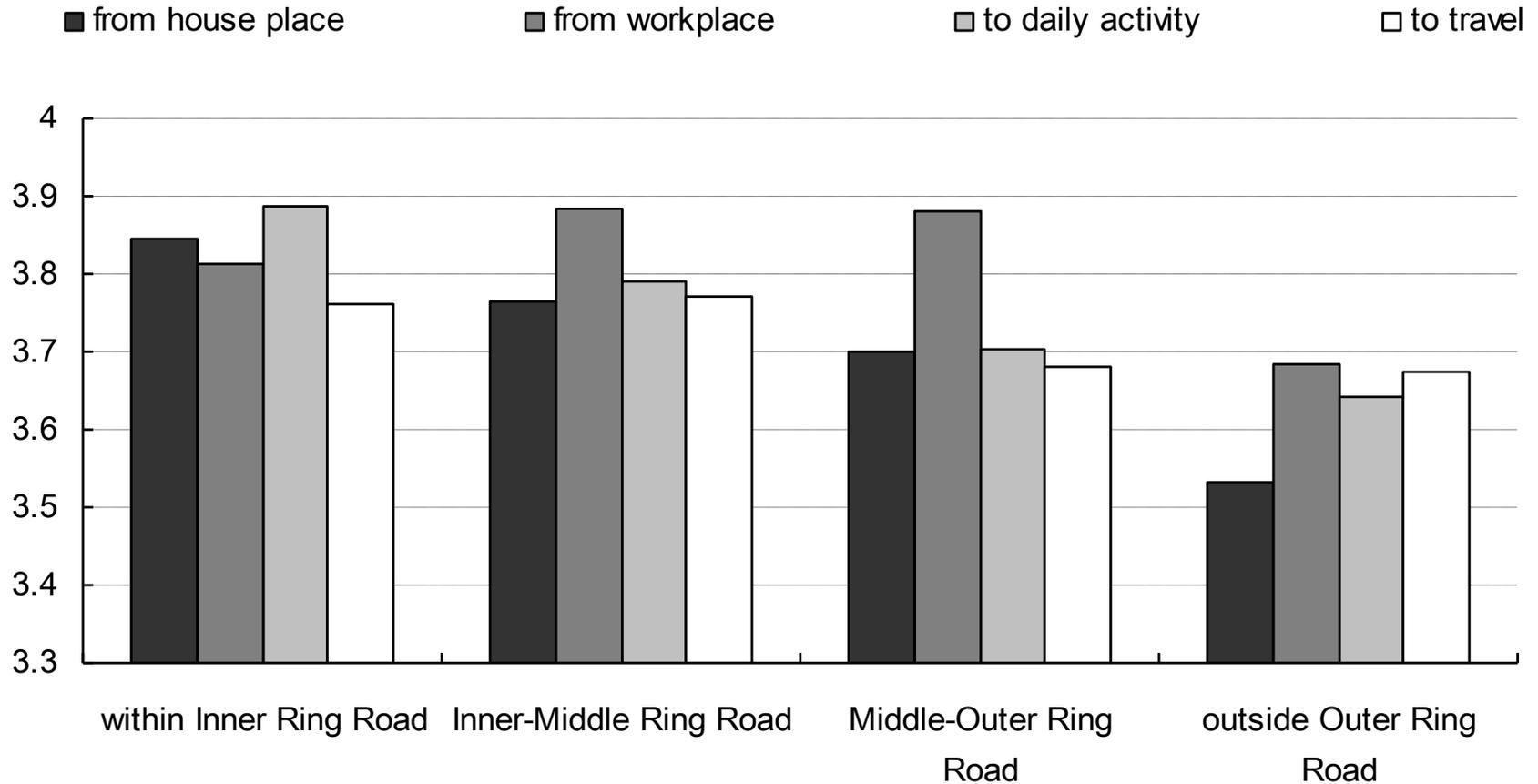


# Accessibility to public transport in different areas



Note: the bars show the distance from home to PT service (km). The lines show the walking time from home to PT service (min).

# Perceived public transport accessibility by location

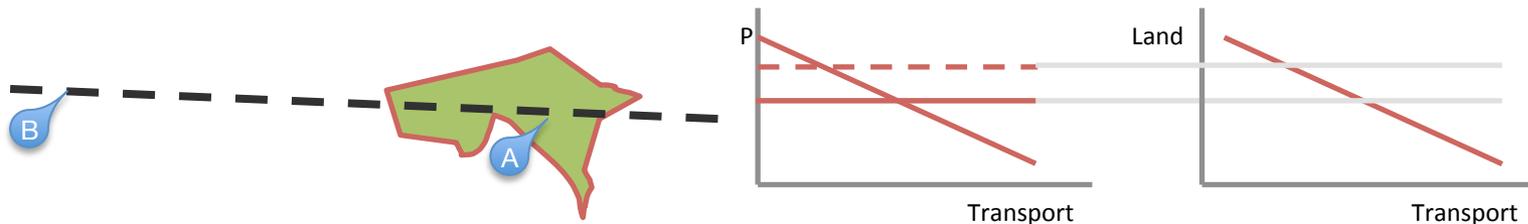


Zhao & Block-Schachter (forthcoming)

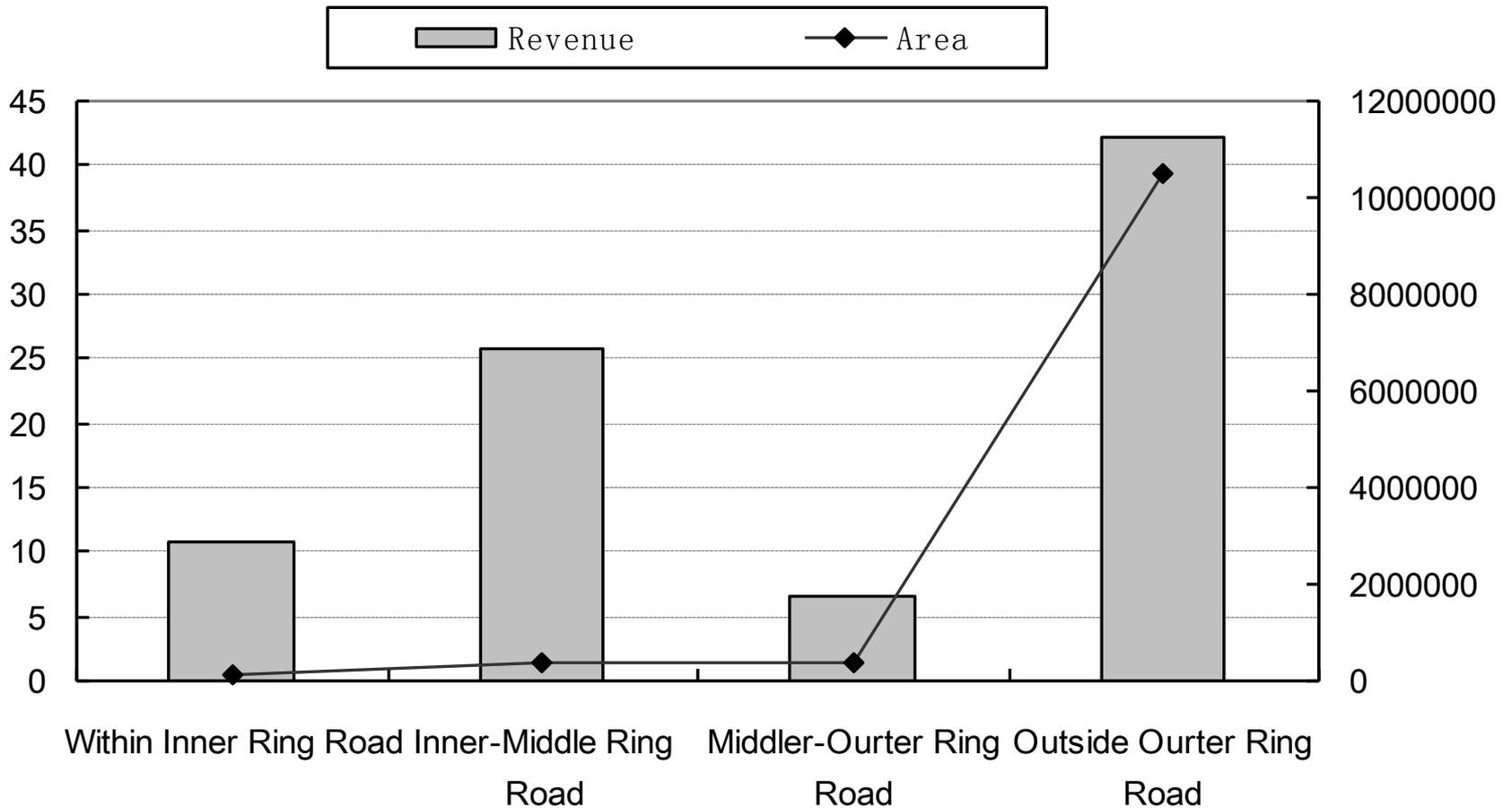
# Land Sales Financing

# Recap & expectations

- Municipal governments are authorized to represent the state to sell land use rights to buyers for a fixed period ranging from 40 to 70 years
- Increasing economic pressure on municipal governments to maximize revenues by (re)development.
- Gross land premium amounted to 1.59 trillion CNY in 2009, representing 19% of the aggregate local fiscal revenue for all levels of government from the provincial level on down
- Form of tax on land with upfront payment
  - Incentives exist at time of payment, not in ongoing connectivity
  - Reduction in accessibility where land grabbing takes place



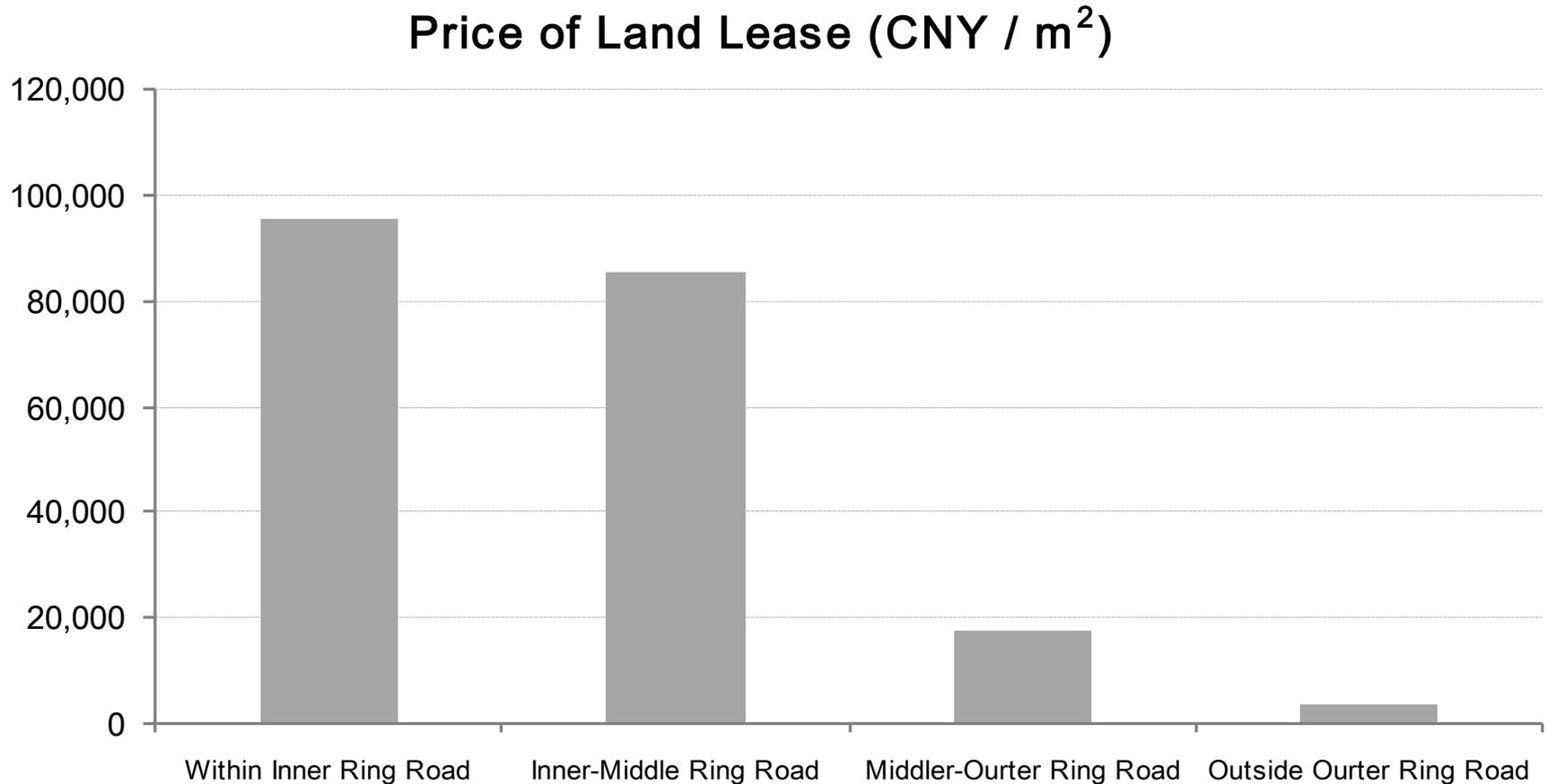
# Spatial distribution of land leases in Shanghai in 2013



Zhao & Block-Schachter (forthcoming)

Source: Shanghai Urban Planning and Land Resource Management Bureau (2013)

# Distribution of unit land lease price in Shanghai in 2013



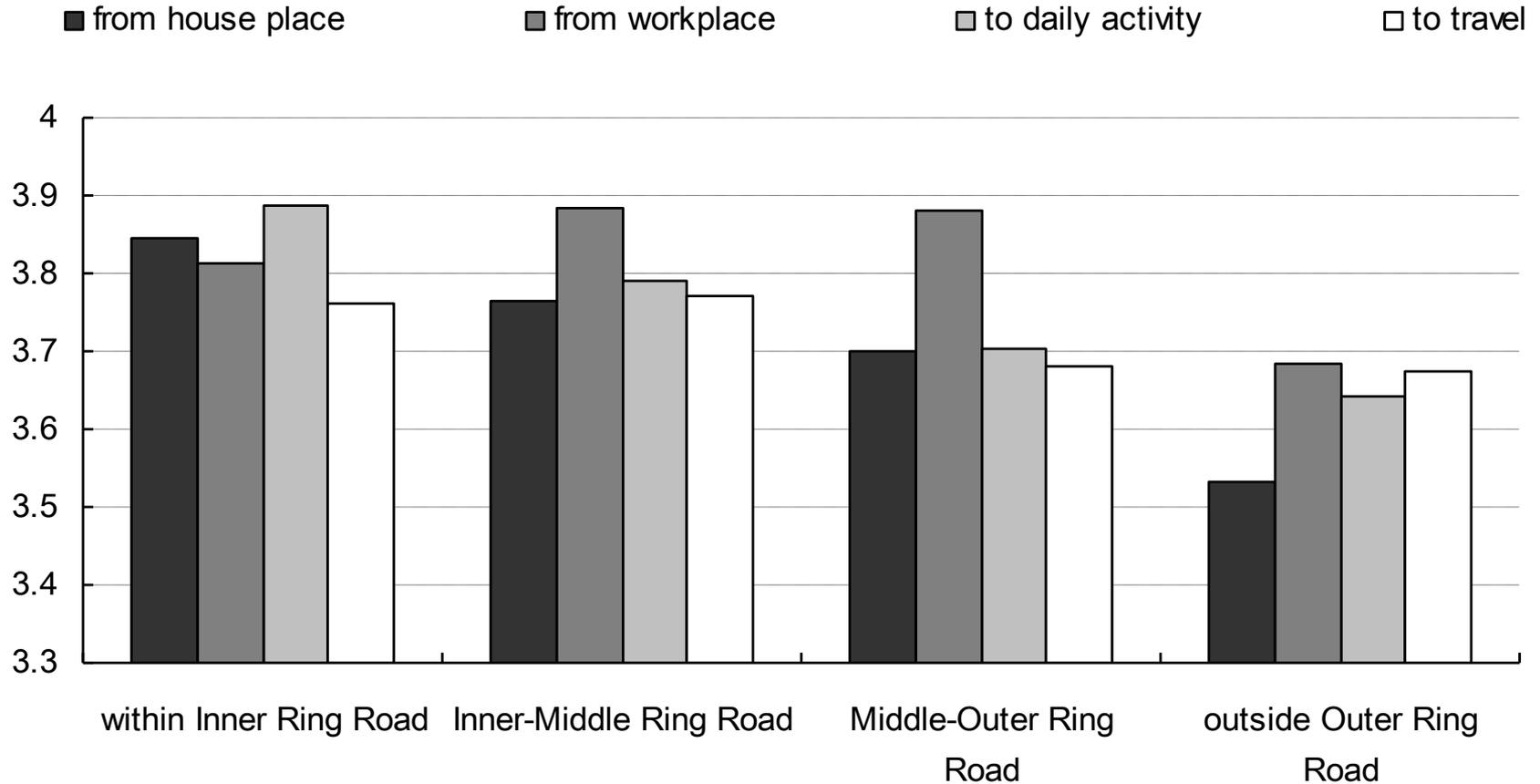
# Lot sizes of land leases in Shanghai in 2013

Image removed due to copyright restrictions. Map of Shanghai, displaying relative sizes of land leases from 2013.  
Source: Shanghai Urban Planning and Land Resource Management Bureau.

# Mismatched neighborhoods and urban services

- Single-use monolithic residential and industrial developments emerge where urban services are still in the blueprint phase
- The source of revenue is the sale of land, not the use of that land
- Services are expensive for the city to provide, and the very reason they resorted to land sales financing → informal services
- Result: longer trips to existing city services, a growing demand for vehicles, and worsened accessibility

# Perceived public transport accessibility by location

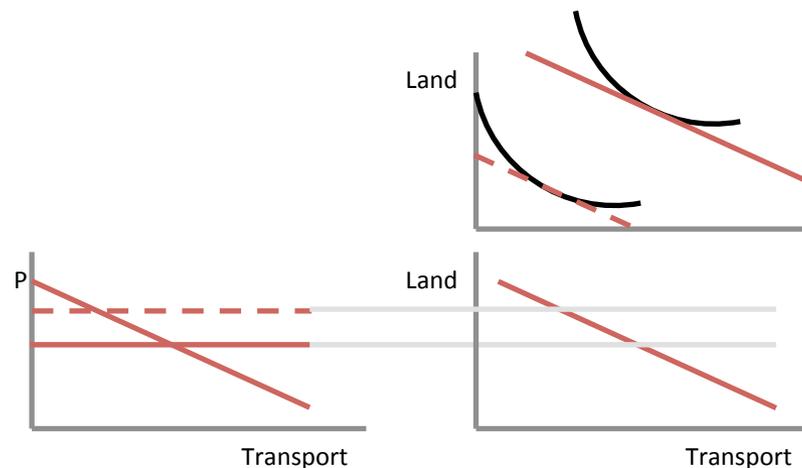


Zhao & Block-Schachter (forthcoming)

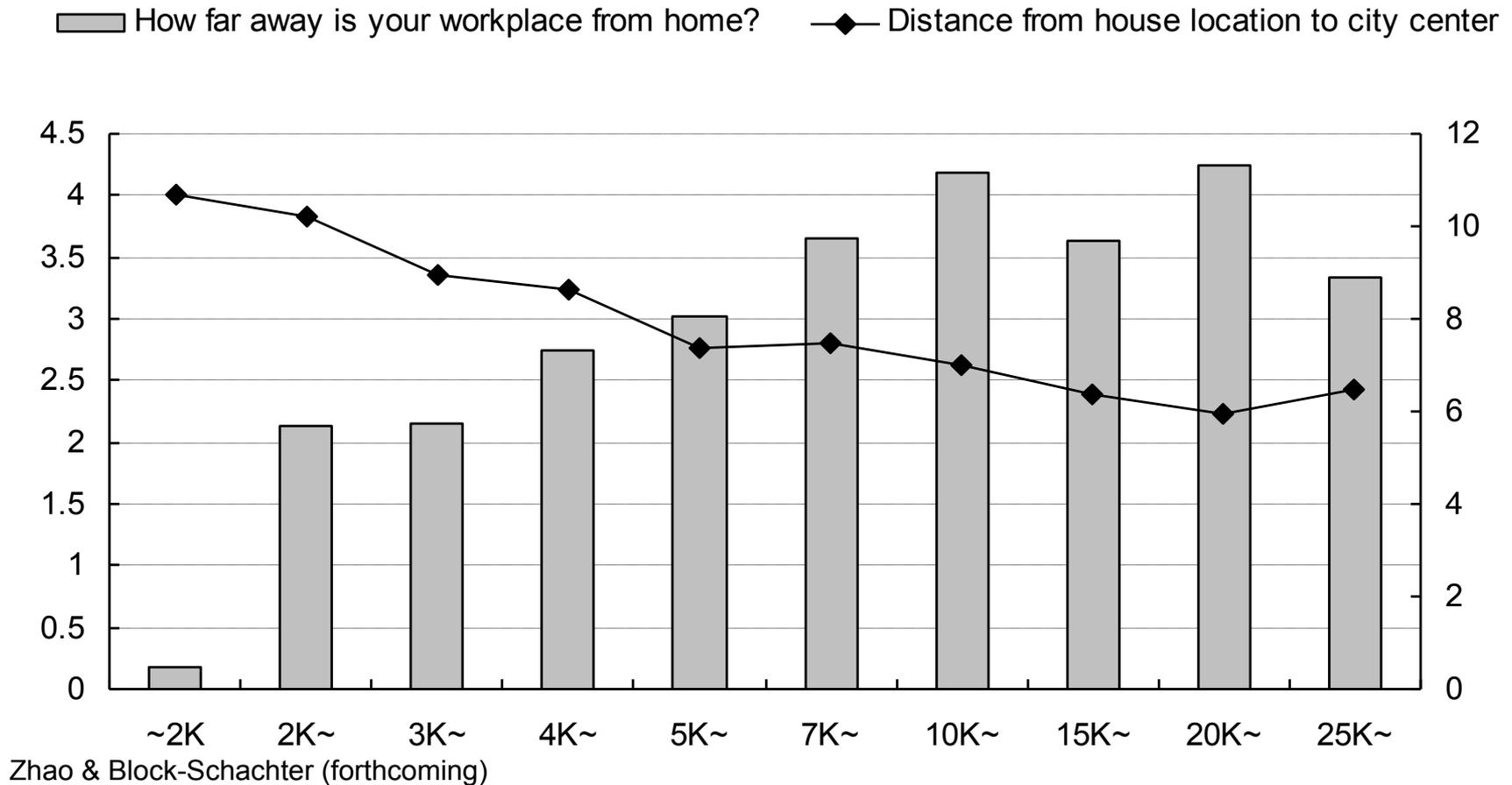
# Distribution

# Rich and poor

- 3 options for the poor. Trade accessibility for well being
  - Settle at the periphery to reduce land costs, but increase travel time to opportunities
  - Remain in the center, but reduce their consumption of other goods to pay for the increased price of housing
  - Reduce their consumption of housing



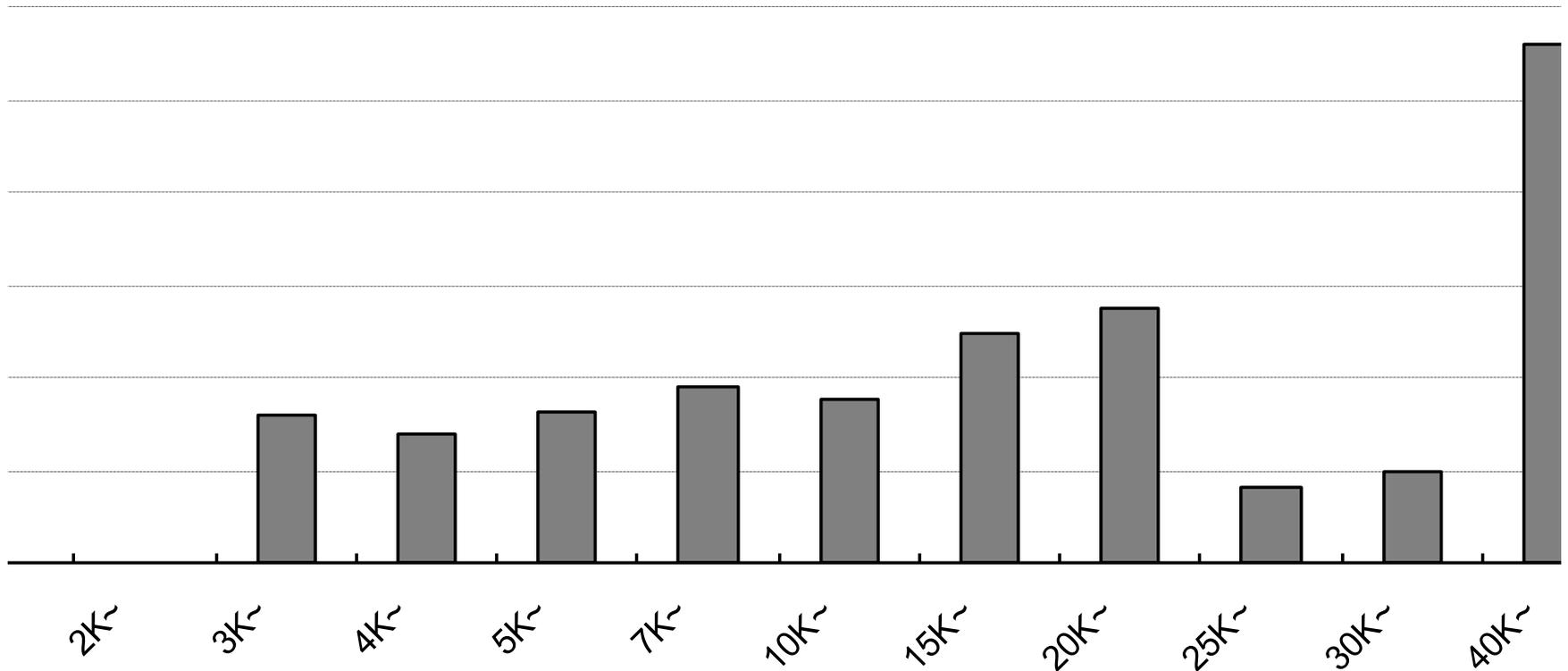
# Housing and working location of people with different incomes



Note: the bar shows the distance from home to work place (km), and the line shows the distance from home to city center (1: within inner ring, 2: inner-middle ring, 3: middle-outer ring, 4: outside outer ring).

# Car ownership of people with different incomes

Car Ownership



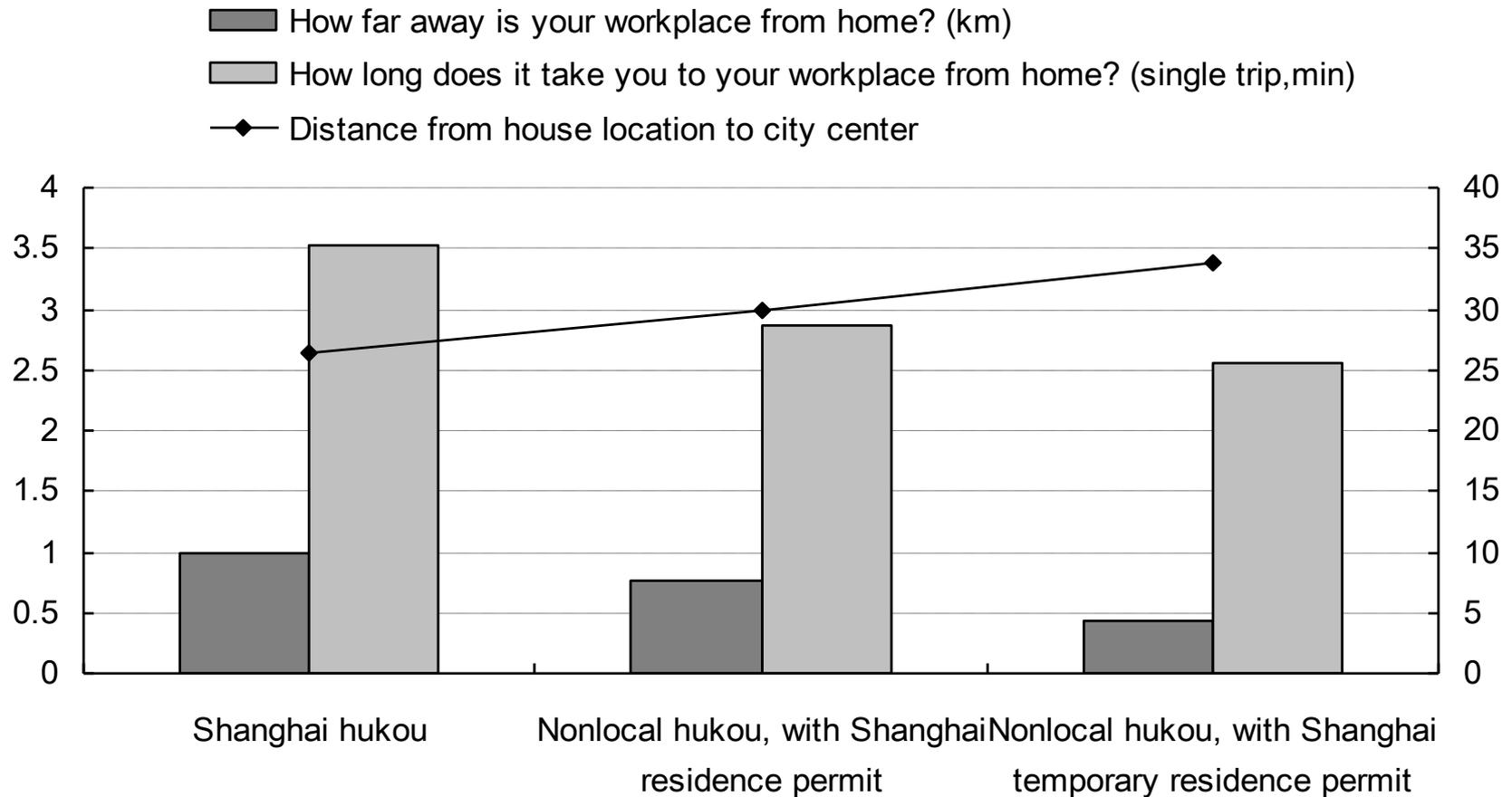
# Car owners and non car owners

- Shanghai: redistribution of accessibility gains from car owners to public transit users
- Decreased travel times for those with cars, at a monetary cost
- Expenditure of the revenues from the auction has increased accessibility for those without cars
- To the extent that this infrastructure has kept up with the increased demand displaced from the road network, there are net gains on all sides
  - Fare subsidies may also impact residential location choice, reducing accessibility in the long-run
  - Last-mile problem and coordination failures reduce realized accessibility

# Migrants and locals

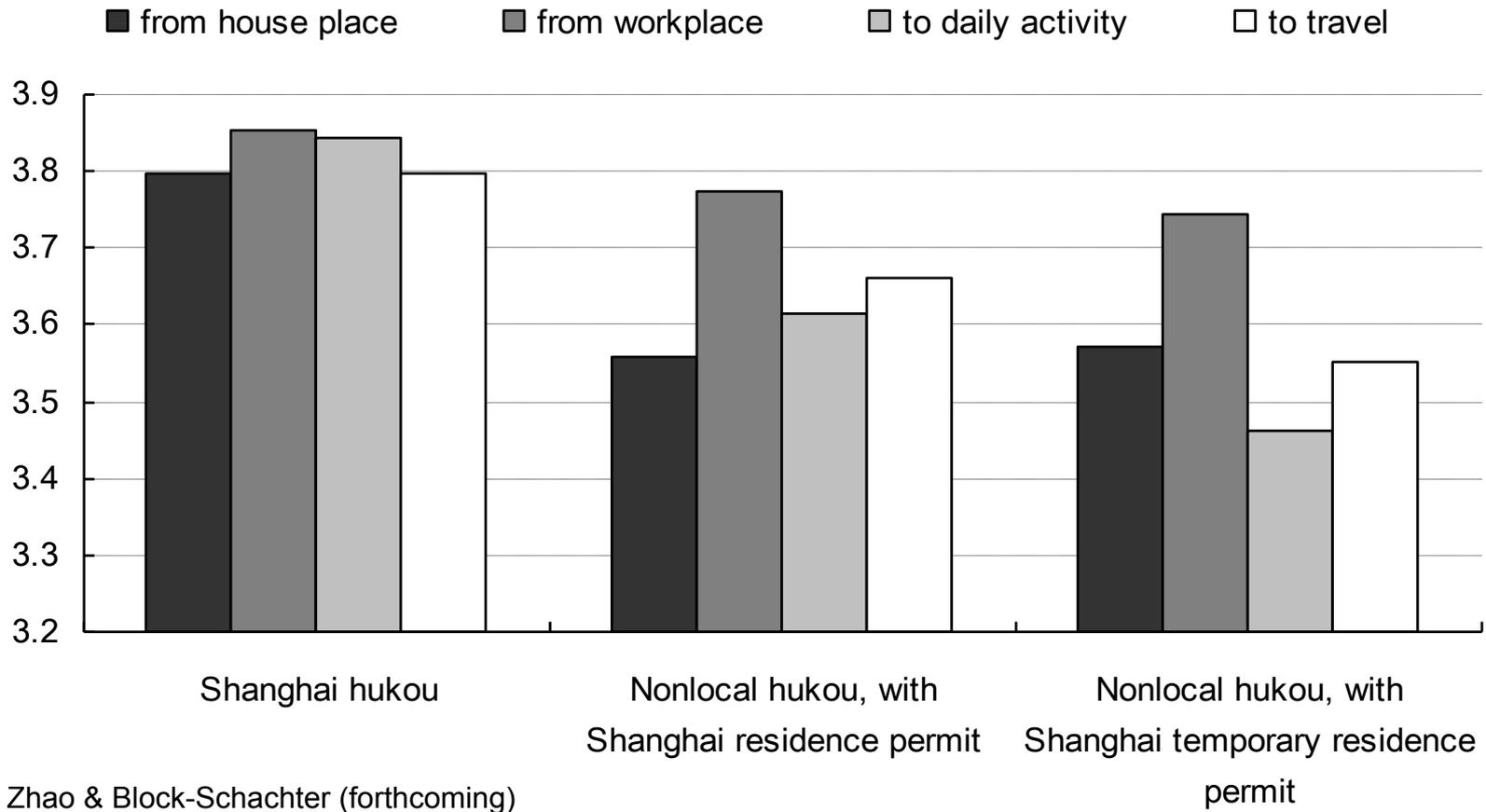
- Recall: approximately 40% migrants in Shanghai, with many not qualifying for permanent residence permit

# Housing and working decision of local citizens and migrants



Note: the bar shows the distance from home to work place (km), and the line shows the travel time from home to work place (min).

# Accessibility to public transport of local citizens and migrants



Note: the plot shows different groups' attitudes towards availability of PT service (1: very low, 5: very high).

# Migrants: evidence

- Substitute auto access for home ownership in the use of their capita
  - Equally likely to own and use a vehicle as local residents, but are much less likely to own their homes
- Reasons
  - less family-oriented
  - financial resources – migrants live farther from the center of the city where less expensive housing exists
  - use the flexibility of renting to optimize their accessibility to a given workplace, while sacrificing accessibility to the rest of the urban area
- Result: migrants live in a far less accessible city for their daily activities than non-migrants.
- Land-grabbing as an inadequate response to meet the needs of the urban area to expand to accommodate these migrants

# Conclusions

# Recap

- To increase accessibility via the collection mechanism make bad things expensive, and good things cheap
  - vs. revenue goals, politics, history, equity, etc.
  - Challenge of moving from an existing system
    - Moving from an upfront to an ongoing system make the politics of “double” charging existing users difficult

# Final thoughts

- A sustainable source of funding for basic accessibility needs has yet to be achieved
  - Building institutional will and political and technical capacity
- Land grabbing as expropriations
- Land grabbing as streetcar suburbs
  - Private operators of streetcars make money from selling land
    - And then go broke
  - vs MTR/SMRT model where retain an interest
- Financing infrastructure based on the sale of long term licenses – whether 70 year land leases or lifetime vehicle licenses – reduces the incentive to husband those resources sustainably

MIT OpenCourseWare  
<http://ocw.mit.edu>

11.S945 Urbanizing China: A Reflective Dialogue  
Fall 2013

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.