

# Financing Transport Infrastructure in Developing Country Cities:

## Evaluation of and Lessons from the Nascent Use of Impact Fees in Santiago de Chile

82nd Annual Meeting of the  
Transportation Research Board (TRB)  
Washington, DC,  
15 January 2003

Christopher Zegras  
Massachusetts Institute of Technology  
Department of Urban Studies and Planning  
Cambridge, MA, USA

## Outline

- I. The Context – Urban Transport Infrastructure Finance**
- II. Overview of Transport Impact Fees**
  - Their Relationship to Related Tools
  - Precedents
  - A Framework for Assessing Their Use
- III. Transport Impact Fees in Santiago**
  - Transport Finance System & Institutional Context
  - Current Transport Impact Fee Use
  - Assessment of the Experience To Date
  - Recommendations for Improvements
- IV. Lessons for other developing countries**
- V. Final Considerations**

## THE CONTEXT: URBAN TRANSPORT INFRASTRUCTURE FINANCE

### In an “ideal world”

- fuel prices cover resource costs & environmental costs of carbon dioxide emissions
  - road maintenance and congestion costs charged directly through highly differentiated tolls;
  - local environmental costs charged through emission fees;
  - redistribution objectives pursued through non-distorting lump sum taxes (World Bank, 2001).
- Would not only send accurate signals to system users to ensure “efficient” system use, it would also provide a sustainable financing source (i.e., Morhing & Harwitz, 1962)

3  
© P. Christopher Zegas

## The Context: Urban Transport Infrastructure Finance

### The “real world”

- Few accurate, direct user charges exist.
  - A variety of indirect mechanisms (fuel taxes, vehicle license fees, etc.)
  - Fuel taxes often used for general revenues and income redistribution
  - Multiple infrastructure supplying “agents” – maintenance v/s construction; local v/s regional v/s national
- Formally, budgeting processes unclear, users rarely recognize fees as “prices”, governments scramble for revenues from any available sources.

4  
© P. Christopher Zegas

## Impact Fees

- A form of ‘exaction’ – requirement for real estate developer contribution to infrastructure
  - ‘in-kind’ exactions – actual provision of infrastructure
    - typically on-site
  - ‘financial’ exactions – payments towards infrastructure provision (impact fees)
    - typically off-site (i.e., trunk roads)
- Exactions can provide for efficient infrastructure *delivery*
  - Developers face the costs resulting from growth
- Cannot guarantee efficient infrastructure *use*
  - Combination with user fees better justified
  - Or, second best: making impact fees represent cost differentials among development types and locations

5  
© P. Christopher Zegas

## Impact Fees v/s Value Capture

- Work in opposite direction, hinge – ultimately – on different precepts.
- Value capture (or valorization) recaptures increased property values due to public investments in infrastructure (or other government interventions)
  - for example, betterment taxes
  - most often used in already built-up areas
- Impact fees charge for the direct impacts real estate projects will have on infrastructure
  - typically used for new *developments* in high growth areas

6  
© P. Christopher Zegas

## Impact Fees - Precedents

### In the U.S.

- Pioneered in rapidly growing southern and western localities during the 1970s
- By the mid-1980s, used to finance police and fire stations, sewers, schools, etc. (7).
  - 60 percent of localities in the U.S. were using impact fees and exactions
- Originally adopted on a trial-and-error basis, often producing legal battles (8)
- Today, generally legally enabled

### In the Developing World

- Various forms of exactions exist, not well documented, often not well-enforced
- Jakarta Indonesia has had a betterment tax (valorization) since 1972
  - To recover part of new and improved infrastructure costs.
  - Reportedly, only sporadically used to finance road projects.
- In most Latin American countries national legislation allows the public sector to capture land value increases from public investments or changes in public regulations
- Colombia's *contribución de valorización* in use since at least the 1960s
  - approximates an impact fee, with: the infrastructure costs estimated; a zone of influence around the project defined; and, costs allocated to specific properties, typically using a coefficient system reflecting the project's effect on the property (12).
  - Still, the *valorización* assumes an increase in the value of abutting land,
  - An impact fee, technically, levied based on the need that the abutting land imposes on infrastructure

7  
© P. Christopher Zegras

## Transport Impact Fees

$$\text{Impact Fee} = \frac{(\text{ADT}_i * \text{TL}_i)/2 * C - \text{Credits}_i}{\text{Cap}}$$

ADT = Average daily trip ends for land use i

TL<sub>i</sub> = Average trip lengths for land use i

Cap = Capacity of lane at planned LOS standard.

C = Cost of right-of-way acquisition and construction per km of road lane.

Credits<sub>i</sub> = Discounted, PV of the stream of road user revenues to finance capital costs for each use, i.

8  
© P. Christopher Zegras

## 9 Principles for Assessing Impact Fee Use

<i>Principle</i>	<i>Explanation</i>
1. Guidance	On the type of facilities eligible for impact fee financing and the conditions for use as supplement to existing financing sources
2. Demonstrated Need	For impact fees within the context of a capital improvement plan, comprehensive plan
3. Links to Exactions	Clarifying relationship to “in-kind” exactions
4. Rational “Nexus”	Between real estate project and infrastructure needs
5. Demonstrated Responsibility	That new infrastructure needs result from new development (not existing deficiencies); requires appropriate planning process and cost apportioning

9  
© P. Christopher Zegras

## 9 Principles for Assessing Impact Fee Use

<i>Principle</i>	<i>Explanation</i>
6. Clear Benefits	Establishing the connection between fee expenditure and benefits: 1) reasonable expectation that contributing projects will use the facilities; 2) facilities must be proximate and available in reasonable time
7. Minimal Housing Cost Impact	Designing the fees and payment schemes to minimize the ultimate impacts on housing affordability, i.e. through: avoiding exacting fee at permitting stage, delaying levy until project is occupied; allowing payment over time, at subsidized interest rates
8. Uniformity	Assessing the fees on each development in a similar way
9. Mitigate Adverse Effects	Considering the effects of the fees on other policy priorities (i.e., affordable housing, industrial development).

Source: Derived from Lillydahl, *et al.* 1988, The Need for a Standard State Impact Fee Enabling Act, *JAPA*.

10  
© P. Christopher Zegras

## Transport Impact Fees in Santiago

- In-kind exactions date to at least early 1970s
  - More recently formalized in regulations
- In early 1990s, 2 rapidly growing suburban Municipalities turned to an ad hoc roadway impact fee scheme
  - to finance trunk road connections to the rest of the urban area
- More recently, national authorities are using impact fee financing in response to massive suburbanization in the north of Santiago
  - Currently attempting to formalize their use

11  
© P. Christopher Zegras

## Transport Finance System & Institutional Context

### Municipal Government

- 37 locally-elected Municipal governments in Greater Santiago
- Relevant revenues: local property taxes and annual vehicle registration fees (76% and 14% of total revenues, respectively), no bond issuance authority
- Massive disparities in Municipal government incomes
  - Even after National Government transfers, the richest Municipalities in the RM have 8 times more income per capita than the poorest

### National Government

- Accounts for 95% of all public revenues raised in the country, plays a major role in local and regional finance and investments

### Transport Finance

- Specific Revenues: Excise tax on gasoline and diesel; vehicle license fees
  - In Greater Santiago estimated revenues from these two sources (1994): US\$290 million – 88% from dedicated fuel taxes (controlled by National Government)
- Costs: Roadway construction, maintenance; Metro Construction; “externalities”
  - air pollution costs range US\$165 to \$520 million/year

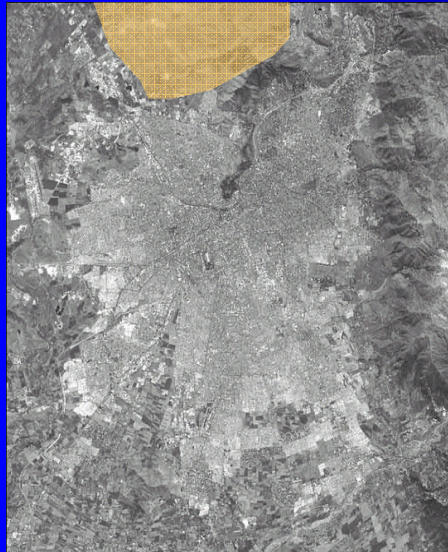
12  
© P. Christopher Zegras

## Current Transport Impact Fee Use in Santiago

- Challenge: Rapid Suburbanization in Santiago's North (Chacabuco Province)
  - Historically agricultural area, little infrastructure
- Late 1990s, National Ministry of Public Works, Transportation and Telecommunications (MOPTT) developed transport plan for the area
  - used the transportation model EMME/2
  - Identified minimum network necessary for peak period demand from 14 proposed real estate projects (with a total of 40,000 households by 2010)
  - Accounted for each real estate projects' size, location, socio-economic characteristics and subsequent travel demand
- A total of US\$106 million in non-concessionaire road infrastructure identified
  - 62 Kms of roadways and several major interchange upgrades
- Impact fees designed
  - Real estate project's financial contribution based on peak demand generated (veh/hour)
  - A relative index of infrastructure "consumption" used to allocate total infrastructure cost to individual real estate projects.
  - Travel demand from low income housing exempted from charges
  - Government ultimately agreed to assume direct financing responsibility of 39% of total infrastructure costs.

13  
© P. Christopher Zegras

## Suburbanization in Chacabuco



14  
© P. Christopher Zegras

## Assessing Santiago Experience

1. Guidance
  - Currently does not exist; ad-hoc, case-by-case negotiation.
2. Demonstrated Need
  - Exists in Chacabuco Province; transport plans developed in accordance with Chilean planning principles.
3. Links to Exactions
  - No clear differentiation in existing agreements between impact fees and exactions.
  - Further complications from disconnect with environmental impact fees.
4. Rational Connection
  - The transport planning process has shown the nexus between future real estate projects and the infrastructure requirements.
5. Demonstrated Responsibility
  - Without the planned real estate projects, the road infrastructure would likely not be required.
  - However, complications inherent to modeling the system (i.e., what would happen to the existing network without Chacabuco?).
  - Not entirely clear how future developments (or expansions to existing developments) will be treated.
  - Other user charges ignored (i.e., no consideration of credits).

15  
© P. Christopher Zegras

## Assessing Santiago Experience (cont'd)

6. Clear Benefits
  - Clearly established link between the expenditure of fees (development of infrastructure) and benefits to the individual projects.
7. Minimal Housing Cost Impact
  - Upfront payment means fees will likely be passed on to homebuyers.
  - Knowing the true effects requires more analysis.
8. Uniformity
  - Current application has been uniform
  - Uncertain whether it will continue (in Chacabuco, elsewhere, or for other land uses).
9. Mitigate Adverse Impacts
  - Exempting low income housing closely allies with the government's housing policy.
  - Introducing fees in Chacabuco may positively affect ostensible policy of controlling urban expansion.
  - Ultimate impacts on urban and regional form and efficiency require more study.
  - The effects on attempts to introduce congestion pricing remains to be seen.

16  
© P. Christopher Zegras

## Fulfillment of Principles in Chacabuco Case

Principle	Fulfilled?
1. Guidance	No
2. Demonstrated Need	Yes
3. Links to Exactions	Partially
4. Rational Connection	Yes
5. Demonstrated Responsibility	Partially
6. Clear Benefits	Yes
7. Minimal Housing Cost Impact	Uncertain
8. Uniformity	Uncertain
9. Mitigate Adverse Effects	Partially

17  
© P. Christopher Zegras

## Recommendations for Improvements

- Over-arching legal guidance on the use of transportation impact fees in Chile.
  - Will also help ensure a uniform approach in future applications.
- Clarification of impact fees' relationship to other financial instruments.
- Better contextualization within the broader transport system finance context
  - To clarify the difference between impact fees and other user charges and the potential need for credits.
- Understanding of the ultimate incidence of transport impact fees needs to be better understood
  - who will ultimately bear the burden (i.e., the owners of undeveloped land, new or existing residents, landowners)?
- The extension of impact fee use to non-residential land uses should be considered.
- Need to better assess the effects on other public policy goals and potential integration with other relevant instruments.

18  
© P. Christopher Zegras

## Lessons for Other Developing Countries

1. Administrative capacity and growth management controls
  - perhaps the most important prevailing condition necessary for the use of impact fees in any city
2. Government concerns with “efficiency” and “fairness”
  - Chilean authorities have consistently shown a predisposition towards self-financing of transportation infrastructure and services, when viable and equitable
3. Unintended and unanticipated consequences
  - Potential to displace growth to other parts of the metropolitan area; the relation of impact fees to other user charges
4. The public finance context
  - Best to deploy impact fees within a clear and transparent public finance framework, in order to better justify the fees, understand their relationship to other charges, and to calculate any credits

19  
© P. Christopher Zegras

## Final Considerations

- Impact fee use can precede explicit legal authorization (i.e., “enabling” legislation)
  - As in US, however, system may wind up in the courts.
  - Framework presented here might assist in establishing a solid foundation for use.
- Santiago (like the US case) may not be the best example for their widespread application in developing world
  - GDP per capita of US\$5,000 in 2000 (approx)
  - Chile has strong administrative and technical capacity and some degree of growth management capabilities (to diminish potential “free-rider” problem)
- Impact fees likely most promising for cities with concentrated areas of large-scale new real estate developments, with few alternatives
- Future research & applications might explore structuring fees to promote “transport-efficient development” and/or to finance public transport infrastructure (i.e., dedicated busways).
- Impact fees cannot solve such challenges as housing provision and employment needs
  - Issues on forefront of developing world’s urban agenda

20  
© P. Christopher Zegras