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 3rd 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

How many cars does your household own?  What is your percentage of car trip in all trips?

Zhao & Block-Schachter (forthcoming)
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)
Distribution of unit land lease price in Shanghai in 2013

Price of Land Lease (CNY / m²)
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.

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)
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

- $2K$~
- $3K$~
- $4K$~
- $5K$~
- $7K$~
- $10K$~
- $15K$~
- $20K$~
- $25K$~
- $30K$~
- $40K$~
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 subsides 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).

Zhao & Block-Schachter (forthcoming)
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 exactments
• 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
Fall 2013

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