Overview

- Introduction
- Accessibility
- Measurement
- Empirical Examples
- Value Capture Policies
  - Land value tax, impact fees and exactions, joint development
- Case Studies
- Thought Experiment
Finance

- Revenue sources
- Taxes
  - Fuel, vehicle sales, registration, property
- Direct user charges
  - Fares, tolls
Value Capture: An Introduction
What is Value Capture?

- A collection of public finance techniques that involve recovering the cost of a public investment through land-related taxes
- Examples: land value tax, property tax, special assessment
- Related policies: Joint development, impact fees, tax increment finance
How Much Investment is Enough?

- A good guide: MB = MC
- What are benefits?
  - Reduced travel time
  - Reduced fuel consumption
  - Reduced maintenance costs
  - Reduced emissions, noise, etc.
An Alternative Method

- Look at land value benefits
  - A substitute for travel time
- Less travel time vs. *more* access
  - Travel time budgets
- How do land markets respond to transportation improvements?
An Analogy: Streetcars

- Combined transportation services with other activities
  - Real estate
  - Power Generation
Accessibility
Accessibility

- The link between transportation and land use
- Measures the ease of reaching desired destinations
- Types of measures
  - Cumulative opportunity
  - Gravity or zone-based
  - Utility-based (logsum)
  - Constraints-based/Person-based
Gravity-based accessibility

A_{im} = \sum_j O_j \exp(C_{ijm})
Accessibility has value

- Increases or decreases in access translate are mediated by land markets.
- Households value access to employment, shopping, etc.
  - +10% in job access (30 min) leads to +1.38% house price in Twin cities.
- Firms value access to employees, other firms.
Measurement
Hedonic Price Models

- A *revealed demand* approach
- **Assumption:** demand for a good (e.g. housing) is really the demand for the bundle of characteristics it represents
  - Composite goods (Lancaster 1966)
  - Implicit Markets (Rosen 1974)
Hedonic Prices for Housing

Housing is also a composite good. Its price (or rent) can be decomposed into its many attributes:

\[ P = f(S,N,L,T) \]

where:
- \( P \) = Price
- \( S \) = vector of structural attributes
- \( N \) = vector of neighborhood attributes
- \( L \) = location within the market (or submarket)
- \( T \) = time of observation (month/year)
Hedonic regression specification

The relationship between price and housing attributes can be expressed using several forms:

\[ P = Xb + e \]  
(Linear)

\[ \ln P = \ln(Xb + e) \]  
(Double-log or log-log)

\[ \ln P = Xb + e \]  
(Log-Linear)

\[ P = \exp(Xbe) \]
Possible Regressors

- Bedrooms
- Bathrooms
- Square footage
- Age
- Fireplaces
- Garage stalls
- Structure type

- School quality
- Neighborhood income
- Socio-economic characteristics
- Lake frontage
- Accessibility
Repeat sales indexes

- Alternative to hedonic price functions
- Requires multiple observations on a property
- Estimate annualized price changes between sales
- Advantage: Requires no structural attribute data
- Disadvantage: discards much useful data
- Example: S & P Case-Shiller Index
Empirical Examples
Example 1: ROC 52 Project

- 11-mile major reconstruction project on U.S. 52 in Rochester, MN
- Highway expansion, new interchanges
- Spring 2003 – Fall 2005
Example 1: ROC 52 Project

- Estimate effect of reconstruction on home prices near Highway 52
- Home sales data 2000-2007
  - Matched to county parcel records
  - 14,900 observations
- Divided into three periods
  - Pre-construction, construction, post-construction
Example 1: ROC 52 Project

- Log-linear model form
  - Dependent variable: ln sale price
- Location measurement
  - ¼ mile distance bands (up to 1 mile)
  - Measured to highway & nearest interchange
  - Access and nuisance effects hypothesized
## Estimation Results

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Highway Proximity Effect
Access Effect

Price Premium (percent)

Access Point Distance Band and Construction Period

1/4 Mile
1/2 Mile
3/4 Mile
1 Mile
Example 2: Hiawatha LRT

- Study of single-family and multifamily prices near LRT stations (Goetz et al.)
- Data on home sales 1997-2007
- Stratified by side of track (east/west) and station region
  - Account for neighborhood effects
Example 2: Hiawatha LRT

- **Findings**
  - Little effect east of Hiawatha due to presence of highway and industrial corridor
  - West of Hiawatha, effect of station proximity up to 500m, with nuisance effect of proximity to track up to 600m

- **Total Price Premium**
  - $18.4 M for SF homes
  - $6.9 M for MF homes
Split-Rate and Land Value Tax
Concept and Rationale

- Conventional property tax is really two taxes
  - Tax on buildings:
    - Creates disincentive to invest in buildings
    - Taxes value created by owner’s effort/resources
  - Tax on land:
    - Less distortionary because land supply is fixed
    - Taxes value created by provision of public goods
Concept and Rationale

Effects of tax on buildings
Concept and Rationale

Effects of tax on land
Extent of Use

- Popularized by Henry George
  - Proposed “single tax” to replace all other taxes
- United States
  - Split-rate tax at city level in Pennsylvania
- Worldwide
  - Canada, Australia and New Zealand
  - Elsewhere
Pennsylvania

- Pittsburgh and Scranton adopted in 1913
  - Split-rate tax, land rate = 2x building rate
- Ratio increased in 1970s
  - Pittsburgh ended up at 6:1
- More cities adopted in 1980s
  - Extended to boroughs and school districts
  - Currently in use in 15 cities
Effect on development

- Research has focused on development effects
  - Value, number of building permits
- Analytical papers show increased intensity, decreased city size
- Pittsburgh study results vary:
  - Several authors find no correlation
  - Necessary but not sufficient to increase building
- Scranton/Wilkes-Barre comparison
- Statewide
Equity

- Would not affect all properties equally
  - Low building-to-land ratio = increased tax
  - High building-to-land ratio = decreased tax
- Greatest benefit to single-family residential in middle-class and affluent areas
- Greatest cost to industrial and vacant parcels
- Low-value properties would see increase
  - Remedies include threshold value, tax credit
Adequacy & Sustainability

- Depends on goal and value created
  - Cost recovery vs. value capture
- If rate is too high, tax becomes confiscatory
- Several studies have shown value is generated by transportation projects
- At least as stable as property tax
  - Effect on land values must be monitored
- Keeps up with inflation if assessments do
Laffer Curve

The Laffer Curve

Tax Rates

0%

100%

Tax Revenues $
Impact Fees and Exactions
Impact Fees

Impact fees are one-time predetermined assessments levied on new development, to offset the impact of the development on the capital cost of providing regional services and infrastructure.
Developer Exactions

Developer exaction are negotiated or mandatory contributions from a private provision of land or facilities to serve public infrastructure needs created by new development and made as a condition of approval.
Rational Nexus Test

Facilities must be elements of a comprehensive local plan for service improvements

Impact fee calculation must consider other tax combinations to avoid double-billing projects

Revenues must be segregated until used and must be spent in a timely manner

Source: Altshuler and Ibanez (1993)
Demand Driven Fee System

Number of trips generated \times Average trip length \times Cost per trip based on cost to improve mile of roadway

Improvements Driven Fee System

The road improvement budget contain in the capital improvements program \div The trip generation rate for the proposed land use

Assessments

**Housing Production Effects** - Evidence Ambiguous

**Housing Price Effects** - Difficult to measure effect of impact fees on housing prices. Development growth demand causes price changes

**Economic Development Effects** - No discernable economic effects from impact fees are present
Equity

Current residents
• Quality of service can be diminished by new development
• Have paid for facilities through property taxes and fees
• Avoidance subsidizing new development.

New residents could be disproportionately charged for infrastructure upgrades or expansions depending on current capacity
Joint Development

- Cost recovery technique for new infrastructure (mostly rail systems)
  - Developer can provide infrastructure
    - Cascade Station, OR
  - Developer can lease space at stations from public agency
    - 28th Ave. Station (Hiawatha), P & Rs
Case Studies
Case Study (Batt 2003)

- Looks at effect of I-87 (Northway) near Albany, NY
- 2-mile catchment area identified along 9 mile segment
  - Western Ave. to Mohawk River
- From 1958 to 1995, land in catchment area increased in value from $500M to $4.18B
  - Attributed to Northway
Case Study: Stopher (1993)

- Case study of development of special assessment for land near L.A. subway
- Designed to raise $130M for initial 4.4 mile segment
Case Study: Stopher (1993)

- Issues with practical implementation
  - Legality challenged
  - Homeowners vs. businesses
  - Delineation of district boundaries
  - Empirical basis
Thought Experiment

Assume you are a central planner working for the Metropolitan Council.

You are given a budget which will fund construction and operation of 10 new bus or rail transitways.

Given what you know about the existing transit system, settlement patterns and the location of activities, **identify** and **rank** new links to be built in order to maximize transit accessibility (and hence potential for value capture).
Example: Twin Cities

Legend
- cbd
- LRT stations
- Bus routes
- LRT line
- Major Highways

Projection: NAD 1983 UTM Zone 15N
Data Sources: Metropolitan Council, Minnesota Department of Transportation