Targeted Subsidies in Public Transport: Combining Affordability with Financial Sustainability

Public transport systems have to balance financial sustainability with a need to provide affordable services, in particular to lower-income populations. In reality, meeting both goals is difficult, with transport systems either relying on high levels of subsidies or charging transit fares that are too expensive for the city’s poor. This note describes the opportunities associated with the use of targeted subsidies, which would allow operators to set prices at a level needed for cost recovery, while ensuring that services remain affordable for carefully targeted beneficiaries. Today, a new generation of targeted subsidies can take advantage of the increased use of electronic fare systems and “smartcards,” as well as sophisticated methodologies for defining who is poor and needs support. Key aspects related to the design and implementation of targeted subsidy schemes are (i) defining who needs the support, (ii) understanding how people travel, (iii) analyzing the impacts of the new scheme in terms of both financial sustainability and accessibility, and (iv) avoiding fraud and unintended consequences. Based on recent experiences with World Bank projects in Buenos Aires, Bogotá, and other Latin American cities, this note presents some early experiences and a five-step framework for cities to get started.

Introduction – A New Generation of Targeted Subsidies

Public transport is an important mode of transport, especially for low-income populations. Cities, however, struggle to provide public transport services for fees that are both affordable and financially sustainable. As a result, some city’s transport systems use low fare levels (examples are Buenos Aires or the Mexico City subway), which require high levels of public subsidy. Other cities use higher and thus more sustainable fares, but risk excluding people from the transport services. The latter is the case in Bogotá, Colombia, where fares for its Transmilenio Bus Rapid Transit (BRT) system are set high, at cost-recovery levels, which are unaffordable for part of the city population.

To balance the needs for economic and social sustainability, in general cities have tried setting fares for cost-recovery, but then offering targeted subsidies for specific segments of the population. These subsidies, however, have not always lead to the intended results because of difficulties with accurately identifying the target population (especially if not employed in the formal sector), potential abuse of the subsidy, and large errors of both exclusion or inclusion of the target population (Box 1).

Building on the experiences of these “first generation” subsidies, which were still rather broad, more advanced targeted subsidy schemes can be developed by bringing in sophisticated methodologies for defining and targeting beneficiary populations, as well as modern electronic fare systems. In particular the use of smartcards has opened up the opportunity to structure subsidies that target demand rather than supply: smart cards can be personalized and subsidies delivered via smartcard can take on different structures, such as a flat amount or differential discounts depending on the characteristics of individual trips, such as by time of day or type of route.
With targeted subsidies, transport fares can be set at cost-recovery levels, while specific subsidies are provided to those who need it most. The following segments highlight some of the key aspects associated with the design and implementation of such targeted subsidy schemes.

Using Existing Methodologies to Determine the Target Population

Many city or national governments already use sophisticated methodologies and tools to define and identify the low-income and poor populations that need support; these same instruments can support the introduction of targeted subsidies. In Latin America, Brazil, Colombia, and Mexico, among others, use national targeting systems that encompass several socio-economic indicators—such as household demographic composition, education, employment, income, possession of goods and assets, and dwelling characteristics—to categorize potential beneficiaries of social programs. Conditional cash transfer programs, such as Bolsa Familia and related programs in Brazil, the Familias en Accion program in Colombia, the Asignación Universal por hijo program in Argentina, and the Oportunidades program in Mexico, have already leveraged these poverty targeting instruments to reach potential beneficiaries and provide a broad analytical basis for the use of these instruments to develop targeted transport subsidies. In Bogotá, implementation of its latest transport subsidy program is based directly on experiences with other poverty targeting initiatives and the national poverty targeting database (Box 2).

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**Box 1. Lessons from “first generation” subsidy programs**

Several types of subsidies have been used to support low-income users of public transport. While well-intended, the subsidies provided through these “first generation” subsidy programs do not always reach the target audience and may even have unintended outcomes. The following are four types of subsidy programs and lessons that have been learned from their implementation:

- **Vale-Transporte.** This subsidy program in Brazil caps commuting expenses for workers in the formal economy to 6% of their wages, with employers paying for the rest as a tax-deductible expense. This makes formal workers somewhat immune to higher transit tariffs, while providing no relief to workers in the informal sector (who constitute about 57% of the labor force nationwide).

- **Cable cars (telefericos) and feeder lines.** Teleferico services in Rio de Janeiro (Brazil) and Medellin (Colombia) provide free transport to and from certain poorer neighborhoods using cable cars. In Bogotá (Colombia), free “feeder lines” connect certain neighborhoods to the city’s Transmilenio BRT system. While providing free services to poorer neighborhoods increases access, this kind of subsidy has significant exclusion errors in that it excludes a large number of low-income households living elsewhere in the city. The subsidy may also exacerbate a city’s already existing spatial segregation.

- **The Bilete Unico system of subsidized transfers.** The Bilete Unico system in Rio de Janeiro and Sao Paulo, Brazil, uses a card to cap the fare for multi-modal trips. The program basically subsidizes transfers, which (in an urban structure with most of the poor living in the city’s periphery and often needing to transfer) indeed overwhelmingly supports low-income households. It however also reinforces tendencies for urban sprawl and is characterized by errors of inclusion.

- **Subsidized fares for the elderly, students, war veterans, and other categories.** While an important way to improve transport access for target groups, this kind of subsidy suffers from both inclusion and exclusion errors: many poor might not fall into one of these categories and people who do may not be poor.
Understanding Current and Expected Travel Patterns

An important part of a successfully designed subsidy program is understanding how mobility constraints and poverty are interacting and how people, in particular the target population, currently travel and will likely travel under a subsidy scheme.

Answering these basic questions, however, is not easy, as a significant mismatch exists between available data on travel patterns and data on poverty. While many cities collect travel survey data as part of their broader transport planning process, most of these surveys do not include good information on poverty. Likewise, poverty surveys rarely collect mobility data. Colombia’s national targeting system, SISBEN, for example uses several socio-economic indicators to categorize potential beneficiaries, but it does not collect data on the travel patterns of potential beneficiaries. Specific surveys might be needed, with the type of survey depending on the particular situation. In systems where a targeted subsidy scheme is expected to attract new riders (such as in Bogotá where currently the low-income population has limited access to affordable transport), a sample of potential beneficiaries may be surveyed. These potential beneficiaries could be identified using a broader poverty targeting instrument, such as the SISBEN. In systems where fares are currently low and the concern is how to protect the poor from a general fare increase, surveys could focus more on existing riders, to identify the intended beneficiary population.

Box 2. Pro-poor public transit subsidy in Bogotá

In February 2014, the District of Bogotá in Colombia rolled-out a “pro-poor” transport subsidy program, based on recent technical assistance provided by the World Bank. The program builds on two key aspects: (i) the progressive adoption of electronic fare media (smart cards) in Bogotá’s public transit systems, and (ii) national experience with other poverty targeting initiatives, such as conditional cash transfer programs, that use the country’s poverty targeting system and database (the Sistema Nacional de Selección de Beneficiarios or SISBEN). Beneficiaries, defined as “SISBEN 1 and 2 users” can receive a public transit subsidy effectively amounting to a 40% discounted fare capped at 21 trips per month.

To be eligible for the subsidy, users need to be registered in the SISBEN database and hold a public transit smartcard with sufficient credit on the card. The use of the card is intended to avoid abuse of the subsidy, while also allowing subsidies to target demand rather than supply. To obtain the card, potential beneficiaries can register online or visit a city service center. Once their ID is validated against the SISBEN database, the beneficiary receives the smartcard in about three business days.

Assessing Impacts of a New Subsidy Scheme: Affordability and Financial Sustainability

Different kinds of subsidy schemes exist (including also the “first generation” schemes from Box 1) and which one fits best depends on the characteristics of the city population, the transport system, and transit users, as well as on political decisions related to the available resources and size of the target populations. A systematic comparison of alternative subsidy schemes, covering both affordability benefits to the target population and financial objectives for the transport system, can provide a sound basis for discussion and decision making.

Impact on the Target Population: Comparing Efficiency and Effectiveness

Table 1 presents an example comparison of two subsidy schemes. The comparison addresses the efficiency of the scheme, in terms of targeting the right population (considering both errors of in- and exclusion), as well as effectiveness (share of total subsidy obtained by the poor, the transport affordability index), and financial impact (subsidy as share of total revenue).

In general, the goal should be to minimize the subsidy’s errors of inclusion and exclusion to ensure the subsidy reaches the intended audience. If a scheme, for example, can only be accessed by the targeted beneficiaries, no inclusion error exists, while a general fare subsidy has a high inclusion error. Similarly, a scheme that covers all the poor in a metropolitan area has no exclusion error, but a geographically focused subsidy does. When two systems both have an error of inclusion, the percentage of subsidy obtained by the poor may help differentiate between the two.

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Note: [1] For Buenos Aires, the proposed fare structure reflects an increase in the general fare with a reduced fare for card-holders of identified ‘categories’ (elderly, students, household workers, unemployed). The poor/intended beneficiaries are defined as the poorest quintile of households; [2] In Bogota, the proposed fare structure reflects the structure actually implemented by Bogota (see Box 2). The intended beneficiaries are households with a SISBEN score below 100. For budget reasons, however, the subsidy has been extended only to a section of this population with SISBEN scores below 40, excluding those who have a car, are younger than 16 years old and have another type of public transit subsidy (disabled or old age). SISBEN is recognized as only an approximate measure to identify potential beneficiaries of social programs in Bogota and is being continuously and incrementally improved. Indicator was only calculated for trips taken in zonal buses of the SITP, does not include trips in trunk corridors. With proposed subsidy, indicator decreased from 8.2% to 7.1%.

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Table 1. Example comparison of fare structures using indicators to measure the effectiveness of alternative tariff schemes

<table>
<thead>
<tr>
<th></th>
<th>Proposed ‘optimal’ structure for greater Buenos Aires¹</th>
<th>Proposed structure in Bogota²</th>
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</thead>
<tbody>
<tr>
<td>Errors of exclusion (% intended beneficiaries left out)</td>
<td>13.6%</td>
<td>68%</td>
</tr>
<tr>
<td>Errors of inclusion (% beneficiaries that are unintended)</td>
<td>19.8%</td>
<td>0%</td>
</tr>
<tr>
<td>Share of total subsidy obtained by the intended beneficiaries</td>
<td>35.1%</td>
<td>100%</td>
</tr>
<tr>
<td>Public transport affordability index for the intended beneficiaries</td>
<td>9.5%</td>
<td>7.1%*</td>
</tr>
<tr>
<td>Public transport affordability index for the population as a whole</td>
<td>6.4%</td>
<td>NA</td>
</tr>
<tr>
<td>Subsidy as share of total operator revenue</td>
<td>1.6%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

Source: CIPPEC 2013 and Dahlberg 2013.

Notes:
[1] For Buenos Aires, the proposed fare structure reflects an increase in the general fare with a reduced fare for card-holders of identified ‘categories’ (elderly, students, household workers, unemployed). The poor/intended beneficiaries are defined as the poorest quintile of households.
[2] In Bogota, the proposed fare structure reflects the structure actually implemented by Bogota (see Box 2). The intended beneficiaries are households with a SISBEN score below 100. For budget reasons, however, the subsidy has been extended only to a section of this population with SISBEN scores below 40, excluding those who have a car, are younger than 16 years old and have another type of public transit subsidy (disabled or old age). SISBEN is recognized as only an approximate measure to identify potential beneficiaries of social programs in Bogota and is being continuously and incrementally improved. Indicator was only calculated for trips taken in zonal buses of the SITP, does not include trips in trunk corridors. With proposed subsidy, indicator decreased from 8.2% to 7.1%.
The fare affordability index (see Box 3) is a measure of the financial impact of a standard basket of transit trips and a good indication of the affordability the subsidy scheme really provides. The last comparison, the subsidy as share of total operator revenue, is a measure of the financial affordability of the subsidy scheme (further discussed in the next section).

Financial Impacts: Comparing System Impacts and Financial Implications
Assessing the financial sustainability of different subsidy schemes is a critical part of the planning and design process. The main objective would be to determine the implications of the new subsidy scheme on overall ridership, system revenues, operating costs, and other conditions of the public transport system.

Box 3. Using the Fare Affordability Index
While the final scale and scope of a subsidy program may well be a political decision based on a city’s financial situation and other objectives, certain tools and indices can help structure the conversation on who should receive funding and how much. An example of this is the use of a fare affordability index to measure the financial impact of a standard basket of transit trips (say 45 trips a month for each member of the household) on a specific segment of the population. The financial impact (the public transit expense) is often measured as a percentage of household income. Figure B3.1 illustrates this approach for Buenos Aires, where the affordability of public transport was measured for the average population and families in the lowest income quintile.

Figure B3.1. Affordability of public transport in Buenos Aires 2003-2013

- For the typical household in Buenos Aires, expenditure in public transport as a share of total income decreased from 8.4% in 2003 to 2.4% in 2012; and
- For the average household in income quintile 1, expenditure in public transport as a share of total income fell from 43.1% in 2003 to 11.2% in 2013.

Source: CIPPEC 2013

While a helpful approach, it is important to note that there is no accepted normative manner to determine what share of income spent on transport would be considered unaffordable for a family. Affordability will depend on the alternatives (how practical are walking and cycling as alternatives to public transport) and other costs of living, including housing. Housing decisions in particular have a large impact, as many cities present a trade-off between high-accessibility (in the city center) and better quality housing (in the metropolitan periphery). Despite these limitations, use of the affordability index can still provide a structure to help policy makers understand and articulate different levels of subsidy in a structured manner. In the case of Buenos Aires, the understanding of affordability levels at different periods of time helped to illustrate that fares could be increased considerably and still achieve the levels of affordability (measured by the share of income the poorest quintile spent on a basket of travel) that existed a decade ago.
The total revenue impact, for example, is a combination of the additional revenue obtained from new trips taken by beneficiaries, the foregone revenue resulting from subsidizing beneficiaries that are currently using the system, and any additional costs incurred by operators from increasing service supply to cater to new trips (Box 4).

Determining the impact of changes in fare prices on ridership, however, is complicated, as almost no empirical data exists on the response of the target population to significant changes in fare levels, in particular reductions in fares. Moreover, most empirical estimates of fare elasticity are valid only for small changes in fare levels; for systems with low current fares, the range of fares under consideration may well be significantly larger and also well outside the validity within which existing estimates of fare elasticity are valid.

In the case of Bogotá, information on the fare elasticity for different beneficiary groups (those currently using the integrated new SITP system; those using the traditional public transit system; and those currently not able to afford public transport) was needed to assess the impact of the subsidy scheme on system revenues, costs, and operating conditions (see Box 4). Because only limited data was available about the way they would react to changes in fares (either by increasing or decreasing certain trips or changing modes of transport), simple correlations were estimated using the city’s mobility survey to get a sense of the direction and magnitude of their response to fare price changes, which was then followed by a price elasticity analysis using seven years of data from smart card swipes and user entries at different Transmilenio stations in one of Bogotá’s poorest neighborhoods, Usme. This time series included 2012, when Transmilenio

**Box 4. Assessing the effect of a targeted demand subsidy in Bogotá’s SITP**

Bogotá is currently implementing its Integrated Public Transport System (SITP), which will integrate (under a single fare, operation, and infrastructure) all its Transmilenio’s BRT corridors with the traditional bus system. The SITP is set up with the same type of competitive concession arrangements for service provision that were implemented under Transmilenio, which means fares are set at cost recovery levels to pay for service provided by all agents in the system, including the cost for the bus operators, fare collectors, trust agent, and costs for managing the system. Against this backdrop, the design of a targeted subsidy scheme required carrying out an assessment of the scheme’s potential impact on Transmilenio and SITP system conditions (operating revenues, costs, and operational constraints) under the current contractual arrangements of the SITP.

As shown in figure B4.1, the analysis suggested three linked outcomes of the implementation of the planned subsidy scheme: (i) partial revenue would be foregone for about 650,000 trips (about 4.9 percent of ridership) currently made by the intended beneficiaries annually who pay full fare; (ii) additional revenue would be generated by 110,000 new trips a year, as a result of subsidy beneficiaries making more trips, adding 0.8% to ridership and revenue annually; and (iii) these additional revenues from new trips would require additional system capacity, leading to new costs—additional cost/fleet and cost/km logged—roughly equivalent (and thus canceling out) the additional revenue. These effects are a direct result of the fare elasticity of different beneficiary cohorts.

![Figure B4.1. Evaluating financial and operational impacts: Impact of a 30% face discount for the poor in Bogotá](image-url)

**Figure B4.1. Evaluating financial and operational impacts: Impact of a 30% face discount for the poor in Bogotá**
applied a differential fare scheme that provided rebates for off-peak travel. All in all, the result of these different methodological approaches pointed to the fact that price elasticity for potentially poor beneficiaries was rather low.

Finally, in terms of financial impacts and system comparison, attention also has to be paid to funding sources of a subsidy scheme, which ideally would not come from the public transport revenue, to not put further financial strains on the system. One viable option is generating cross-subsidies from private vehicle users (parking charges, congestion pricing, and fines) to public transit users and then using those funds to improve public transit systems and financing targeted subsidy schemes.

**Implementation Specifics: Considering Abuse and Incentives**

The last key aspects related to the design and implementation of a targeted subsidy scheme involve the consideration of unintended consequences, leakage, and abuse. In terms of leakage and abuse, the main goal is to ensure only individuals eligible for the subsidy can take advantage of it. To avoid abuse, different technologies may be implemented, such as biometric identification (Box 5). In addition, the process to obtain the subsidy (for example in the form of a transit card), may be designed to limit abuse. In Bogotá, for example, potential beneficiaries have to demonstrate eligibility for the subsidy by presenting their identification, which is validated against the SISBEN registry. The card also has to be picked up in person.

Bogotá is also considering including a photo of the subsidy holder on the smartcard, combined with random checks at stations to further discourage abuse.

As for the unintended consequences, targeted subsidy schemes—like almost any other public policy scheme—may have unanticipated
impacts as a result of the incentives it creates for different stakeholders. Already at the design stage, the influence of the subsidy scheme on land use patterns and the competitiveness of transit fares (both related to user incentives) should be considered, along with operator incentives.

The subsidy schemes in Brazilian cities, such as the flat fares, the vale-transporte, and Bilete Unico, for example do not pass the costs of long trips on to users, which has arguably been one of the factors contributing to metropolitan sprawl in Brazil’s big urban centers. In addition, as a fare strategy, it is important to ensure that transit remains competitive with autos, motorcycles, and taxis, and is able to attract trip-makers who have a choice. Because externalities related to congestion, air pollution, CO2 emissions, and crashes associated with private vehicle travel are borne by all metropolitan area residents, it is generally considered acceptable to use general taxation revenues to complement fare-revenues to keep fares at competitive levels and offer quality services that attract trip-makers.

Finally, operator incentives should be carefully assessed to make sure subsidies are not captured by the operators. This may be the case in situations where the operator has no strong incentives for efficiency, for example when contracts are not subject to open competition.

There is some perception that this has been the case with the vale-transporte in Brazil, where historically routes have not been competitively tendered in a transparent and open manner. The vale-transporte reduced what can often be a healthy tension between passengers and suppliers to limit costs and there is a perception among some experts that this interplay of strong incumbents, ‘lazy’ tariff-setting, and indifferent formal sector riders is responsible for up to 30 percent inflation in bus system costs in Brazilian cities.

**In Summary: A Five-Step Framework for Designing and Implementing a Targeted Subsidy Program**

The two recent World Bank supported analyses in Buenos Aires and Bogotá have helped identify several key aspects of implementation—described in previous sections, which are the basis of the five-step framework presented in Box 6. Targeted subsidies present a solution to the dilemma of affordable prices and financial sustainability. With increasing pressures for cities to achieve both—and facilitated by sophisticated poverty analysis tools and smart cards—the design and implementation of targeted subsidy schemes is not only possible, but an affordable and smart way to use city resources.

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**Box 6. A framework for designing and implementing a targeted transport subsidy program**

Building on recent World Bank experiences in Bogotá and Buenos Aires, the following framework for design and implementation of targeted subsidies was identified.

- **Understanding Beneficiary Travel Patterns**
  - Use existing databases to identify and target low-income households.
  - Survey current transport users as well as beneficiaries currently not using the system.

- **Identifying Who to Subsidize and How Much**
  - Use the affordability index and other tools to guide political decisions about who to fund and how much.

- **Comparing Alternative Subsidy Schemes**
  - Compare in- and exclusion errors; share of subsidy reaching intended beneficiaries; Fare Affordability Index levels and other measures; and aggregate financial impact.

- **Considering System Conditions and Financial Implications**
  - Estimate impacts on system conditions, overall ridership, revenues, and operating costs.

- **Planning for Implementation**
  - Minimize leaking and abuse by using smartcards, ICT tools, and administrative processes.
  - Consider user and operator incentives.
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