Balancing Financial Sustainability and Affordability in Public Transport

The Case of Bogota, Colombia

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Agenda

I. Subsidies in Public Transit

II. Bogota’s Tariff Policy

III. Bogota’s Pro-Poor Subsidy Scheme
Traditionally, the arguments for public transit subsidies have included the following:

- reducing the costs of environmental externalities
- making efficient use of modes with different cost structures
- taking advantage of user economies of scale ("Mohring effect")

But, if transport subsidies are inadequately used and are not accompanied by efficiency incentives, they can lead to "padding of costs", system inefficiencies, and risks associated with supply-side subsidies (i.e. unsustainable fiscal commitments, difficult exit strategies).

In a developing country context, the arguments against supply-side subsidies can further be extended by the need to limit fiscal burden and focus subsidies where they are most needed socially.

- Cities should set fares for cost recovery but offer targeted subsidies for specific segments of the population.
- "First Generation" demand-side subsidy programs (socio-demographic targeting, *vale transporte* and *billete unico* in Brazil, feeder lines/cable cars) do not always reach the target audience and may even have unintended outcomes.
Cost recovery vs sustainability

US FTA experience with operating subsidies
- Impact on productive efficiency – unsustainable
- Neither poor nor service quality benefited

Buenos Aires fares frozen in 2002
- Impact on service quality – unsustainable
- Impact on productive efficiency – unsustainable (1% GDP)
- Most of the subsidy benefits the middle class

Bogota, Brazilian cities
- Cost recovery
- Fare integration— Bogota
- Yet, unaffordable for the poor – particularly the informal sector

London experience
- Competitive concessions to pick operators
- Financing from congestion pricing
- Improvements in service quality – mode choice
# Early Experience with Demand-Side Subsidies

<table>
<thead>
<tr>
<th></th>
<th>Productive Efficiency</th>
<th>Effectiveness at targeting poor</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>User groups; elderly, students</td>
<td>No impact</td>
<td>Convenient more than accurate</td>
<td>Does government pay?</td>
</tr>
<tr>
<td>Brazil <em>vale transporte</em> for employees</td>
<td>Reduces cost discipline for operators – users don’t have stake in costs</td>
<td>Self-selects poor employees with 6% threshold BUT informal workers left out</td>
<td>Some reselling. Labor tax on poor employees</td>
</tr>
<tr>
<td>USA TransitChek</td>
<td>No impact</td>
<td>All employees – not poor but mode shift</td>
<td>Government forgoes tax revenue</td>
</tr>
<tr>
<td>Pereira “free morning”</td>
<td>No impact</td>
<td>Self-selected</td>
<td>Low fiscal impact</td>
</tr>
<tr>
<td>Chile fuel subsidy</td>
<td>No impact</td>
<td>Appropriate but not public transport</td>
<td>No impact</td>
</tr>
<tr>
<td><em>Bilete Unico</em> (SP, Rio, Curitiba) &amp; Integrated Fares Santiago, Bogota</td>
<td>Starting point—organized/rationalized network</td>
<td>Effectively subsidizes transfer for multi-modal trips—low-income groups overwhelmingly benefit, but reinforces sprawl?</td>
<td>Usually high fiscal, if not accompanied by some network rationalization (Curitiba)</td>
</tr>
</tbody>
</table>
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Tariff Policy: Competitive Bidding to Identify Cost Recovery

“Cost Recovery” Principle Formula...

Where, each of these elements (except the public sector administrator costs) are bid out separately:

- **Trunk & Feeder**
  - Provides public transit services
  - Competitive bidding process for trunk and feeder services.

- **Fare Collection**
  - Automatic fare collection, centralized fleet control/programming
  - Competitive bidding process.

- **Trust Agent**
  - Manages system’s resources and pays different agents
  - Receives a percentage over total tariff (fare) sales

- **Local BRT Agency**
  - System planning and control
  - Fixed payment
Tariff Policy: Technical Tariff & User Tariff

- From “Cost Recovery” Principle, a notional Technical Tariff is calculated to estimate the required average revenue per ticket sold that is needed to guarantee remuneration of all of the system’s service providers.

- User Tariff set close to Technical Tariff and determined by decree (Mayor of Bogotá).
“User Experience” worsened by changes in city’s mobility patterns and policies

- Changes in Bogota’s mobility patterns have challenged the assumptions incorporated in the operational design of the SITP

- The city has changed (increased motorization, congestion) and the District has modified key policies that change the assumptions incorporated in the operational design (license plate restriction, infrastructure, bus typology, tariff rates)
# High Quality Ridership Estimates

Benchmarking subsidies in selected Colombian Cities (2014)

<table>
<thead>
<tr>
<th>Indicador</th>
<th>Barranquilla</th>
<th>Bogota</th>
<th>Bucaramanga</th>
<th>Cali</th>
<th>Medellin</th>
<th>Pereira</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRT Network Length (km)</td>
<td>13.3</td>
<td>112.0</td>
<td>20.1</td>
<td>39.0</td>
<td>18.0</td>
<td>16.15</td>
</tr>
<tr>
<td>Projected Daily Demand (pax, from model)</td>
<td>305,000</td>
<td>1,500,000</td>
<td>220,000</td>
<td>441,600</td>
<td>249,200</td>
<td>140,000</td>
</tr>
<tr>
<td>Daily Demand (pas)</td>
<td>92,000</td>
<td>2,087,229</td>
<td>133,156</td>
<td>265,000</td>
<td>127,370</td>
<td>92,000</td>
</tr>
<tr>
<td>Daily Passengers per KM</td>
<td>6,917.3</td>
<td>18,636.0</td>
<td>6,624.7</td>
<td>6,794.9</td>
<td>7,076.1</td>
<td>5,696.6</td>
</tr>
<tr>
<td>A. Daily system income - tickets (USD)</td>
<td>$48,875.00</td>
<td>$1,066,443.57</td>
<td>$68,658.56</td>
<td>$132,500.00</td>
<td>$78,298.88</td>
<td>$48,875.00</td>
</tr>
<tr>
<td>B. Technical Tariff (USD)</td>
<td>$0.85</td>
<td>$0.58</td>
<td>$0.54</td>
<td>$0.51</td>
<td>$0.45</td>
<td>$0.65</td>
</tr>
<tr>
<td>C. User Tariff (USD)</td>
<td>$0.53</td>
<td>$0.51</td>
<td>$0.52</td>
<td>$0.50</td>
<td>$0.44</td>
<td>$0.53</td>
</tr>
<tr>
<td>D. Annual Subsidy (USD)</td>
<td>$11,286,795.83</td>
<td>$51,014,240.83</td>
<td>$1,428,797.62</td>
<td>$663,487.33</td>
<td>$634,154.54</td>
<td>$4,146,169.90</td>
</tr>
<tr>
<td>Annual Subsidy as % of City GDP (%)</td>
<td>0.079%</td>
<td>0.055%</td>
<td>0.005%</td>
<td>0.002%</td>
<td>0.001%</td>
<td>0.077%</td>
</tr>
</tbody>
</table>
Lessons Learnt: Length of Contract

**Selected Bus Concession Contract**

<table>
<thead>
<tr>
<th>Location</th>
<th>Length Contract</th>
<th>Cost/Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bogota SITP</td>
<td>24</td>
<td>USD 2,85/km</td>
</tr>
<tr>
<td>Bogota Transmilenio (Phase1 &amp; 2)</td>
<td>10 (+add 3)</td>
<td>USD 3,42/km</td>
</tr>
<tr>
<td>Santiago (Trunk Operators)</td>
<td>12</td>
<td>USD 2,5/km</td>
</tr>
<tr>
<td>Santiago (Feeder)</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>London</td>
<td>8</td>
<td>--</td>
</tr>
</tbody>
</table>

Source: World Bank SITP Study (2013)

- Key driver in determining length of contract, is the time it will take the operator to recoup investment (i.e. fleet)
- Critical contract feature that determines the public sector’s ability to adjust, and move towards truly ‘competitive bidding’ process
Lessons Learnt: Be “aware” of the promise of financial sustainability

### Composition of the Technical Tariff – Selected Colombian Cities

<table>
<thead>
<tr>
<th></th>
<th>Bogotá</th>
<th>Barranquilla</th>
<th>Bucaramanga</th>
<th>Cali</th>
<th>Pereira</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Operators</strong> (1)</td>
<td>87.96%</td>
<td>68.6%</td>
<td>67.6%</td>
<td>68.0%</td>
<td>87.2%</td>
</tr>
<tr>
<td><strong>Fare Collection</strong></td>
<td>8%</td>
<td>6.0%</td>
<td>13.5%</td>
<td>13.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td><strong>BRT Agency</strong></td>
<td>4%</td>
<td>7.0%</td>
<td>6.85%</td>
<td>7.0%</td>
<td>3.5%</td>
</tr>
<tr>
<td><strong>Bus Scrapping</strong> (2)</td>
<td>--</td>
<td>9.4%</td>
<td>--</td>
<td>3.0%</td>
<td>--</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>--</td>
<td>9.0%</td>
<td>11.75%</td>
<td>3.0%</td>
<td>--</td>
</tr>
<tr>
<td><strong>Trust Agent</strong> (3)</td>
<td>0.04%</td>
<td>N/A</td>
<td>0.03%</td>
<td>N/A</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Transport Authority</strong></td>
<td>--</td>
<td>--</td>
<td>0.27%</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Contingency Fund</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6.0%</td>
<td>--</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Source: World Bank (2014)*

1. Tariff “scope creep” non-opex costs
2. Competitiveness of the bidding process
3. Contract duration
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Bogota’s poor face an affordability constraint—they devote more income to transport, make lower number of trips per day.

### % Individual Income devoted to Transport

- **Very Poor:** 17%
- **Poor:** 13%
- **Non-Poor:** 7%

### Number of Motorized Trips per Day

- **Very Poor:** 0.895
- **Poor:** 1.21
- **Non-Poor:** 2.01

Source: 2011 Bogota Mobility Survey. Definition of Very Poor, Poor and Non-Poor is based on % of residents with a SISBEN score of <35 in every transport zone. Figure is based on Bogotá Multi-Purpose Survey, 2014.
Proxy Means Testing for Targeting: SISBEN

- Proxy means tested System for Selecting Beneficiaries of Social Spending
- General objective: establish a technical, objective, equitable and uniform mechanism for selecting beneficiaries of social programs to be used by all government levels.
- Methodology updated every three years
- SISBEN III: allows each subsidy program to define its own cutting points based on the objectives of the program, and the characteristics of the population

Variables SISBEN III

**Health**
- Disability
- Adolescent fertility

**Education**
- School Attendance
- School Lag
- % Adults with incomplete high-school or less
- Functional analphabetism
- Child labor

**Housing**
- Water source
- Hook-up and exclusiveness of sanitary
- Waste disposal
- Floors
- Walls
- Overcrowding
- Fuel for cooking
- Type of housing unit

**Vulnerability**
- No. of people
- Type of hierarchy
- Demographic dependance rate
- Assets
- Infant mortality rate (municipal)
- Homicide R. (mun.)
- Net Education Coverage Rate (mun.)
- Use of health services when needed (mun.)
To targeted subsidies, Bogota leveraged increase use of Smartcards and improved methodologies for defining who is poor.

<table>
<thead>
<tr>
<th>Who?</th>
<th>What?</th>
<th>How?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proxy-Means tested using SISBÉN Database (Score 40 or less)</td>
<td>• All journeys in Bogota’s system – “Zonal” services and Phase 3* Trunk Services Trunk</td>
<td></td>
</tr>
<tr>
<td>• Self Selection</td>
<td>• # of subsidized segments: Fixed monthly number (40 trips)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• % of subsidy:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Fixed COP$ 900 (USD 0.3) discount:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 50% for Trunk (full cost: COP$1,800)</td>
<td>Tech</td>
</tr>
<tr>
<td></td>
<td>- 60% for Zonal (full cost: COP$1,500)</td>
<td>nology</td>
</tr>
<tr>
<td></td>
<td>- No transfer cost</td>
<td></td>
</tr>
<tr>
<td>*(due to non-existing coverage of TuLlave Smartcard in Phases 1 and 2 of Trunk System)</td>
<td></td>
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</tbody>
</table>

Funding: Annual City Budget

Technology
• Personalized Smartcard (Tu Llave)

Distribution Network
• Local Gov’t service centers
• Mobile Points of Sale (minivans)
• Partner w/ other social programs
• Mail Home delivery
Almost 160,000 new users of the public transport system due to the subsidy scheme

- Nearly 285,000 smartcards delivered with subsidy; almost 160,000 cards have been validated (134,000 new users, 26,000 existing users)
- Nearly US$2.5 million worth of discounts
What determines whether you obtain the public transport subsidy?

- At the individual level:
  - Women are more likely to obtain the subsidized card (10% greater probability)
  - The higher the level of education, the greater the likelihood of obtaining the subsidized card
- As family income increases, the probability of obtaining the subsidy decreases
- Workers have a higher probability of obtaining the card than students or individuals who stay at home.
- Word of mouth is important—likelihood of obtaining subsidy increases if someone in your neighborhood obtained it.
- Point of sales (card personalization spots) and proximity to bus stop do not appear to have an effect on obtaining the card.
Effect of the subsidy on the use of the Transit System

• The SISBEN subsidy recipients have an **increase in monthly trips of nearly 56%** when compared to normal fare card use.

• Subsidy helps overcome the lower frequency of daily-motorized travel among the poor.

• Increase in transfers might indicate that the users are learning how to take advantage of a multimodal system.

• **No significant effects on the total transport expenses** incurred by users being subsidize.
Labor Outcomes

- Significant effects were found only for in the case of hourly income of informal workers’ hourly income—an increase between 19% and 22% in their hourly compensation is estimated.

- No significant effects on employment status, access to education.

- Robustness: Sensitivity Analysis and Dif-in-Dif using continuous treatment variable confirmed previous results.

- Heterogeneous effects: The hourly income of informal workers is higher and significant for the case of employees (not independent)—these workers are more likely to have less flexible working hrs.